



**VIGNANA BHARATHI**®  
Institute of Technology

(A UGC Autonomous Institution, Approved by AICTE, Accredited by NBA & NAAC-A Grade, Affiliated to JNTUH)

Aushapur (V), Ghatkesar (M), Medchal – Dist. Telangana State – 501 301.

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**DEPARTMENT  
OF  
ELECTRONICS AND COMMUNICATION ENGINEERING**

**R22 B.TECH. ECE**

**ACADEMIC YEAR: 2023-24**

**I B.TECH (ECE)  
COURSE STRUCTURE  
&  
SYLLABUS**



**B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING**  
**EFFECTIVE FROM ACADEMIC YEAR 2023 - 24 ADMITTED BATCH**

**R22 COURSE STRUCTURE AND SYLLABUS**

**I YEAR I – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1.	22BS1111	Matrices and Calculus	3	1	0	4
2.	22BS1113	Applied Physics	3	1	0	4
3.	22CS1115	C Programming for Engineers	3	0	0	3
4.	22ME1156	Engineering Workshop	0	1	3	2.5
5.	22HS1112	English for Skill Enhancement	2	0	0	2
6.	22EC1155	Elements of Electronics and Communication Engineering	0	0	2	1
7.	22BS1153	Applied Physics Laboratory	0	0	3	1.5
8.	22CS1155	C Programming for Engineers Laboratory	0	0	2	1
9.	22HS1152	English Language and Communication Skills Laboratory	0	0	2	1
10.	22MC0002	Environmental Science	3	0	0	0
11.	22MC0001	Induction Program				
		<b>Total</b>	<b>14</b>	<b>3</b>	<b>12</b>	<b>20</b>

**I YEAR II – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1.	22BS1211	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	22BS1212	Engineering Chemistry	3	1	0	4
3.	22ME1255	Computer Aided Engineering Graphics	1	0	4	3
4.	22EE1214	Basic Electrical Engineering	2	0	0	2
5.	22EC1215	Electronic Devices and Circuits	2	0	0	2
6.	22CS1253	Applied Python Programming Laboratory	0	1	2	2
7.	22BS1252	Engineering Chemistry Laboratory	0	0	2	1
8.	22EE1254	Basic Electrical Engineering Laboratory	0	0	2	1
9.	22EC1255	Electronic Devices and Circuits Laboratory	0	0	2	1
		<b>Total</b>	<b>11</b>	<b>3</b>	<b>12</b>	<b>20</b>



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**R22 B.Tech**

**ECE**

**2023-2024**

**I Year – I Semester**



## 22BS1111-MATRICES AND CALCULUS

**I B Tech. I Semester**

**L T P C**  
**3 1 - 4**

**Prerequisite(s):** Mathematical knowledge at Pre university level.

**Course Objectives:** Develop ability to learn the concept of

1. Rank of the matrix and apply the same to know the consistency for the linear system of equations.
2. Eigen values and Eigen vectors to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems, Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and Finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

**Course Outcomes:** After successful completion of this course, the student should be able to

1. Write the matrix representation of a set of linear equations, find the rank and apply the same to analyse the solution of the system of equations.
2. Reduce the quadratic form to canonical form using orthogonal transformations by finding Eigenvalues and Eigen vectors.
3. Solve the applications on the mean value theorems, Evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints using partial differentiation.
5. Evaluate the multiple integrals and apply the concept to find areas and volumes.

### UNIT - I: MATRICES

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

### UNIT - II: EIGEN VALUES AND EIGEN VECTORS

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### UNIT - III: CALCULUS

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proof). Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates for known curves (circle, parabola, ellipse), Definition of Improper Integral: Beta and Gamma functions and their applications.

### UNIT - IV: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and



three variables using method of Lagrange multipliers.

**UNIT-V: MULTIVARIABLE CALCULUS (INTEGRATION)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form for known curves (circle, parabola, ellipse), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

**REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



**22BS1113- APPLIED PHYSICS**

**I B Tech. I Semester**

**L T P C**  
**3 1 0 4**

**Course Objectives:**

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibers.

**Course Outcomes:**

At the end of the course the student will be able to:

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic and energy materials for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

**UNIT - I: QUANTUM PHYSICS AND SOLIDS**

**Quantum Mechanics:** Introduction to quantum physics, blackbody radiation, Wein's and Rayleigh-Jean's law, Planck's radiation law (Qualitative) - photoelectric effect de-Broglie hypothesis and matter waves- Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

**Solids:** Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative) Bloch's theorem - Kronig-Penney model (Qualitative) origin of energy bands- classification of solids.

**UNIT - II: SEMICONDUCTORS AND DEVICES**

Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)–LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

**UNIT - III: DIELECTRIC, AND MAGNETIC AND ENERGY MATERIALS**

**Dielectric Materials:** Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials.

**Magnetic Materials:** Basic definitions – classification of Magnetic materials – Domain theory of ferromagnetism in hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance.



**Energy Materials:** Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors.

#### **UNIT - IV: NANOTECHNOLOGY**

Nanoscale, quantum confinement, surface to volume ratio, **bottom-up fabrication:** sol-gel, precipitation, combustion methods – **top-down fabrication:** ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nanomaterials.

#### **UNIT - V: LASER AND FIBER OPTICS**

**Lasers:** Laser beam characteristics-three quantum processes-Einstein coefficients and their relations-lasing action - pumping methods, CO<sub>2</sub> laser, Nd: YAG laser- semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

#### **TEXT BOOKS:**

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.

#### **REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.



**22CS1115- C PROGRAMMING FOR ENGINEERS**

**I B Tech. I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

1. To learn the fundamentals of computers.
2. To understand the various steps in Program development.
3. To learn the syntax and semantics of C Programming Language.
4. To learn how to use arrays and pointers to solve problems.
5. To learn the usage of structured programming approach in solving problems.

**Course Outcomes:** Upon completing this course, the students will be able to

1. Draw flowcharts for solving arithmetic and logical problems
2. Develop modular reusable code by understanding concepts of functions.
3. Formulate algorithms and programs using arrays, pointers, strings and structures.
4. Able to develop applications on Files
5. Write a programs using Searching and sorting algorithms

**UNIT- I: INTRODUCTION TO COMPUTER ALGORITHMS AND PROGRAMMING**

**Components of a computer system:** Memory, processor, I/O devices, storage, operating system, the concept of assembler, compiler, interpreter, loader, and linker.

**From algorithm to program:** Representation of an algorithm, flowchart, Pseudocode with examples, converting algorithms to programs.

**Programming Basics:** Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object, and executable code. Components of C language, standard I/O in C, data types, variables and constants, memory storage, and storage classes.

**UNIT – II: EXPRESSIONS AND STATEMENTS**

**Expressions and their evaluation:** Operands and Operators, formation of expressions using arithmetic, relational, logical, and bitwise operators, precedence and associativity rules, mixed operands, type conversion, and evaluation of expressions.

**Statements:** Simple and compound statements, Conditional Branching: if and switch statements, nested if-else, dangling else problem, use of break and default with switch. Iteration and loops: use of while, do-while and for loops, nested loops, use of break and continue statements.

**UNIT – III: FUNCTIONS AND ARRAYS**

**Designing Structured Programs:** Introduction to functions, advantages of modularizing a program into functions, types of functions, passing parameters to functions: call by value; call by reference, passing arrays to functions, recursion with example programs.

**Arrays:** Array notation and representation, manipulating array elements, using multi-dimensional arrays, character arrays.

**C strings:** string input/output functions, Array of strings, string manipulation functions with example programs.

**UNIT – IV: POINTERS AND FILE HANDLING**

**Pointers:** Introduction, declaration of pointer, pointer arithmetic, void pointer, applications, dynamic memory allocation (malloc(), calloc(), realloc(), free()), use of pointers in self-referential structures.

**File handling:** File I/O functions, standard C pre-processors, defining and calling macros, command-





line arguments.

**UNIT – V: DERIVED TYPES AND BASIC ALGORITHMS:**

**Structures, Union, Enums and Bit-fields:** Defining, declaring, and usage of structures, unions, and their arrays, passing structures, and unions to functions, introduction to enums and bit-fields.

**Basic Algorithms:** Searching ((linear and binary search techniques) and Sorting Algorithms (Bubble, Insertion, and Selection), finding roots of equations.

**TEXT BOOKS:**

1. B. A. Forouzan and R. F. Gilberg -Programming & Data Structures, 3<sup>rd</sup> Ed., Cengage Learning`
2. Byron Gottfried - Schaum's Outline of Programming with C, McGraw-Hill

**REFERENCE BOOKS:**

1. Ajay Mittal - Programming in C: A practical approach, Pearson Education, 2010
2. Kernighan Brian W. and Ritchie Dennis M.- The C programming, Pearson Education.
3. J. R. Hanlyand, E. B. Koffman -Problem Solving and Program Design, 5<sup>th</sup> Ed., Pearson Education.
4. H. Cheng - C for Engineers and Scientists, McGraw-Hill International Edition
5. V. Rajaraman - Computer Basics and C Programming, PHI Learning, 2015.

R22-B.TECH  
ECE



**Pre-requisites:** Practical skill

**Course Objectives:**

1. To Study about different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

**Course Outcomes:** At the end of the course, the student will be able to:

1. CO1: Study and practice on machine tools and their operations
2. CO2: Practice on manufacturing of components using work shop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO4: Apply basic electrical engineering knowledge for house wiring practice.
5. CO 5: Study and Practice of arc welding process

**1. TRADES FOR EXERCISES:**

**At least two exercises from each trade:**

1. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
2. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
3. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
4. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
5. Welding Practice – (Arc Welding & Gas Welding)
6. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
7. Black Smithy – (Round to Square, Fan Hook and S-Hook)

**2. TRADES FOR DEMONSTRATION & EXPOSURE:**

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and WoodWorking

**TEXT BOOKS:**

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

**REFERENCE BOOKS:**

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

**22HS1112- ENGLISH FOR SKILL ENHANCEMENT**

**I B Tech. I Semester**

**L T P C**



**Course Objectives:** This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Learn remedial and functional grammar related to various grammar items.
4. Prepare the students for examinations such as IELTS and TOEFL by sharpening their reading and writing skills
5. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:** Students will be able to:

1. Use a wide range of vocabulary and sentence structures and also acquire basic proficiency in reading and writing modules of English.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

### UNIT-I

Chapter entitled '*Toasted English*' by **R.K. Narayan** from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** The Concept of Word Formation – The Use of Prefixes and Suffixes-Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance – Techniques for Effective Reading.

**Writing:** Sentence Structures – Use of Phrases and Clauses in Sentences –Importance of Proper Punctuation – Techniques for Writing precisely – Paragraph Writing –Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

### UNIT-II

Chapter entitled '*Appro JRD*' by **Sudha Murthy** from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

**Writing:** Nature and Style of Writing - Defining/Describing People, Objects, Places and Events Classifying – Providing Examples or Evidence.

### UNIT-III

Chapter entitled '*Lessons from Online Learning*' by **F.Haider Alvi, Deborah Hurstetal** from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Confused – Words from Foreign Languages and their Use in English.



**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

**Writing:** Format of a Formal Letter – Writing Formal Letters e.g. Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

#### UNIT-IV

Chapter entitled ‘**Art and Literature**’ by **Abdul Kalam** from “**English: Language, Context and Culture**” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Exercises for Practice

**Writing:** Writing Practices – Essay Writing – Writing Introduction and Conclusion – Précis Writing.

#### UNIT-V

Chapter entitled ‘**Go, Kiss the World**’ by **Subroto Bagchi** from “**English: Language, Context and Culture**” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Technical Vocabulary and their Usage

**Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

**Reading:** Reading Comprehension – Exercises for Practice

**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats - Structure of Reports (Manuscript Format) - Types of Reports - Writing a Report.

**Note:** Listening and Speaking Skills which are given under Unit -6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- **Note: 1.** As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is Open-ended*, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- **Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

#### TEXTBOOK:

1. “English: Language, Context and Culture” by Orient Black Swan Pvt. Ltd, Hyderabad.2022. Print.

#### REFERENCEBOOKS:

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction,1,2,3. Cambridge University Press
3. Wood, F. T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2<sup>nd</sup> ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.



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6. Vishwamohan, Aysha.(2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

R22-B.TECH-  
ECE



**22EC1155 - ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**B.Tech. I Year I Sem.**

L	T	P	C
0	0	2	1

**Course Objectives:**

1. To introduce different active and passive components.
2. To familiarize various measuring instruments.
3. To be aware of the usage of electronic equipment.
4. To introduce the concepts of Analog and Digital ICs.
5. To have the knowledge of the supported software for various applications.

**Course outcomes:** Students will be able to:

1. Identify the different components used for electronics applications
2. Measure different parameters using various measuring instruments
3. Distinguish various signal used for analog and digital communications.
4. Acquire the knowledge of various software tools for electronics and communication applications.
5. Know the functionality and importance of various generating and display equipments.

**List of Experiments:**

1. Understand the significance of Electronics and communications subjects
2. Identify the different passive and active components
3. Color code of resistors, finding the types and values of capacitors
4. Measure the voltage and current using voltmeter and ammeter
5. Measure the voltage, current with Multimeter and study the other measurements using Multimeter
6. Study the CRO and measure the frequency and phase of given signal
7. Draw the various Lissajous figures using CRO
8. Study the function generator for various signal generations
9. Study of Spectrum analyzer and measure the spectrum
10. Operate Regulated power supply for different supply voltages
11. Study the various gates module and write down the truth table of them
12. Identify various Digital and Analog ICs
13. Observe the various types of modulated signals.
14. Know the available Softwares for Electronics and communication applications



**22BS1153 - APPLIED PHYSICS LABORATORY**

**B.Tech. I Year I Sem.**

**L T P C**  
**0 0 3 1.5**

**Course Objectives:**

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Understand the method of least square fitting
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Study the behavior of passive components.

**Course Outcomes:**

The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Carried out data analysis
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Learn the characteristics of passive components like L, C and R and their applications.

**LIST OF EXPERIMENTS:**

1. Understanding the method of least squares – torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. Characteristics of series and parallel LCR circuits.
5. V-I characteristics of a p-n junction diode and Zener diode
6. Input and output characteristics of BJT (CE, CB & CC configurations)
7. a). V-I and L-I characteristics of light emitting diode (LED)  
b). V-I characteristics of a Laser diode
8. V-I Characteristics of solar cell
9. a). Determination of the beam divergence of the given LASER beam  
b). Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. Determination of Energy gap of a semiconductor.
11. Determination of time constant of RC Circuit.
12. Study B-H curve of a magnetic material.

*Note: Any 8 experiments are to be performed.*

**REFERENCE BOOK:**

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.



**22CS1155 - C PROGRAMMING FOR ENGINEERS LABORATORY**

**B.Tech. I Year I Sem.**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

1. To learn C-language Programs using the data types, input/ output statements and control statements.
2. Describe the importance of modular programming and arrays using C-Language Program.
3. Understand the concept and use of pointers for memory management techniques
4. Understand structure, union, and enumerated types.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams.

**Course Outcomes:**

1. Ability to design and test programs to solve mathematical and scientific problems.
2. Ability to write structured programs using control structures and functions.
3. Able to Implement C programs using arrays & pointers.
4. Able to Use the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Able to execute programs that read and write text, binary files using the formatting and character I/O functions.

**List of Experiments:**

**WEEK-1:**

- a. Write a C program to find simple interest and compound interest.
- b. Write a C program to convert Celsius to Fahrenheit.
- c. Write a C Program to swap two numbers.
- d. Write a C program to perform all arithmetic operations (+, -, \*, /, %).
- e. Write a simple program that prints the results of all the operators available in C (Including pre/ post increment, bitwise and/or/not, etc.). Read required operand Values from standard input.

**WEEK-2:**

- a. Write a C program to find the sum of individual digits of a positive integer.
- b. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
- c. Write a C program to generate the first n terms of the sequence.

**WEEK-3:**

- a. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- b. Write a C program to find the roots of a quadratic equation.

**WEEK-4:**

- a. Write a C program to find the factorial of a given integer.
- b. Write a C program to find the GCD (greatest common divisor) of two given integers.

**WEEK-5:**

- a. Write a C program to solve Towers of Hanoi problem.
- b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch





Statement).

**WEEK-6:**

- a. Write a C program to find both the largest and smallest number in a list of integers.
- b. Write a C program that uses functions to perform the following:
  - i) Addition of Two Matrices
  - ii) Multiplication of Two Matrices

**WEEK-7:**

Write a C program that uses functions to perform the following operations:

- i) To insert a sub-string in to a given main string from a given position.
- ii) To delete n Characters from a given position in a given string.

**WEEK-8:**

- a. Write a C program to determine if the given string is a palindrome or not.
- b. Write a C program that displays the position or index in the string S where the string T begins, or - 1 if S doesn't contain T.

**WEEK-9:**

- a. Write a C program to count the lines, words and characters in a given text.
- b. Write a C program to generate Pascal's triangle.
- c. Write a C program to construct a pyramid of numbers

**WEEK-10:**

- a. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:  $1+x+x^2+x^3+\dots+x^n$   
For example: if n is 3 and x is 5, then the program computes  $1+5+25+125$ . Print sum and Perform error checking.  
For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if  $n < 0$ , then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.
- b. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

**WEEK-11:**

- a. Write a C program to convert a Roman numeral to its decimal equivalent.
- b. Write a C program that uses functions to perform the following operations:
  - i. Reading a complex number
  - ii. Writing a complex number
  - iii. Addition of two complex numbers
  - iv. Multiplication of two complex numbers(Note: represent complex number using a structure.)

**WEEK-12:**

- a. Write a C program which copies one file to another.
- b. Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)

**WEEK-13:**

- a. Write a C program to display the contents of a file.
- b. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

**WEEK-14:**

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order



i) Bubble sort

ii) Selection sort

iii) Insertion sort

**WEEK-15:**

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:

i) Linear search

ii) Binary search

R22-B.TECH-  
ECE



**B.Tech. I Year I Sem.**

**L T P C**  
**0 0 2 1**

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

**Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

**Course Outcomes:** Students will be able to:

1. Make use of various online and web resources for independent language learning.
2. Understand the nuances of English language through audio-visual experience and group activities.
3. Neutralize their accent for intelligibility for enabling them to communicate with a global audience.
4. Speak with clarity and confidence which in turn improves their academic performance in the other courses.
5. Face and interact with various stakeholders leading to the enhancement of their employability skills.

**Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. **Computer Assisted Language Learning (CALL) Lab**
- b. **Interactive Communication Skills (ICS) Lab**

**Listening Skills:**

**Objectives**

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.*

- Listening for general content
- Listening to fill up information



- Intensive listening
- Listening for specific information

### **Speaking Skills:**

#### Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
  - Oral practice
  - Describing objects/situations/people
  - Roleplay – Individual/Group activities
  - Just A Mine (JAM) Sessions

The following course contents prescribed for the **English Language and Communication Skills Lab.**

#### **Exercise–I**

##### **CALL Lab:**

Understand: Listening Skill- Its importance – Purpose - Process - Types - Barriers - Effective Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants –Minimal Pairs - Consonant Clusters - Past Tense Marker and Plural Marker - Testing Exercises

##### **ICS Lab:**

Understand: Spoken vs. Written language – Formal and Informal English.  
Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

#### **Exercise–II CALL Lab:**

Understand: Structure of Syllables–Word Stress–Weak Forms and Strong Forms– Stress pattern in sentences – Intonation.  
Practice: Basic Rules of Word Accent – Stress Shift - Weak Forms and Strong Forms – Stress pattern in sentences – Intonation - Testing Exercises

##### **ICS Lab:**

Understand: Features of Good Conversation – Strategies for Effective Communication.  
Practice: Situational Dialogues – Role Play – Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

#### **Exercise-III CALL Lab:**

Understand: Errors in Pronunciation – Neutralising Mother Tongue Interference (MTI).  
Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

##### **ICS Lab:**

Understand: Descriptions – Narrations – Giving Directions and Guidelines – Blog Writing  
Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions –Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

#### **Exercise–IV**

##### **CALL Lab:**

Understand: Listening for General Details.  
Practice: Listening Comprehension Tests - Testing Exercises



**ICS Lab:**

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication - Presentation Skills.

Practice: Making a Short Speech – Extempore – Making a Presentation.

**Exercise–V CALL Lab:**

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests – Testing Exercises

**ICS Lab:**

Understand: Group Discussion

Practice: Group Discussion

**Minimum Requirement of infrastructural facilities for ELCSLab:**

**1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

**System Requirement (Hardwarecomponent):**

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i. Computers with Suitable Configuration
- ii. High Fidelity Headphones

**1. Interactive Communication Skills (ICS) Lab:**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

**Source of Material (Master Copy):**

- *Exercises in Spoken English, Part1, 2, 3.* CIEFL and Oxford University Press

**Note:** Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10<sup>th</sup> Edition.
- English in Mind (Series1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL&GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

**REFERENCE BOOKS:**



1. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook*. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook*. Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient Black Swan Pvt.Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.

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ECE



**22MC0002 - ENVIRONMENTAL SCIENCE**

**B.Tech. I Year I Sem.**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Course Objectives:**

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

**Course Outcomes:**

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I : ECOSYSTEMS**

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II : NATURAL RESOURCES: CLASSIFICATION OF RESOURCES**

Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III : BIODIVERSITY AND BIOTIC RESOURCES**

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV : ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES : ENVIRONMENTAL POLLUTION**

Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

**UNIT - V : ENVIRONMENTAL POLICY, LEGISLATION & EIA**

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data



acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

**TEXT BOOKS:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

**REFERENCE BOOKS:**

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.





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**22MC0001: INDUCTION PROGRAM**

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# **R22 B.Tech**

# **ECE**

## **2023-2024**

# **I Year – II Semester**



**22BS1211- ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**

**I B.Tech. II Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** Develop ability to learn

1. Methods of solving the Ordinary Differential Equations of first order.
2. Methods of solving the higher order Ordinary Differential Equations.
3. Concept, properties of Laplace transforms & using the same to solve ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to vector integration.

**Course outcomes:** After successful completion of this course, student should be able to

1. Identify the type of first order Ordinary Differential Equation and solve them by appropriate method.
2. Apply the concept of higher order Ordinary Differential Equations to solve real world problems.
3. Solve ordinary differential equations by using Laplace transform techniques.
4. Calculate scalar potential for a vector and directional derivative of a scalar point function using vector differentiation.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

### **UNIT-I: FIRST ORDER ODE**

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

### **UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER**

Second and higher order linear differential equations with constant coefficients: non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin bx$ ,  $\cos bx$ , polynomials in  $x^k$ ,  $ve^{ax}$  and  $x V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

### **UNIT-III: LAPLACE TRANSFORMS**

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, second shifting theorem (without proof), Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

### **UNIT-IV: VECTOR DIFFERENTIATION**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives,



Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

### **UNIT-V: VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition,
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.



**22BS1212- ENGINEERING CHEMISTRY**

**B.Tech. I Year II Sem.**

**L T P C**  
**3 1 0 4**

**Course Objectives:**

1. To acquire knowledge about desalination of brackish water and treatment of municipal water
2. To include the fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
4. To understand the significance of green chemistry and green synthesis and to imbibe the green chemistry principles.
5. To acquire required knowledge about engineering materials like smart materials, lubricants, and biodiesel.

**Course Outcomes:**

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4. The student can use real examples to illustrate how the principles of *green chemistry* can be applied to chemical process in engineering
5. They can predict potential applications of engineering materials and practical utility in order to become good engineers and entrepreneurs.

**UNIT - I: WATER AND ITS TREATMENT:**

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation, Determination of F<sup>-</sup> ion by ion-selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion-exchange processes. Desalination of water – Reverse osmosis.

**UNIT – II BATTERY CHEMISTRY & CORROSION**

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

**UNIT - III: POLYMERIC MATERIALS:**

Definition – Classification of polymers with examples – Types of polymerization –addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:**



Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

#### **UNIT - IV: GREEN CHEMISTRY AND ENGINEERING FOR SUSTAINABLE DEVELOPMENT**

Definition and history of Green chemistry, Concept and principles (Prevention, Atom Economy, Less Hazardous Chemical Syntheses, Designing Safer Chemicals, Safer Solvents and Auxiliaries, Design for Energy Efficiency, Use of Renewable Feedstock, Reduce, Derivatives, Catalysis, Design for Degradation, Real-time Analysis for Pollution Prevention, Inherently Safer Chemistry for Accident Prevention) of Green Chemistry with suitable examples.

#### **UNIT - V: ENGINEERING MATERIALS:**

##### **Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Bio Diesel:** Sources and applications of Biodiesel

#### **TEXT BOOKS:**

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
5. Engineering Chemistry by K Sesha Maheswaramma and Mridula Chugh, Pearson Publications.

#### **REFERENCE BOOKS:**

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)



**22ME1255 - COMPUTER AIDED ENGINEERING GRAPHICS**

**B.Tech. I Year II Sem.**

**L T P C**

**1 0 4 3**

**Course Objectives:**

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products
3. To draw sectional views and pictorial views for various types of solids.
4. To develop the lateral surfaces of basic engineering objects
5. To impart knowledge about standard principles of orthographic projection and isometric views of different objects.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D and 3D objects
2. sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

**UNIT – I: INTRODUCTION TO ENGINEERING GRAPHICS:**

Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

**UNIT- II: ORTHOGRAPHIC PROJECTIONS:**

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

**UNIT – III:**

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

**UNIT – IV:**

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

**UNIT – V:**

**Isometric Projections:** Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

**TEXT BOOKS:**

- 1 Engineering Drawing N.D. Bhatt / Charotar



2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

**REFERENCE BOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

**Note:** - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.

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ECE





**B.Tech. I Year II Sem.**

**L T P C**  
**2 0 0 2**

**Prerequisites:** Mathematics

**Course Objectives:**

1. To study and understand DC circuits.
2. To study and understand Single & Three phase AC circuits.
3. To study and understand the Single Phase Transformers.
4. To study and understand the different types of DC and AC machines.
5. To have the knowledge of various electrical installations and the concept of power factor improvement.

**Course Outcomes:** After completion of this course, students will be able to

1. Analyze DC circuits using various techniques
2. Analyze Single & Three phase AC circuits
3. Discuss the working principles and estimate the performance of Single Phase Transformers
4. Discuss the Construction and working principle of different types of DC and AC machines.
5. Classify various components of Low Voltage Electrical Installations and identify the importance of power factor improvement

**UNIT-I: D.C. CIRCUITS:** Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation (Series, Parallel, Series and Parallel circuits, Nodal Analysis and Mesh Analysis). Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**UNIT-II: A.C. CIRCUITS:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series circuits only), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

**UNIT-III: SINGLE PHASE TRANSFORMERS:** Working Principle and construction of Transformer, Types, Ideal and practical transformer, EMF Equation, equivalent circuit, losses in transformers, regulation and efficiency.

**UNIT-IV: ELECTRICAL MACHINES**

**D. C. Generator:** Constructional details of D C Machine, Working Principle of D C Generator, EMF Equation, Types, Numerical Problems.

**D. C. Motor:** Working Principle of D C Motor, Types, Torque Equation, Numerical Problems Performance Characteristics of dc shunt motor.

**Three Phase Induction Motor:** Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics.

**Synchronous Generator:** Construction and working of synchronous generator.



**UNIT-V: ELECTRICAL INSTALLATIONS:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement.

**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

- 1 P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2<sup>nd</sup> Edition, 2019.
- 2 D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
- 3 M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1<sup>st</sup> Edition, 2012.
- 4 Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2<sup>nd</sup> Edition, McGraw Hill, 2021.
- 5 L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
- 6 E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
- 7 V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989



## 22EC1215 - ELECTRONIC DEVICES AND CIRCUITS

**B.Tech. I Year II Sem.**

**L T P C**  
**2 0 0 2**

### **Course Objectives:**

1. To introduce components such as diodes, BJT's and FET's.
2. To know the applications of devices.
3. To know the switching characteristics of devices.
4. To know the special purpose devices such as SCR, UJT.
5. To know the MOSFET and its characteristics

*Course Outcomes: Upon completion of the Course, the students will be able to:*

1. Acquire the knowledge of various electronic devices and their use on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.
4. Know the configurations of Transistors
5. Acquire the knowledge of various device characteristics.

### **UNIT - I**

**DIODES:** Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

### **UNIT - II**

Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

### **UNIT - III**

**BIPOLAR JUNCTION TRANSISTOR (BJT):** Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

**UNIT – IV JUNCTION FIELD EFFECT TRANSISTOR (FET):** Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

**UNIT – V Special Purpose Devices:** Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

### **TEXT BOOKS:**

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11<sup>th</sup> Edition, 2009, Pearson.

### **REFERENCE BOOKS:**

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5<sup>th</sup> Edition, Oxford.
2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.



**22CS1253 - APPLIED PYTHON PROGRAMMING LABORATORY**

**B.Tech. I Year II Sem.**

**L T P C**  
**0 1 2 2**

**Course Objectives:**

1. To learn python programming language using the data types, input/ output statements.
2. To install and run the Python interpreter
3. To learn control structures.
4. To Understand Lists, Dictionaries in python
5. To Handle Strings and Files in Python

**Course Outcomes:** Upon completing this course, the students will be able to

1. Build basic programs using fundamental programming constructs
2. Write and execute python codes for different applications
3. Capable to implement on hardware boards
4. Able to Implement File Handling.
5. Able to deploy Small Projects using Predefined Libraries.

**LIST OF EXPERIMENTS:**

**Cycle - 1**

1. Downloading and Installing Python and Modules
  - a. Python 3 on Linux  
Follow the instructions given in the URL <https://docs.python-guide.org/starting/install3/linux/>
  - b. Python 3 on Windows  
Follow the instructions given in the URL <https://docs.python.org/3/using/windows.html> (Please remember that Windows installation of Python is harder!)
  - c. pip3 on Windows and Linux  
Install the Python package installer by following the instructions given in the URL <https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/>
  - d. Installing numpy and scipy  
You can install any python3 package using the command `pip3 install <packagename>`
  - e. Installing jupyterlab  
Install from pip using the command `pip install jupyterlab`
2. Introduction to Python3
  - a. Printing your biodata on the screen
  - b. Printing all the primes less than a given number
  - c. Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sum of all its factors (excluding the number itself) is equal to the number itself
3. Defining and Using Functions
  - a. Write a function to read data from a file and display it on the screen
  - b. Define a boolean function *is palindrome*(<input>)
  - c. Write a function *collatz*(*x*) which does the following: if *x* is odd,  $x = 3x + 1$ ; if *x* is even, then  $x = x/2$ . Return the number of steps it takes for  $x = 1$
  - d. Write a function  $N(m, s) = \exp(-(x-m)^2/(2s^2))/\text{sqrt}(2\pi)s$  that computes the Normal distribution
4. The package numpy
  - a. Creating a matrix of given order  $m \times n$  containing *random numbers* in the range 1 to 99999
  - b. Write a program that adds, subtracts and multiplies two matrices. Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication) should be performed



- c. Write a program to solve a system of  $n$  linear equations in  $n$  variables using matrix inverse
5. The package `scipy` and `pyplot`
  - a. Finding if two sets of data have the same *mean* value
  - b. Plotting data read from a file
  - c. Fitting a function through a set of data points using *polyfit* function
  - d. Plotting a histogram of a given data set
6. The strings package
  - a. Read text from a file and print the number of lines, words and characters
  - b. Read text from a file and return a list of all  $n$  letter words beginning with a vowel
  - c. Finding a secret message hidden in a paragraph of text
  - d. Plot a histogram of words according to their length from text read from a file

### Cycle -2

7. Installing OS on Raspberry Pi
  - a. Installation using PiImager
  - b. Installation using image file

- Downloading an Image
- Writing the image to an SD card
  - using Linux
  - using Windows

- Booting up

Follow the instructions given in the URL

<https://www.raspberrypi.com/documentation/computers/getting-started.html>

8. Accessing GPIO pins using Python
  - a. Installing GPIO Zero library.  
First, update your repositories list:  
`sudo apt update`  
Then install the package for Python 3:  
`sudo apt install python3-gpiozero`
  - b. Blinking an LED connected to one of the GPIO pin
  - c. Adjusting the brightness of an LED
  - d. Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.
9. Collecting Sensor Data
  - a. DHT Sensor interface
    - Connect the terminals of DHT GPIO pins of Raspberry Pi.
    - Import the DHT library using `import Adafruit_DHT`
    - Read sensor data and display it on screen.



**22BS1252 - ENGINEERING CHEMISTRY LABORATORY**

**B.Tech. I Year II Sem.**

**L T P C**  
**0 0 2 1**

**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
5. Students will be able to visualize the experiments virtually for better understanding

**Course Outcomes:** The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.
5. Can perform the experiments making use of working models

**List of Experiments:**

- I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
- II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
- III. **Potentiometry:** Estimation of the amount of  $\text{Fe}^{+2}$  by Potentiometry.
- IV. **pH Metry:** Determination of an acid concentration using pH meter.
- V. **Preparations:**
  - 1.Preparation of Bakelite.
  - 2.Preparation Nylon – 6.

**VI. Lubricants:**

- 1.Estimation of acid value of given lubricant oil.
- 2.Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

**VII. Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

**VIII. Virtual lab experiments**

- 1.Construction of Fuel cell and its working.
- 2.Smart materials for Biomedical applications
- 3.Batteries for electrical vehicles.
- 4.Functioning of solar cell and its applications.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition



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3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

R22-B.TECH-  
ECE



**22EE1254- BASIC ELECTRICAL ENGINEERING LABORATORY**

**B.Tech. I Year II Sem.**

**L T P C**

**0 0 2 1**

**Prerequisites:** Basic Electrical Engineering

**Course Objectives:**

1. To measure the electrical parameters for different types of DC circuits using conventional and theorems approach.
2. To measure the electrical parameters for different types of AC circuits
3. To study the transient response of various R, L and C circuits using different excitations.
4. To determine the performance of Single Phase Transformers.
5. To determine the performance of different types of DC and AC machines.

**Course Outcomes: After completion of this course, students will be able to**

1. Verify the basic conventional approach and theorems for Electrical circuits through different experiments.
2. Calculate the electrical parameters for different types of AC circuits
3. Analyze the transient responses of R, L and C circuits for different input conditions.
4. Evaluate the performance calculations of Single Phase Transformers through various testing methods.
5. Evaluate the performance calculations of DC and AC machines through various testing methods.

**List of experiments/demonstrations:**

**PART- A (compulsory)**

1. Verification of KVL and KCL
2. Verification of Thevenin's theorem
3. Verification of Norton's theorem
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series Circuits.
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

**PART-B (any two experiments from the given list)**

1. Verification of Superposition theorem
2. Transient Response of Series RL and RC circuits for DC excitation
3. Load Test on Single Phase Transformer (Calculate Efficiency)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. No-Load Characteristics of a Three-phase Alternator

**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshiah, "Basic Electrical Engineering", Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.





**REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, "Basic Electrical Engineering", S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

R22-B.TECH-  
ECE



**B.Tech. I Year II Sem.**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

**The main objectives of the course is to**

1. Study basic electronic components.
2. Observe characteristics of electronic devices.
3. Study rectifier characteristics and other diode circuits.
4. Observe BJT and MOSFET amplifiers in different configurations.
5. Gain knowledge of SCR,UJT, Photodiode, Solar Cell & LED.

**Course Outcomes: Students will be able to**

1. Understand the P-N diode and Zener diode characteristics
2. Acquire knowledge about various configurations of transistor like CE, CB and CC.
3. Understand & Analyze Fullwave rectifier, clippers and clampers.
4. Acquire the knowledge about MOSFET in CS and CD configuration
5. Understand and Analyze SCR,UJT, Photodiode, solar cells and LED

**List of Experiments (Twelve experiments to be done):**

Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
  2. Full Wave Rectifier with & without filters
  3. Types of Clippers at different reference voltages
  4. Types of Clampers at different reference voltages
  5. The steady state output waveform of clampers for a square wave input
  6. Input and output characteristics of BJT in CB Configuration
  7. Input and output characteristics of BJT in CE Configuration
  8. Input and output characteristics of BJT in CC Configuration
  9. Input and output characteristics of MOS FET in CS Configuration
  10. Input and output characteristics of MOS FET in CD Configuration
  11. Switching characteristics of a transistor
  12. Zener diode characteristics and Zener as voltage Regulator
  13. SCR Characteristics.
  14. UJT Characteristics and identify negative region
  15. Photo diode characteristics
  16. Solar cell characteristics
  17. LED Characteristics
- \*Design a circuit to switch on and off LED using diode/BJT/FET as a switch.

**Major Equipment required for Laboratories:**

1. Regulated Power Suppliers, 0-30V
1. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
2. Functions Generators-Sine and Square wave signals
3. Multimeters, voltmeters and Ammeters
4. Electronic Components and devices



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**DEPARTMENT OF  
MECHANICAL ENGINEERING  
(R22 B. TECH. ME)**

**ACADEMIC YEAR : 2023-24**

**I B.TECH(MECHANICAL)  
COURSE STRUCTURE  
&  
SYLLABUS**



**B.TECH. MECHANICAL ENGINEERING**

**EFFECTIVE FROM ACADEMIC YEAR 2023 - 24 ADMITTED BATCH**

**R22 COURSE STRUCTURE AND SYLLABUS**

**I YEAR I – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1	22BS1111	Matrices and Calculus	3	1	0	4
2	22BS1113	Applied Physics	3	1	0	4
3	22CS1114	C Programming and Data Structures	3	0	0	3
4	22ME1156	Engineering Workshop	0	1	3	2.5
5	22HS1112	English for Skill Enhancement	2	0	0	2
6	22ME1155	Elements of Mechanical Engineering	0	0	2	1
7	22BS1153	Applied Physics Laboratory	0	0	3	1.5
8	22CS1154	C Programming and Data Structures Laboratory	0	0	2	1
9	22HS1152	English Language and Communication Skills Laboratory	0	0	2	1
10	22MC0002	Environmental Science	3	0	0	0
11	22MC0001	Induction Programme				
		<b>Total</b>	<b>14</b>	<b>3</b>	<b>12</b>	<b>20</b>

**I YEAR II – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1	22BS1211	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	22BS1212	Engineering Chemistry	3	1	0	4
3	22ME1255	Computer Aided Engineering Graphics	1	0	4	3
4	22ME1214	Engineering Mechanics	3	0	0	3
5	22ME1215	Engineering Materials	2	0	0	2
6	22CS1251	Python Programming Laboratory	0	1	2	2
7	22BS1252	Engineering Chemistry Laboratory	0	0	2	1
8	22ME1253	Fuels & Lubricants Laboratory	0	0	2	1
		<b>Total</b>	<b>12</b>	<b>3</b>	<b>10</b>	<b>20</b>



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**R22 B.Tech**

**ME**

**2023-2024**

**I Year – I Semester**



## 22BS1111:MATRICES AND CALCULUS

**I B Tech. I Semester**

**L T P C**  
**3 1 - 4**

**Prerequisite(s):** Mathematical knowledge at Pre university level.

**Course Objectives:** Develop ability to learn the concept of

1. Rank of the matrix and apply the same to know the consistency for the linear system of equations.
2. Eigen values and Eigen vectors to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems, Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and Finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

**Course Outcomes:** After successful completion of this course, the student should be able to

1. Write the matrix representation of a set of linear equations, find the rank and apply the same to analyse the solution of the system of equations.
2. Reduce the quadratic form to canonical form using orthogonal transformations by finding Eigenvalues and Eigen vectors.
3. Solve the applications on the mean value theorems, Evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints using partial differentiation.
5. Evaluate the multiple integrals and apply the concept to find areas and volumes.

### **UNIT - I: Matrices**

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

### **UNIT - II: Eigen values and Eigen vectors**

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### **UNIT - III: Calculus**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proof). Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates for known curves (circle, parabola, ellipse), Definition of Improper Integral: Beta and Gamma functions and their applications.

### **UNIT - IV: Multivariable Calculus (Partial Differentiation and applications)**

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian,



Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

**UNIT-V: Multivariable Calculus (Integration)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form for known curves (circle, parabola, ellipse), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

**REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



**22BS1113- APPLIED PHYSICS**

**I B Tech. I Semester**

**L T P C**  
**3 1 0 4**

**Course Objectives:**

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nano scale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibres.

**Course Outcomes:**

1. At the end of the course the student will be able to:
2. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
3. Identify the role of semiconductor devices in science and engineering Applications.
4. Explore the fundamental properties of dielectric, magnetic and energy materials for their applications.
5. Appreciate the features and applications of Nano materials.
6. Understand various aspects of Lasers and Optical fibre and their applications in diverse
7. fields.

**UNIT - I: QUANTUM PHYSICS AND SOLIDS**

**Quantum Mechanics:** Introduction to quantum physics, blackbody radiation, Wein's and Rayleigh-Jean's law, Planck's radiation law (Qualitative) - photoelectric effect de-Broglie hypothesis and matter waves- Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

**Solids:** Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative) Bloch's theorem -Kronig-Penney model (Qualitative) origin of energy bands- classification of solids.

**UNIT - II: SEMICONDUCTORS AND DEVICES**

Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)–LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

**UNIT - III: DIELECTRIC, AND MAGNETIC AND ENERGY MATERIALS**

**Dielectric Materials:** Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyro electric materials.

**Magnetic Materials:** Basic definitions – classification of Magnetic materials – Domain theory of ferromagnetism in hysteresis - soft and hard magnetic materials - magnetostriction, magneto resistance.

**Energy Materials:** Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors.

**UNIT - IV: NANOTECHNOLOGY**





Nanoscale, quantum confinement, surface to volume ratio, **bottom-up fabrication**: sol-gel, precipitation, combustion methods – **top-down fabrication**: ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nanomaterials.

#### **UNIT - V: LASER AND FIBER OPTICS**

**Lasers:** Laser beam characteristics-three quantum processes-Einstein coefficients and their relations-lasing action - pumping methods, CO<sub>2</sub> laser, Nd: YAG laser- semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

#### **TEXT BOOKS:**

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A. Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.

#### **REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group.
7. Energy Materials, Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.



## 22CS1114: C PROGRAMMING AND DATA STRUCTURES

**B.Tech. I Year I Sem**

**L T P C**

**3 0 0 3**

### Course Objectives:

1. Learn adequate knowledge by problem solving techniques.
2. Understand programming skills using the fundamentals and basics of C Language.
3. Improve problem solving skills using arrays, strings, and functions.
4. Understand the dynamics of memory by pointers.
5. Study files creation process with access permissions.

### Course Outcomes:

1. Explore the basic concepts in C Programming Language.
2. Develop modular and readable C Programs
3. Understand the basic concepts such as Abstract Data Types, Linear and Non-Linear Data structures.
4. Apply data structures such as stacks, queues in problem solving
5. To understand and analyze various searching and sorting algorithms.

### UNIT – I

**Introduction to Computers** – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

**Introduction to C Language** – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output

**Structure of a C Program** – Operators, Bit-wise operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements.

### UNIT – II

**Statements** – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Recursion.

**Designing Structured Programs**- Functions, basics, user defined functions, inter function communication, standard functions.

**Arrays** – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays.

### UNIT – III

**Pointers** – Introduction, Pointers for inter function communication, pointers to pointers, compatibility.

**Pointer Applications** – Passing an array to a function, Memory allocation functions:



malloc(),calloc(),realloc(),free(), array of pointers

**Strings** – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion.

#### UNIT – IV

**Derived types** – The Typedef, enumerated types, Structures – Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.

**Input and Output** – Text vs Binary streams, standard library functions for files, converting file types, File programs – copy, merge files.

#### UNIT – V:

Searching and Sorting Techniques- Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms)

**Data Structures** – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

#### TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

#### REFERENCE BOOKS:

1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.



**22ME1156 - ENGINEERING WORKSHOP**

**I B Tech. I Semester**

**L T P C**  
**0 1 3 2.5**

**Pre-requisites:** Practical skill

**Course Objectives:**

1. To Study about different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

**Course Outcomes:** At the end of the course, the student will be able to:

1. CO1: Study and practice on machine tools and their operations
2. CO2: Practice on manufacturing of components using work shop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO4: Apply basic electrical engineering knowledge for house wiring practice.
5. CO 5: Study and Practice of arc welding process

**1. TRADES FOR EXERCISES:**

**At least two exercises from each trade:**

1. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
2. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
3. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
4. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
5. Welding Practice – (Arc Welding & Gas Welding)
6. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
7. Black Smithy – (Round to Square, Fan Hook and S-Hook)

**2. TRADES FOR DEMONSTRATION & EXPOSURE:**

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and WoodWorking

**TEXT BOOKS:**

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

**REFERENCE BOOKS:**

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP



**22HS1112: ENGLISH FOR SKILL ENHANCEMENT**

L T P C  
2 0 0 2

**B.Tech. I Year I Sem.**

**Course Objectives:** This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Learn remedial and functional grammar related to various grammar items.
4. Prepare the students for examinations such as IELTS and TOEFL by sharpening their reading and writing skills
5. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:** Students will be able to:

1. Use a wide range of vocabulary and sentence structures and also acquire basic proficiency in reading and writing modules of English.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

**UNIT-I**

Chapter entitled '*Toasted English*' by R.K. Narayan from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** The Concept of Word Formation – The Use of Prefixes and Suffixes- Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance – Techniques for Effective Reading.

**Writing:** Sentence Structures – Use of Phrases and Clauses in Sentences – Importance of Proper Punctuation – Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence- Organizing Principles of Paragraphs in Documents.

**UNIT-II**

Chapter entitled '*Appro JRD*' by Sudha Murthy from "*English: Language, Context and*



**Culture** published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

**Writing:** Nature and Style of Writing - Defining/Describing People, Objects, Places and Events – Classifying – Providing Examples or Evidence.

### UNIT-III

Chapter entitled '**Lessons from Online Learning**' by **F.Haider Alvi, Deborah Hurstetal** from "**English: Language, Context and Culture**" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Confused – Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

**Writing:** Format of a Formal Letter – Writing Formal Letters e.g. Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

### UNIT-IV

Chapter entitled '**Art and Literature**' by **Abdul Kalam** from "**English: Language, Context and Culture**" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Exercises for Practice

**Writing:** Writing Practices – Essay Writing – Writing Introduction and Conclusion – Précis Writing.

### UNIT-V

Chapter entitled '**Go, Kiss the World**' by **Subroto Bagchi** from "**English: Language, Context and Culture**" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Technical Vocabulary and their Usage

**Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

**Reading:** Reading Comprehension – Exercises for Practice

**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats - Structure of Reports (Manuscript



Note: Listening and Speaking Skills which are given under Unit -6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- **Note: 1.** As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is **Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- **Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

#### **TEXTBOOK:**

1. “English: Language, Context and Culture” by Orient Black Swan Pvt. Ltd, Hyderabad.2022. Print.

#### **REFERENCEBOOKS:**

- 1.Effective Academic Writing by Liss and Davis (OUP)
- 2.Richards, Jack C. (2022) Interchange Series. Introduction,1,2,3. Cambridge University Press
- 3.Wood, F. T. (2007). Remedial English Grammar. Macmillan.
- 4.Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2<sup>nd</sup> ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
- 6.Vishwamohan, Aysha.(2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition



**22ME1155: ELEMENTS OF MECHANICAL ENGINEERING**

**B.Tech. I Year I Sem.**

**L T P C**  
**0 0 2 1**

**Course Objectives:** The objectives of this course are to

1. Make the student to experimentally measure the common geometric properties like length, diameter, flatness, curvature, volume and moment of inertia etc.
2. Give a practical knowledge to evaluate the friction between surfaces and also to evaluate the natural frequency of the system.
3. Correlate between theory and experimental results, directly observe the proof of principles and theories through practical knowledge
4. Introduce students to the basic concepts of manufacturing through the demonstration of various processes.
5. Understand the commonly used mechanical components like gear box, working of boilers and IC engine etc.

**Course Outcomes:** At the end of the course, students will be able to:

1. CO 1: Understand the operation, usage and applications of different measuring instruments and tools.
2. CO 2: Examine the different characteristics of instruments like accuracy, precision etc.
3. CO 3: Prepare simple composite components and joining different materials using soldering process.
4. CO 4: Identify tools & learn practically the process of turning, milling, grinding on mild steel pieces.
5. CO 5: Understand the basic components of IC engine, Gear box and boiler

**List of Experiments to be performed:**

1. Measurement of length, height, diameter by vernier calipers.
2. To measure diameter of a given wire and sphere, thickness of a given sheet and volume of an irregular lamina using micrometer screw gauge.
3. Use of straight edge and spirit level in finding the flatness of surface plate.
4. Determination of time period and natural frequency of simple pendulum.
5. Determination of time period and natural frequency of compound pendulum.
6. To measure the coefficients of static and kinetic friction between a block and a plane using various combination of materials.
7. To determine the radius of curvature of a given spherical surface.
8. The experimental determination of the Moment of Inertia of regular and irregular solids.
9. Metal joining process—soldering of metal alloys to any PCB board
10. A simple composite geometry preparation by hand layup method.
11. Grouping of Dry cells for a specified voltage and current and its measurement using ammeters and voltmeters etc.
12. Demonstration of lathe, milling, drilling, grinding machine operations.
13. Study of transmission system –gear box
14. Assembly /disassembly of Engines





15. Study of Boilers

**Note:** Perform any 10 out of the 15 Exercises.

R22-B.TECH-MECHANICAL



**22BS1153 - APPLIED PHYSICS LABORATORY**

**B.Tech. I Year I Sem.**

**L T P C**  
**0 0 3 1.5**

**Course Objectives:**

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Understand the method of least square fitting
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Study the behavior of passive components.

**Course Outcomes:**

The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Carried out data analysis
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Learn the characteristics of passive components like L, C and R and their applications.

**LIST OF EXPERIMENTS:**

1. Understanding the method of least squares – torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. Characteristics of series and parallel LCR circuits.
5. V-I characteristics of a p-n junction diode and Zener diode
6. Input and output characteristics of BJT (CE, CB & CC configurations)
7. a). V-I and L-I characteristics of light emitting diode (LED)  
b). V-I characteristics of a Laser diode
8. V-I Characteristics of solar cell
9. a). Determination of the beam divergence of the given LASER beam  
b). Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. Determination of Energy gap of a semiconductor.
11. Determination of time constant of RC Circuit.
12. Study B-H curve of a magnetic material.

**Note: Any 8 experiments are to be performed.**

**REFERENCE BOOK:**

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.



**22CS1154: C PROGRAMMING AND DATA STRUCTURES  
LABORATORY**

**B.Tech. I Year I Sem (R22)**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

1. To learn C-language Programs using the data types, input/ output statements and control statements.
2. Describe the importance of modular programming and arrays using C-Language Program.
3. Understand the concept and use of pointers for memory management techniques, structure, union, and enumerated types.
4. Understand the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams.

**Course Outcomes:**

1. Ability to design and test programs to solve mathematical and scientific problems.
2. Ability to write structured programs using control structures and functions.
3. Able to Implement C programs using arrays & pointers.
4. Able to Use the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Able to execute programs that read and write text, binary files using the formatting and character I/O functions.

**List of Experiments:**

**WEEK-1:**

- a. Write a C program to find simple interest and compound interest.
- b. Write a C program to convert Celsius to Fahrenheit.
- c. Write a C Program to swap two numbers.
- d. Write a C program to perform all arithmetic operations (+, -, \*, /, %).
- e. Write a simple program that prints the results of all the operators available in C (Including pre/ post increment, bitwise and/or/not, etc.). Read required operand Values from standard input.

**WEEK-2:**

- a. Write a C program to find the sum of individual digits of a positive integer.
- b. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
- c. Write a C program to generate the first n terms of the sequence.

**WEEK-3:**

- a. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- b. Write a C program to find the roots of a quadratic equation.
- c. Write a C program to find the factorial of a given integer.

**WEEK-4:**



- a. Write a C program to find the GCD (greatest common divisor) of two given integers.
- b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement)
- c. Write a C program to solve Towers of Hanoi problem.

**WEEK-5:**

- a. Write a C program to find both the largest and smallest number in a list of integers.
- b. Write a C program that uses functions to perform the following:
  - i) Addition of Two Matrices
  - ii) Multiplication of Two Matrices

**WEEK-6:**

- a. Write a C program that uses functions to perform the following operations:
- b. To insert a sub-string in to a given main string from a given position.
- c. To delete n Characters from a given position in a given string.

**WEEK-7:**

- a. Write a C program to determine if the given string is a palindrome or not
- b. Write a C program that displays the position or index in the string S where the string T begins, or - 1 if S doesn't contain T.

**WEEK-8:**

- a. Write a C program to count the lines, words and characters in a given text.
- b. Write a C program to generate Pascal's triangle.
- c. Write a C program to construct a pyramid of numbers

**WEEK-9:**

- a. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:  $1+x+x^2+x^3+\dots+x^n$   
For example: if n is 3 and x is 5, then the program computes  $1+5+25+125$ . Print x, n, the sum Perform error checking.

For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if  $n < 0$ , then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.

- b. 2's complement of a number is obtained by scanning it from right to left and complementing

all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

**WEEK-10:**

- a. Write a C program to convert a Roman numeral to its decimal equivalent.
- b. Write a C program that uses functions to perform the following operations:
  - i) Reading a complex number
  - ii) Writing a complex number
  - iii) Addition of two complex numbers
  - iv) Multiplication of two complex numbers(Note: represent complex number using a structure.)

**WEEK-11:**

- a. Write a C program which copies one file to another.
- b. Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)
- c. Write a C program to display the contents of a file.
- d. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

**WEEK-12:**



Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

- i) Bubble sort      ii) Selection sort      iii) Insertion sort

**WEEK-13:**

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:

- i) Linear search      ii) Binary search

**WEEK 14:**

Write a C program that uses functions to perform the following operations on singly linkedlist.:

- i) Creation      ii) Insertion      iii) Deletion      iv) Traversal

**WEEK-15:**

Write C programs that implements the following data structures

- i) Stacks (push,pop,display)      ii) queues(insert,delete,display)

**TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.



**22HS1152 - ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY**

**B.Tech. I Year I Sem.**

**L T P C**  
**0 0 2 1**

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

**Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

**Course Outcomes:** Students will be able to:

1. Make use of various online and web resources for independent language learning.
2. Understand the nuances of English language through audio-visual experience and group activities.
3. Neutralize their accent for intelligibility for enabling them to communicate with a global audience.
4. Speak with clarity and confidence which in turn improves their academic performance in the other courses.
5. Face and interact with various stakeholders leading to the enhancement of their employability skills.

**Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. **Computer Assisted Language Learning (CALL) Lab**
- b. **Interactive Communication Skills (ICS) Lab**

**Listening Skills:**

**Objectives**

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.*

- Listening for general content
- Listening to fill up information
- Intensive listening



- Listening for specific information

### **Speaking Skills:**

#### Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
  - Oral practice
  - Describing objects/situations/people
  - Roleplay – Individual/Group activities
  - Just A Mine (JAM) Sessions

The following course contents prescribed for the **English Language and Communication Skills Lab.**

#### **Exercise-I**

##### **CALL Lab:**

Understand: Listening Skill- Its importance – Purpose - Process - Types - Barriers - Effective Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs - Consonant Clusters - Past Tense Marker and Plural Marker - Testing Exercises

##### **ICS Lab:**

Understand: Spoken vs. Written language – Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

#### **Exercise-II CALL Lab:**

Understand: Structure of Syllables–Word Stress–Weak Forms and Strong Forms– Stress pattern in sentences – Intonation.

Practice: Basic Rules of Word Accent – Stress Shift - Weak Forms and Strong Forms – Stress pattern in sentences – Intonation - Testing Exercises

##### **ICS Lab:**

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role Play – Expressions in Various Situations – Making Requests and Seeking Permissions - Telephone Etiquette.

#### **Exercise-III CALL Lab:**

Understand: Errors in Pronunciation – Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

##### **ICS Lab:**

Understand: Descriptions – Narrations – Giving Directions and Guidelines – Blog Writing

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions –Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

#### **Exercise-IV**

##### **CALL Lab:**

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - Testing Exercises

##### **ICS Lab:**



Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication - Presentation Skills.

Practice: Making a Short Speech – Extempore – Making a Presentation.

**Exercise–V CALL Lab:**

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests – Testing Exercises

**ICS Lab:**

Understand: Group Discussion

Practice: Group Discussion

**Minimum Requirement of infrastructural facilities for ELCSLab:**

**1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

**System Requirement (Hardware component):**

*Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:*

- i. Computers with Suitable Configuration
- ii. High Fidelity Headphones

**1. Interactive Communication Skills (ICS) Lab:**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

**Source of Material (Master Copy):**

1. *Exercises in Spoken English. Part1, 2, 3.* CIEFL and Oxford University Press

**Note:** Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

**Suggested Software:**

2. Cambridge Advanced Learners' English Dictionary with CD.
3. Grammar Made Easy by Darling Kindersley.
4. Punctuation Made Easy by Darling Kindersley.
5. Oxford Advanced Learner's Compass, 10<sup>th</sup> Edition.
6. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
7. English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
8. English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
9. TOEFL&GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
10. Digital All
11. Orell Digital Language Lab (Licensed Version)

**REFERENCE BOOKS:**

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook.* Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* Cambridge





University Press

3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook*. Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient Black Swan Pvt.Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.

R22-B.TECH-MECHANICAL



**22MC0002 - ENVIRONMENTAL SCIENCE**

**B.Tech. I Year I Sem.**

**L T P C**  
**3 0 0 0**

**Course Objectives:**

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

**Course Outcomes:**

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I : ECOSYSTEMS**

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II : NATURAL RESOURCES: CLASSIFICATION OF RESOURCES**

Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III : BIODIVERSITY AND BIOTIC RESOURCES**

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV : ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES : ENVIRONMENTAL POLLUTION**

Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

**UNIT - V : ENVIRONMENTAL POLICY, LEGISLATION & EIA**

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data



acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

**TEXT BOOKS:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

**REFERENCE BOOKS:**

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.



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# **R22 B.Tech**

# **ME**

## **2023-2024**

# **I Year – II Semester**



## 22BS1211- ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I B.Tech. II Semester

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**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** Develop ability to learn

1. Methods of solving the Ordinary Differential Equations of first order.
2. Methods of solving the higher order Ordinary Differential Equations.
3. Concept, properties of Laplace transforms & using the same to solve ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to vector integration.

**Course outcomes:** After successful completion of this course, student should be able to

1. Identify the type of first order Ordinary Differential Equation and solve them by appropriate method.
2. Apply the concept of higher order Ordinary Differential Equations to solve real world problems.
3. Solve ordinary differential equations by using Laplace transform techniques.
4. Calculate scalar potential for a vector and directional derivative of a scalar point function using vector differentiation.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

### UNIT-I: FIRST ORDER ODE

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

### UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second and higher order linear differential equations with constant coefficients: non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin bx$ ,  $\cos bx$ , polynomials in  $x^k$ ,  $ve^{ax}$  and  $x V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

### UNIT-III: LAPLACE TRANSFORMS

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, second shifting theorem (without proof), Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

### UNIT-IV: VECTOR DIFFERENTIATION

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.



### **UNIT-V: VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition,
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, S<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.



## 22BS1212- ENGINEERING CHEMISTRY

**B.Tech. I Year II Sem.**

**L T P C**  
**3 1 0 4**

### **Course Objectives:**

1. To acquire knowledge about desalination of brackish water and treatment of municipal water
2. To include the fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
4. To understand the significance of green chemistry and green synthesis and to imbibe the green chemistry principles.
5. To acquire required knowledge about engineering materials like smart materials, lubricants, and biodiesel.

### **Course Outcomes:**

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4. The student can use real examples to illustrate how the principles of *green chemistry* can be applied to chemical process in engineering
5. They can predict potential applications of engineering materials and practical utility in order to become good engineers and entrepreneurs.

### **UNIT - I: WATER AND ITS TREATMENT:**

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation, Determination of F<sup>-</sup> ion by ion-selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion-exchange processes. Desalination of water – Reverse osmosis.

### **UNIT – II BATTERY CHEMISTRY & CORROSION**

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

### **UNIT - III: POLYMERIC MATERIALS:**

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and



characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

#### **UNIT - IV: GREEN CHEMISTRY AND ENGINEERING FOR SUSTAINABLE DEVELOPMENT**

Definition and history of Green chemistry, Concept and principles (Prevention, Atom Economy, Less Hazardous Chemical Syntheses, Designing Safer Chemicals, Safer Solvents and Auxiliaries, Design for Energy Efficiency, Use of Renewable Feedstock, Reduce, Derivatives, Catalysis, Design for Degradation, Real-time Analysis for Pollution Prevention, Inherently Safer Chemistry for Accident Prevention) of Green Chemistry with suitable examples.

#### **UNIT - V: ENGINEERING MATERIALS:**

##### **Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Bio Diesel:** Sources and applications of Biodiesel

##### **TEXT BOOKS:**

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
5. Engineering Chemistry by K Sesha Maheswaramma and Mridula Chugh, Pearson Publications.

##### **REFERENCE BOOKS:**

- 1 Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
- 2 Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)





**22ME1255 - COMPUTER AIDED ENGINEERING GRAPHICS**

**B.Tech. I Year II Sem.**

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**Course Objectives:**

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products
3. To draw sectional views and pictorial views for various types of solids.
4. To develop the lateral surfaces of basic engineering objects
5. To impart knowledge about standard principles of orthographic projection and isometric views of different objects.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D and 3D objects
2. sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

**UNIT – I: INTRODUCTION TO ENGINEERING GRAPHICS:**

Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

**UNIT- II: ORTHOGRAPHIC PROJECTIONS:**

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

**UNIT – III:**

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

**UNIT – IV:**

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

**UNIT – V:**

**Isometric Projections:** Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.



**TEXT BOOKS:**

- 1 Engineering Drawing N.D. Bhatt / Charotar
- 2 Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

**REFERENCE BOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

**Note:** - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.



**22ME1214: ENGINEERING MECHANICS**

**B.Tech. I Year II Sem.**

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**Course Objectives:** The objectives of this course are to

1. Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
2. Perform analysis of bodies lying on rough surfaces.
3. Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
4. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal moment plane motion of rigid bodies.
5. Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

**Course Outcomes:** At the end of the course, students will be able to

1. CO 1: Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
2. CO 2: Solve problem of bodies subjected to friction.
3. CO 3: Find the location of centroid and calculate moment of inertia of a given section.
4. CO 4: Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
5. CO 5: Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.

**UNIT - I:**

Introduction to Engineering Mechanics - Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy

**UNIT - II:**

**Friction:** Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack;  
Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus

**UNIT - III:**

Area Moment of Inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem  
Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies.



**UNIT - IV:**

Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polarcoordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular,path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

**UNIT - V:**

Kinetics of Rigid Bodies -Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D' Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation.

**TEXT BOOKS:**

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics –Statics & Dynamics

**REFERENCE BOOKS:**

1. Beer F.P & Johnston E.R Jr., Vector Mechanics for Engineers – Statics and Dynamics, McGraw Hill, 12<sup>th</sup> Edition.
2. Dumir P.C, Sengupta, Srinivas, Engineering Mechanics- Universities Press, 2020.
3. Hibbeler R.C, Engineering Mechanics, Pearson, 14<sup>th</sup> Edition.
4. Arshad Noor, Zahid & Goel, Engineering Mechanics, Cambridge University Press, 2018.
5. Khurmi R.S, Khurmi N., Engineering Mechanics, S. Chand, 2020.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press



**22ME1215: ENGINEERING MATERIALS**

**B.Tech. I Year II Sem.**

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**Course Objectives:** The objectives of this course are to

1. Provide basic understanding of engineering materials, their structure, classification and usage.
2. Introduce the testing methods for various material properties and ASTM standards used in testing.
3. Understand the various metals used in composite materials.
4. Understand the importance of ceramics, polymers and other new materials..
5. Introduce the Basic elements of Nano Technology.

**COURSE OUTCOMES:** At the end of the course, students will be able to:

1. Classify the various materials that will be essential for the mechanical engineering applications.
2. Express the mechanical properties of metals and their testing procedures.
3. Understand the application of materials and their processing
4. Understand the requirement and need for the development of the new materials.
5. Understand the need of Nano technology in the development of new materials.

**UNIT-I:**

Classification of Engineering Materials, Ashby chart, Mechanical Properties of Metals and their testing equipment/procedures, ASTM standards for testing, Stress–Strain Behavior of various materials, Sources of Material Data

**UNIT –II:**

Metals and Metal Alloys, Classification of Metal Alloys, Classification, composition, properties and usage of Ferrous alloys, steel, HSS, grey cast iron, white cast iron; Classification, composition, properties and usage of Non-ferrous materials, Aluminum, Titanium, Zinc, Copper, Nickel, Cobalt and their alloys

**UNIT –III:**

Composites: Definitions, Reinforcements and matrices, Types of reinforcements, Types of matrices, Classification of composites, Properties of composites in comparison with standard materials Manufacturing methods: Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs.

**UNIT – IV:**

Ceramics, Classification of ceramic materials, Crystal Structure, Applications and Properties of Ceramics, Ceramic fabrication techniques, Carbon: Diamond and Graphite.

Polymer Structures, Chemistry of Polymer Molecules, Classification scheme of polymer molecules, Thermoplastic and Thermosetting Polymers, Characteristics, Applications, and Processing of Polymers, Elastomers.



**UNIT – V:**

Materials in nano technology: Semiconductor Nanomaterials (Zinc oxide nano materials, titanium dioxide nanoparticles, Metal nanoparticles, ceramic nano materials metal nano particles (Silver, gold, iron and copper), applications, bio materials and other recent materials

**TEXT BOOKS:**

1. George Murray, Charles V. White, Wolfgang Weise, “Introduction to Engineering Materials”, CRC Press, 2007.
2. William. D. Callister, David G. Rethwisch, “Materials Science and Engineering: An Introduction”, John Wiley & Sons, 2018.

**REFERENCE BOOKS:**

1. Myer Kutz, “Mechanical Engineers’ Handbook”, John Wiley & Sons, 2015.
2. M.A. Shah, K.A. Shah, Nano technology, the science of Small, WILEY, Second Edition, 2019.
3. E. Paul De Garmo, J.T. Black, R.A. Kohler. Materials and Processes in Manufacturing, John Wiley and Sons, Inc., NY, 11 th Edition, 2012.
4. R.J. Crawford, plastics engineering, Pergamon Press, 2013.
5. Donald R Asklund and Pradeep P Phule “Essentials of Materials Science and Engineering”, by Pradeep P. Fulay (Author), Donald R. Askeland, 2013.
6. K. K. Chawala, Ceramic Matrix composite Materials, Kluwer Academic Publishers, 2002.



## 22CS1251: PYTHON PROGRAMMING LAB

**B.Tech. I Year II Sem.**

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**0 1 2 2**

### Course Objectives:

1. To learn python programming language using the data types, input/ output statements.
2. To install and run the Python interpreter
3. To learn control structures.
4. To Understand Lists, Dictionaries in python
5. To Handle Strings and Files inPython

**Course Outcomes:** After completion of the course, the student should be able to

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Verify programs using modular approach, file I/O, Python standard library
4. Implement Digital Systems using Python
5. Capable to implement on hardwareboards

Note: The lab experiments will be like the following experiment examples

### Week -1:

1. i) Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.  
i) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3. i) Write a program to calculate compound interest when principal, rate and number of periods are given.  
ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points
4. Read name, address, email and phone number of a person through keyboard and print the details.

### Week - 2:

1. Print the below triangle using for loop.  
5  
4 4  
3 3 3  
2 2 2 2  
1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)



### Week - 3:

1. i) Write a program to convert a list and tuple into arrays.  
ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

### Week - 4:

1. Write a function called is\_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has\_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.

Write a function called remove\_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.

- i). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
- ii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'  
ii) Remove the given word in all the places in a string?  
iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?
4. Writes a recursive function that generates all binary strings of n-bit length

### Week - 5:

1. i) Write a python program that defines a matrix and prints  
ii) Write a python program to perform addition of two square matrices  
iii) Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

### Week-6:

1. a. Write a function called draw\_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.  
b. Add an attribute named color to your Rectangle objects and modify draw\_rectangle so that it uses the color attribute as the fill color.  
c. Write a function called draw\_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.





- objects. Write a function called `draw_circle` that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
  3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

#### **Week- 7:**

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences
4. Write a function that reads a file *file1* and displays the number of words, number of vowels, blankspaces, lower case letters and uppercase letters.

#### **Week - 8:**

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
4. Write a program to implement Half Adder, Full Adder, and Parallel Adder
5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

#### **TEXT BOOKS:**

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

#### **REFERENCE BOOKS:**

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and WebApplications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W. Chun, Pearson
6. Introduction to Python, Kenneth A. Lambert, Cengage



**22BS1252 - ENGINEERING CHEMISTRY LABORATORY**

**B.Tech. I Year II Sem.**

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**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.

**Course Outcomes:** The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.

**List of Experiments:**

- I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
- II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
- III. **Potentiometry:** Estimation of the amount of  $\text{Fe}^{+2}$  by Potentiometry.
- IV. **pH Metry:** Determination of an acid concentration using pH meter.
- V. Preparations:
  1. Preparation of Bakelite.
  2. Preparation Nylon – 6.
- VI. **Lubricants:**
  1. Estimation of acid value of given lubricant oil.
  2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
- VII. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
- VIII. Virtual lab experiments
  1. Construction of Fuel cell and its working.
  2. Smart materials for Biomedical applications
  3. Batteries for electrical vehicles.
  4. Functioning of solar cell and its applications.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).



**22ME1253: FUELS AND LUBRICANTS LABORATORY**

**B.Tech. I Year II Sem.**

**L T P C**  
**0 0 2 1**

**Prerequisite:** Chemistry

**Course Objectives:**

1. To understand the fuel and lubricants properties.
2. To understand about importance of flash point and fire point of fuels
3. To understand about different types of viscometers and their uses
4. To understand about different types of calorimeters and their uses
5. To calculate the carbon residue

**Course Outcomes:** At the end of the course ,students will be able to

1. Find the kinematic viscosity of lubricants and its variation with temperature
2. Determine the flash point, fire point, cloud point and pour point of liquid fuels
3. Determine the calorific value of solid, liquid and gaseous fuels
4. Determination of the dropping point of lubricating grease
5. Determination of distillation characteristics of petroleum products

List of Experiments:

1. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Abels Apparatus
2. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Pensky MartensApparatus
3. Carbon residue test: Liquid fuels.
4. Determination of Viscosity of Liquid lubricants and Fuels using: Saybolt Viscometer
5. Determination of Viscosity of Liquid lubricants and Fuels using: Redwood Viscometer
6. Determination of Viscosity of Liquid lubricants and Fuels using: Engler Viscometer
7. Determination of Calorific value: of Gaseous fuels using: Junkers Gas Calorimeter.
8. Determination of Calorific value: Solid/Liquid/ fuels using: Bomb Calorimeter.
9. Drop point and Penetration Apparatus for Grease.
10. ASTM Distillation Test Apparatus.
11. Cloud and Pour Point Apparatus.



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**DEPARTMENT  
OF  
ELECTRICAL AND ELECTRONICS ENGINEERING**

**R22 B.TECH. EEE**

**ACADEMIC YEAR: 2023-24**

**I B.TECH (EEE)  
COURSE STRUCTURE  
&  
SYLLABUS**

**B.TECH. ELECTRICAL AND ELECTRONICS ENGINEERING****EFFECTIVE FROM ACADEMIC YEAR 2023 - 24 ADMITTED BATCH****R22 COURSE STRUCTURE AND SYLLABUS****I YEAR I – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1	22BS1111	Matrices and Calculus	3	1	0	4
2	22BS1113	Applied Physics	3	1	0	4
3	22CS1114	C Programming and Data Structures	3	0	0	3
4	22EE1113	Electrical Circuit Analysis – I	3	0	0	3
5	22ME1156	Engineering Workshop	0	1	3	2.5
6	22EE1153	Elements of Electrical and Electronics Engineering	0	0	2	1
7	22BS1153	Applied Physics Laboratory	0	0	2	1.5
8	22CS1154	C Programming and Data Structures Laboratory	0	0	2	1
9	22MC0001	Induction Program				
		<b>Total Credits</b>	<b>13</b>	<b>2</b>	<b>10</b>	<b>20</b>

**I Year II Semester**

S. No.	Course Code	Course Title	L	T	P	Credits
1	22BS1211	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	22BS1212	Engineering Chemistry	3	1	0	4
3	22ME1255	Computer Aided Engineering Graphics	1	0	4	3
4	22HS1212	English for Skill Enhancement	2	0	0	2
5	22EE1215	Electrical Circuit Analysis – II	2	0	0	2
6	22BS1252	Engineering Chemistry Laboratory	0	0	3	1
7	22HS1252	English Language and Communication Skills Laboratory	0	0	2	1
8	22CS1253	Applied Python Programming Laboratory	0	1	2	2
9	22EE1255	Electrical Circuit Analysis Laboratory	0	0	2	1
10	22MC0002	Environmental Science	3	0	0	0
		<b>Total Credits</b>	<b>13</b>	<b>2</b>	<b>14</b>	<b>20</b>



# **R22 B.Tech**

# **EEE**

## **2023-2024**

# **I Year – I Semester**


**22BS1111-MATRICES AND CALCULUS**
**I B Tech. I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Prerequisite(s):** Mathematical knowledge at Pre university level.

**Course Objectives:** Develop ability to learn the concept of

1. Rank of the matrix and apply the same to know the consistency for the linear system of equations.
2. Eigen values and Eigen vectors to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems, Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and Finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

**Course Outcomes:** After successful completion of this course, the student should be able to

1. Write the matrix representation of a set of linear equations, find the rank and apply the same to analyse the solution of the system of equations.
2. Reduce the quadratic form to canonical form using orthogonal transformations by finding Eigenvalues and Eigen vectors.
3. Solve the applications on the mean value theorems, Evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints using partial differentiation.
5. Evaluate the multiple integrals and apply the concept to find areas and volumes.

**UNIT - I: MATRICES**

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

**UNIT - II: EIGEN VALUES AND EIGEN VECTORS**

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

**UNIT - III: CALCULUS**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proof). Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates for known curves (circle, parabola, ellipse), Definition of Improper Integral: Beta and Gamma functions and their applications.

**UNIT - IV: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND**

**APPLICATIONS)**

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

**UNIT-V: MULTIVARIABLE CALCULUS (INTEGRATION)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form for known curves (circle, parabola, ellipse), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

**REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.





## 22BS1113: APPLIED PHYSICS

**B. Tech. I Year I Sem**

**L T P C**  
**3 1 0 4**

### Course Objectives:

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrication techniques.
5. Study the characteristics of lasers and optical fibers.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering applications.
3. Explore the fundamental properties of dielectric, magnetic and energy materials for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

### UNIT-I: QUANTUM PHYSICS AND SOLIDS

**Quantum Mechanics:** Introduction to quantum physics, blackbody radiation, Wein's and Rayleigh-Jean's law, Planck's radiation law (Qualitative) –photo electric effect de-Broglie hypothesis and matter waves-Davisson and Germer experiment-Heisenberg uncertainty principle-Born interpretation of the wave function-time independent Schrodinger wave equation-particle in one dimensional potential box.

**Solids:** Free electron theory (Drude & Lorentz, Sommerfeld)(Qualitative) Bloch's theorem-Kronig-Penney model(Qualitative) origin of energy bands-classification of solids.

### UNIT- II: SEMICONDUCTORS AND DEVICES

Intrinsic and extrinsic semiconductors-Hall effect- direct and indirect band gap semiconductors- construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor(BJT)-LED, PIN diode, avalanche photo diode(APD) and solar cells, their structure, materials, working principle and characteristics.



### UNIT- III: DIELECTRIC AND MAGNETIC AND ENERGY MATERIALS

**Dielectric Materials:** Basic definitions-types of polarizations (qualitative)-ferroelectric, piezoelectric, and pyroelectric materials.

**Magnetic Materials:** Basic definitions – classification of Magnetic materials – Domain theory of ferromagnetism in hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance.

**Energy Materials:** Conductivity of liquid and solid electrolytes-super ionic conductors-materials and electrolytes for super capacitors.

### UNIT-IV: NANOTECHNOLOGY

Nanoscale, quantum confinement, surface to volume ratio. **Bottom-up fabrication:** sol-gel, precipitation, combustion methods. **Top-down fabrication:** ball milling-physical vapor deposition (PVD)-chemical vapor deposition (CVD)-characterization techniques - XRD, SEM&TEM-applications of nanomaterials.

### UNIT-V: LASER AND FIBEROPTICS

**Lasers:** Laser beam characteristics-three quantum processes-Einstein coefficients and their relations- lasing action –pumping methods, CO<sub>2</sub> laser, Nd: YAG laser-semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber-advantages of optical Fibers-total internal reflection- construction of optical fiber-acceptance angle-numerical aperture-classification of optical fibers- losses in optical fiber-optical fiber for communication system-applications.

### TEXTBOOKS:

1. M.N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy "A Text book of Engineering Physics"- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices-Basic Principle–Donald A, Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B. K .Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.

**REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics–Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V.Kumar, Pragathi Prakashan, 2019.
5. A. K. Bhandhopadhyaya -Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.



## 22CS1114: C PROGRAMMING AND DATA STRUCTURES

**B.Tech. I Year I Sem**

**L T P C**  
**3 0 0 3**

### Course Objectives:

1. Learn adequate knowledge by problem solving techniques.
2. Understand programming skills using the fundamentals and basics of C Language.
3. Improve problem solving skills using arrays, strings, and functions.
4. Understand the dynamics of memory by pointers.
5. Study files creation process with access permissions.

### Course Outcomes:

1. Explore the basic concepts in C Programming Language.
2. Develop modular and readable C Programs
3. Understand the basic concepts such as Abstract Data Types, Linear and Non-Linear Datastructures.
4. Apply data structures such as stacks, queues in problem solving
5. To understand and analyze various searching and sorting algorithms.

### UNIT - I

**Introduction to Computers** – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

**Introduction to C Language** – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output

**Structure of a C Program** – Operators, Bit-wise operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements.

### UNIT - II

**Statements** – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Recursion.

**Designing Structured Programs**- Functions, basics, user defined functions, inter function communication, standard functions.

**Arrays** – Concepts, using arrays in C, inter function communication, array applications, two –dimensional arrays, multidimensional arrays.

### UNIT - III

**Pointers** – Introduction, Pointers for inter function communication, pointers to pointers, compatibility.



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**Pointer Applications** – Passing an array to a function, Memory allocation functions: malloc(), calloc(), realloc(), free(), array of pointers

**Strings** – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion.

#### UNIT - IV

**Derived types** – The Typedef, enumerated types, Structures – Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.

**Input and Output** – Text vs Binary streams, standard library functions for files, converting file types, File programs – copy, merge files.

#### UNIT – V:

**Searching and Sorting Techniques**- Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms)

**Data Structures** – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

#### TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, CengageLearning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, PearsonEducation.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/PearsonEducation

#### REFERENCE BOOKS:

1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.


**22EE1113: ELECTRICAL CIRCUIT ANALYSIS –I**
**B.Tech. I Year I Sem.**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Prerequisites:** Mathematics

**Course Objectives:**

1. To gain knowledge in circuits and to understand the fundamentals of derived circuit laws.
2. To study and understand the analysis of single phase circuits.
3. To study and understand the different theorems.
4. To study and understand the analysis of Three-phase circuits.
5. To study and understand the concept of coupled circuits and network topology.

**Course Outcomes:** After completion of this course, students will be able to

1. Summarize basic laws and various techniques used in electrical circuits analysis
2. Evaluate steady state behavior of circuits for AC excitations.
3. Analyze electric circuits using network theorems.
4. Analyze the three phase balanced and unbalanced circuits.
5. Discuss the concepts of coupled circuits and network topology

**UNIT-I:**
**Network Elements & Laws:** Active elements, Independent and dependent sources. Passive elements

— R, L and C, Energy stored in inductance and capacitance, Kirchhoff's laws, Source transformations, Star-delta transformations, Node voltage method, Mesh current method including super node and supermesh analysis.

**UNIT-II:**

**Single-Phase Circuits:** RMS and average values of periodic sinusoidal and non- sinusoidal waveforms, Phasor representation, Steady-state response of series, parallel and series-parallel circuits. Impedance, Admittance, Current locus diagrams of RL and RC series and parallel circuits with variation of various parameters. Resonance: Series and parallel circuits, Bandwidth and Q-factor.

**UNIT-III:**

**Network theorems:** Superposition theorem, Thevinin's theorem, Norton's theorems, Maximum power

transfer theorem, Tellegen's theorem, Compensation theorem, Milliman's theorem and Reciprocity theorem. (AC & DC).

**UNIT-IV:**

**Poly-phase Circuits:** Analysis of balanced and unbalanced 3-phase circuits, Star and delta



connections, Measurement of three-phase power for balanced and unbalanced loads.

**UNIT-V:**

**Coupled circuits:** Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of circuits with mutual inductance.

**Topological Description of Networks:** Graph, tree, chord, cut-set, incident matrix, circuit matrix and cut-set matrix,

**TEXTBOOKS:**

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3<sup>rd</sup> Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2<sup>nd</sup> Edition, 2019.

**REFERENCE BOOKS:**

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W. Nilsson, Susan A. Riedel, "Electric Circuits", Pearson, 11<sup>th</sup> Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGrawHill, 5<sup>th</sup> Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3<sup>rd</sup> Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGrawHill, 6<sup>th</sup> Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.



## 22ME1156: ENGINEERING WORKSHOP

**B.Tech. I Year I Sem.**

**L T P C**  
**0 1 3 2.5**

**Pre-requisites:** Practical skill

**Course Objectives:**

1. To Study about different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

**Course Outcomes:** At the end of the course, the student will be able to:

1. CO1: Study and practice on machine tools and their operations
2. CO2: Practice on manufacturing of components using work shop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO4: Apply basic electrical engineering knowledge for house wiring practice.
5. CO 5: Study and Practice of arc welding process

### 1. TRADES FOR EXERCISES:

**At least two exercises from each trade:**

- I. Carpentry–(T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting–(V-Fit, Dovetail Fit & Semi-circular fit)
- III. Tin-Smithy–(Square Tin, Rectangular Tray & Conical Funnel)
- IV. Foundry–(Preparation of Green Sand Mould using Single Piece and split Pattern)
- V. Welding Practice–(Arc Welding & Gas Welding)
- VI. House-wiring–(Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy–(Round to Square, Fan Hook and S-Hook)

### 2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working





**TEXT BOOKS:**

1. Work shop Practice/B. L. Juneja/Cengage
2. Work shop Manual/K.Venugopal/Anuradha.

**REFERENCEBOOKS:**

1. Work shop Manual-P.Kannaiah/K.L.Narayana/Scitech
2. Work shop Manual/Venkat Reddy/BSP

R22-B.TECH-  
EEE


**22EE1153: ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING**
**B.Tech. I Year I Sem.**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Prerequisites:** Elements of Electrical Engineering

**Course Objectives:**

1. To measure the electrical parameters for different types of DC circuits using conventional approaches.
2. To measure the electrical parameters for different types of DC circuits using theorems approach.
3. To measure the electrical parameters for different types of AC circuits
4. To study the transient response of various R, L and C circuits using DC excitation.
5. To determine form factor for non-sinusoidal waveform

**Course Outcomes:** After completion of this course, students will be able to

1. Verify the basic conventional approaches for D C electrical circuits
2. Verify the various theorems for D.C electrical circuits
3. Calculate the electrical parameters for different types of AC circuits
4. Analyze the transient responses of R, L and C circuits for different input conditions.
5. Estimate form factor for non-sinusoidal waveform

**List of experiments/demonstrations:**
**PART-A (compulsory)**

1. Verification Ohm's Law
2. Verification of KVL
3. Verification of KCL
4. Verification of Thevenin's theorem
5. Verification of Norton's theorem
6. Verification of Superposition theorem
7. Verification of Reciprocity Theorem
8. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits

**PART-B (any two experiments from the given list)**

1. Verification of Milliman's Theorem.
2. Verification of Maximum Power Transfer Theorem.
3. Determination of form factor for non-sinusoidal waveform



4. Transient Response of Series RL circuit for DC excitation
5. Transient Response of Series RC circuit for DC excitation

**TEXTBOOKS:**

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

1. P.Ramana, M.Suryakalavathi, G.T.Chandrasheker, "Basic Electrical Engineering", S.Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M.S.Sukhija, T.K.Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.



## 22BS1153: APPLIED PHYSICS LABORATORY

**B. Tech. I Year I Sem**

**L T P C**

**0 0 3 1.5**

**Course Objectives:** The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photo electric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Understand the method of least square fitting
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Study the behavior of passive components.

**Course Outcomes:** At the end of this course, the students will be able to

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Carried out data analysis
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Learn the characteristics of passive components like L, C and R and their applications.

**LIST OF EXPERIMENTS:** Any 8 experiments are to be performed

1. Understanding the method of least squares– torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. Characteristics of series and parallel LCR circuits.
5. V-I characteristics of a p-n junction diode and Zener diode
6. Input and output characteristics of BJT(CE, CB & CC configurations)
7. a). V-I and L-I characteristics of light emitting diode (LED) b). V-I characteristics of a Laser diode
8. V-I Characteristics of solar cell
9. a). Determination of the beam divergence of the given LASER beam  
b). Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. Determination of Energy gap of a semiconductor.
11. Determination of time constant of RC Circuit.
12. Study B-H curve of a magnetic material.

**REFERENCEBOOK:**

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"-S Chand Publishers, 2017.



### 22CS1154: C PROGRAMMING AND DATA STRUCTURES LABORATORY

**B.Tech. I Year I Sem**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Objectives:**

1. To learn C-language Programs using the data types, input/ output statements and control statements.
2. Describe the importance of modular programming and arrays using C-Language Program.
3. Understand the concept and use of pointers for memory management techniques, structure, union, and enumerated types.
4. Understand the basic characteristics of text, binary files
5. Understand and C implementation of file I/O using streams.

**Course Outcomes:**

1. Ability to design and test programs to solve mathematical and scientific problems.
2. Ability to write structured programs using control structures and functions.
3. Able to Implement C programs using arrays & pointers.
4. Able to Use the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Able to execute programs that read and write text, binary files using the formatting and character I/O functions.

**List of Experiments:**

**WEEK-1:**

- a. Write a C program to find simple interest and compound interest.
- b. Write a C program to convert Celsius to Fahrenheit.
- c. Write a C Program to swap two numbers.
- d. Write a C program to perform all arithmetic operations (+, -, \*, /, %).
- e. Write a simple program that prints the results of all the operators available in C (Including pre/ post increment, bitwise and/or/not, etc.). Read required operand values from standard input.

**WEEK-2:**

- a. Write a C program to find the sum of individual digits of a positive integer.
- b. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
- c. Write a C program to generate the first n terms of the sequence.

**WEEK-3:**

- a. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- b. Write a C program to find the roots of a quadratic equation.
- c. Write a C program to find the factorial of a given integer.

**WEEK-4:**

- a. Write a C program to find the GCD (greatest common divisor) of two given integers.



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- b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement)
- c. Write a C program to solve Towers of Hanoi problem.

### WEEK-5:

- a. Write a C program to find both the largest and smallest number in a list of integers.
- b. Write a C program that uses functions to perform the following:
  - i) Addition of Two Matrices
  - ii) Multiplication of Two Matrices

### WEEK-6:

- a. Write a C program that uses functions to perform the following operations:
- b. To insert a sub-string in to a given main string from a given position.
- c. To delete n Characters from a given position in a given string.

### WEEK-7:

- a. Write a C program to determine if the given string is a palindrome or not
- b. Write a C program that displays the position or index in the string S where the string T begins, or  
– 1 if S doesn't contain T.

### WEEK-8:

- a. Write a C program to count the lines, words and characters in a given text.
- b. Write a C program to generate Pascal's triangle.
- c. Write a C program to construct a pyramid of numbers

### WEEK-9:

- a. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:  $1+x+x^2+x^3+\dots+x^n$   
For example: if n is 3 and x is 5, then the program computes  $1+5+25+125$ . Print x, n, the sum Perform error checking.

For example, the formula does not make sense for negative exponents – if n is less than 0.

Have your program print an error message if  $n < 0$ , then go back and read in the next pair of numbers without computing the sum. Are any values of x also illegal? If so, test for them too.

- b. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

### WEEK-10:

- a. Write a C program to convert a Roman numeral to its decimal equivalent.
- b. Write a C program that uses functions to perform the following operations:



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- i) Reading a complex number
  - ii) Writing a complex number
  - iii) Addition of two complex numbers
  - iv) Multiplication of two complex numbers
- (Note: represent complex number using a structure.)

**WEEK-11:**

- a. Write a C program which copies one file to another.
- b. Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)
- c. Write a C program to display the contents of a file.
- d. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

**WEEK-12:**

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

- i) Bubble sort ii) Selection sort iii) Insertion sort

**WEEK-13:**

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:

- i) Linear search                      ii) Binary search

**WEEK 14:**

Write a C program that uses functions to perform the following operations on singly linked list.:

- i) Creation                      ii) Insertion                      iii) Deletion                      iv) Traversal

**WEEK-15:**

Write C programs that implements the following data structures

- i) Stacks (push,pop,display)    ii) queues(insert,delete,display)

**TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.



**22MC001: INDUCTION PROGRAM**

R22-B.TECH-  
EEE





**R22 B.Tech**

**EEE**

**2023-2024**

**I Year – II Semester**


**22BS1211: ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**
**B. Tech. I Year II Sem**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** Develop ability to learn

1. Methods of solving the Ordinary Differential Equations of first order.
2. Methods of solving the higher order Ordinary Differential Equations.
3. Concept, properties of Laplace transforms & using the same to solve ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to vector integration.

**Course Outcomes:** After successful completion of this course, student should be able to

1. Identify the type of first order Ordinary Differential Equation and solve them by appropriate method.
2. Apply the concept of higher order Ordinary Differential Equations to solve real world problems.
3. Solve ordinary differential equations by using Laplace transform techniques.
4. Calculate scalar potential for a vector and directional derivative of a scalar point function using vector differentiation.
5. Evaluate the line,

**UNIT-I: FIRST ORDER ODE**

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates).

**Applications:** Newton's law of cooling, Law of natural growth and decay.

**UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER**

 Second and higher order linear differential equations with constant coefficients: non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin bx$ ,  $\cos bx$ , polynomials in  $x$ ,  $ve^{ax}$  and  $V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

**Applications:** Electric Circuits

**UNIT-III: LAPLACE TRANSFORMS**
**Laplace Transforms:** Laplace Transform of standard functions, First shifting theorem, second shifting theorem (without proof), Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof).

**Applications:** Solving Initial value problems by Laplace Transform method.

**UNIT-IV: VECTOR DIFFERENTIATION**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

**UNIT-V: VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

**TEXTBOOKS:**

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition,
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

**REFERENCEBOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G. B. Thomas and R. L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.


**22BS1212- ENGINEERING CHEMISTRY**
**B.Tech. I Year II Sem.**
**L T P C**  
**3 1 0 4**
**Course Objectives:**

1. To acquire knowledge about desalination of brackish water and treatment of municipal water
2. To include the fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
4. To understand the significance of green chemistry and green synthesis and to imbibe the green chemistry principles.
5. To acquire required knowledge about engineering materials like smart materials, lubricants, and biodiesel.

**Course Outcomes:**

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4. The student can use real examples to illustrate how the principles of *green chemistry* can be applied to chemical process in engineering
5. They can predict potential applications of engineering materials and practical utility in order to become good engineers and entrepreneurs.

**UNIT - I: WATER AND ITS TREATMENT:**

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation, Determination of  $F^-$  ion by ion-selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion-exchange processes. Desalination of water – Reverse osmosis.

**UNIT – II BATTERY CHEMISTRY & CORROSION**

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

**UNIT - III: POLYMERIC MATERIALS:**

Definition – Classification of polymers with examples – Types of polymerization –addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:**

Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP).

**Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokolrubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction intrans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

**UNIT - IV: GREEN CHEMISTRY AND ENGINEERING FOR SUSTAINABLE DEVELOPMENT**

Definition and history of Green chemistry, Concept and principles (Prevention, Atom Economy, Less Hazardous Chemical Syntheses, Designing Safer Chemicals, Safer Solvents and Auxiliaries, Design for Energy Efficiency, Use of Renewable Feedstock, Reduce, Derivatives, Catalysis, Design for Degradation, Real-time Analysis for Pollution Prevention, Inherently Safer Chemistry for Accident Prevention) of Green Chemistry with suitable examples.

**UNIT - V: ENGINEERING MATERIALS:****Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinylamides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Bio Diesel:** Sources and applications of Biodiesel

**TEXT BOOKS:**

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengae learning, 2016
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
5. Engineering Chemistry by K Sesha Maheswaramma and Mridula Chugh, Pearson Publications.

**REFERENCE BOOKS:**

- 1 Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
- 2 Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)


**22ME1255: COMPUTER AIDED ENGINEERING GRAPHICS**
**B.Tech. I Year II Sem.**
**L T P C**  
**1 0 4 3**
**Course Objectives:**

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products
3. To draw sectional views and pictorial views for various types of solids.
4. To develop the lateral surfaces of basic engineering objects
5. To impart knowledge about standard principles of orthographic projection and isometric views of different objects.

**Course Outcomes:** At the end of the course, the student will be able to

1. Apply computer aided drafting tools to create 2D and 3D objects
2. sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

**UNIT-I:**
**Introduction to Engineering Graphics:** Principles of Engineering Graphics and their Significance, Scales–Plain & Diagonal, Conic Sections including the Rectangular Hyperbola –General method only. Cycloid, Epi cycloid and Hypo cycloid, Introduction to Computer aided drafting–views, commands and conics

**UNIT-II:**
**Orthographic Projections:** Principles of Orthographic Projections–Conventions–Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections–points, lines and planes

**UNIT-III:**

Projections of Regular Solids–Auxiliary Views–Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids– sectional views

**UNIT-IV:**

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

**UNIT-V:**
**Isometric Projections:** Principles of Isometric Projection–Isometric Scale–Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical



Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions.  
Conversion of orthographic projection into isometric view using computer aided drafting.

**TEXTBOOKS:**

1. Engineering Drawing N. D. Bhatt /Charotar
2. Engineering Drawing and graphics Using Auto CAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.

**REFERENCEBOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition Mc Graw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane/Pearson.
4. Engineering Drawing, N.S. Parthasarathy and VelaMurali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

**Note:** - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.


**22HS1212: ENGLISH FOR SKILL ENHANCEMENT**
**B.Tech. I Year II Sem.**
**L T P C**
**2 0 0 2**
**Course Objectives:** This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Learn remedial and functional grammar related to various grammar items.
4. Prepare the students for examinations such as IELTS and TOEFL by sharpening their reading and writing skills
5. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:** Students will be able to:

1. Use a wide range of vocabulary and sentence structures and also acquire basic proficiency in reading and writing modules of English.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

**UNIT-I**

 Chapter entitled '*Toasted English*' by R. K. Narayan from "*English: Language, Context and Culture*" published by Orient BlackSwan, Hyderabad.

**Vocabulary:** The Concept of Word Formation – The Use of Prefixes and Suffixes- Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance – Techniques for Effective Reading.

**Writing:** Sentence Structures – Use of Phrases and Clauses in Sentences–Importance of Proper Punctuation – Techniques for Writing precisely–Paragraph Writing–Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

**UNIT-II**

 Chapter entitled '*Appro JRD*' by Sudha Murthy from "*English: Language, Context and Culture*" published by Orient BlackSwan, Hyderabad.

**Vocabulary:** Words Often Misspelt-Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.





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**Reading:** Sub-Skills of Reading–Skimming and Scanning–Exercises for Practice

**Writing:** Nature and Style of Writing-Defining/Describing People, Objects, Places and Events  
 – Classifying – Providing Examples or Evidence.

### UNIT-III

Chapter entitled ‘**Lessons from Online Learning**’ by **F.Haider Alvi, Deborah Hurstetal** from “*English: Language, Context and Culture*” published by Orient BlackSwan, Hyderabad.

**Vocabulary:** Words Often Confused – Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading–Intensive Reading and Extensive Reading– Exercises for Practice.

**Writing:** Format of a Formal Letter – Writing Formal Letters e.g. Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

### UNIT-IV

Chapter entitled ‘**Art and Literature**’ by **Abdul Kalam** from “*English: Language, Context and Culture*” published by Orient BlackSwan, Hyderabad.

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Exercises for Practice

**Writing:** Writing Practices – Essay Writing – Writing Introduction and Conclusion – Précis Writing.

### UNIT-V

Chapter entitled ‘**Go, Kiss the World**’ by **Subroto Bagchi** from “*English: Language, Context and Culture*” published by Orient BlackSwan, Hyderabad.

**Vocabulary:** Technical Vocabulary and their Usage

**Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

**Reading:** Reading Comprehension – Exercises for Practice

**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

**Note:** *Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.*

➤ **Note:** 1. As the syllabus of English given in AICTE Model Curriculum-2018 for



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*B.Tech First Year is **Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

- **Note: 2.**Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents.They are advised to teach 40 percent of each topic from the syllabus in blended mode.

**TEXT BOOK:**

1. “English: Language, Context and Culture” by Orient BlackSwan Pvt. Ltd, Hyderabad.2022. Print.

**REFERENCE BOOKS:**

1. Effective Academic Writing by Liss and Davis(OUP)
2. Richards, Jack C.(2022)Interchange Series. Introduction,1,2,3.Cambridge University Press
3. Wood, F.T.(2007).Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha.(2018).Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2<sup>nd</sup> ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha.(2013).English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael.(2016).PracticalEnglishUsage.OxfordUniversityPress.FourthEdition.


**22EE1215: ELECTRICAL CIRCUIT ANALYSIS – II**
**B.Tech. I Year II Sem.**
**L T P C**
**2 0 0 2**
**Prerequisites:** Mathematics

**Course Objectives:**

1. To study and understand the transient analysis of various R, L and C circuits for different inputs
2. To study and understand electrical circuit analysis using Laplace transforms
3. To study and understand two-port networks.
4. To study and understand Fourier Series and Integrals
5. To study and understand the concept of filters

**Course Outcomes:** After completion of this course, students will be able to

1. Interpret the response of various R, L and C circuits for different excitations.
2. Analyze the behavior of circuits using Laplace transforms
3. Classify and Calculate two port network parameters
4. Discuss the Fourier Series and Integrals
5. Classify and Describe various filters

**UNIT-I:**

**Transient analysis:** Transient response of R, L & C circuits, Formulation of integral differential equations, Initial conditions, Transient Response of RL, RC and RLC (series and parallel) networks subjected to internal energy, Response to impulse, step, and ramp, exponential and sinusoidal excitations.

**UNIT-II:**

**Electrical circuit Analysis using Laplace Transforms:** Application of Laplace Transforms to RL, RC and RLC (series and parallel) Networks for impulse, step, and ramp, exponential and sinusoidal excitations.

**UNIT-III:**

**Two port network parameters:** Open circuit impedance, short-circuit admittance, Transmission, Hybrid parameters & inter-relationships, Series, parallel and cascade connection of two port networks, System function, and Impedance and admittance functions.

**UNIT-IV:**

**Fourier Series and Integral:** Fourier series representation of periodic functions, Symmetry conditions, Exponential Fourier series, Discrete spectrum, Fourier integral and its properties, Continuous spectrum, Application to simple networks

**UNIT-V:**

**Filters:** Classification of filters – Low pass, High pass, Band pass and Band Elimination,



Constant-k and M-derived filters-Low pass and High pass Filters and Band pass and Band elimination filters (Elementary treatment only)

**TEXTBOOKS:**

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3<sup>rd</sup> Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2<sup>nd</sup> Edition, 2019.

**REFERENCE BOOKS:**

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W. Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11<sup>th</sup> Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGrawHill, 5<sup>th</sup> Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., "Network Analysis", B.S. Publications, 3<sup>rd</sup> Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, "Engineering Circuit Analysis", McGraw Hill, 6<sup>th</sup> Edition, 2002.
6. Chakravarthy A., "Circuit Theory", Dhanpat Rai & Co., First Edition, 1999.

R22-B.TECH  
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**22BS1252: ENGINEERING CHEMISTRY LABORATORY**
**B Tech. I Year II Sem**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
5. Students will be able to visualize the experiments virtually for better understanding

**Course Outcomes:** The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.
5. Can perform the experiments making use of working models

**List of Experiments:**

**I. Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.

**II. Conductometry:** Estimation of the concentration of an acid by Conductometry.

**III. Potentiometry:** Estimation of the amount of  $\text{Fe}^{+2}$  by Potentiometry.

**IV. pH Metry:** Determination of an acid concentration using pH meter.

**V. Preparations:**

1. Preparation of Bakelite.
2. Preparation Nylon -6.

**VI. Lubricants:**

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

**VII. Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

**VIII. Virtual lab experiments**

1. Construction of Fuel cell and its working.



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2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi(2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi(2007).

R22-B.TECH-  
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**22HS1252: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY**
**B.Tech. I Year II Sem.**
**L T P C**
**0 0 2 1**

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

**Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

**Course Outcomes:** Students will be able to:

1. Make use of various online and web resources for independent language learning.
2. Understand the nuances of English language through audio-visual experience and group activities.
3. Neutralize their accent for intelligibility for enabling them to communicate with a global audience.
4. Speak with clarity and confidence which in turn improves their academic performance in the other courses.
5. Face and interact with various stakeholders leading to the enhancement of their employability skills.

**Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. **Computer Assisted Language Learning (CALL) Lab**
- b. **Interactive Communication Skills(ICS)Lab**

**Listening Skills:**
**Objectives**

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions



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*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.*

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

### **Speaking Skills:**

#### **Objectives**

1. To involve students in speaking activities in various contexts
  2. To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice
  - Describing objects/situations/people
  - Role play–Individual/Group activities
  - Just A Mine(JAM)Sessions

The following course contents prescribed for the **English Language and Communication Skills Lab.**

#### **Exercise–I**

##### **CALL Lab:**

*Understand:* Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. *Practice:* Introduction to Phonetics–Speech Sounds–Vowels and Consonants– Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- *Testing Exercises*

##### **ICS Lab:**

*Understand:* Spoken vs. Written language – Formal and Informal English.

*Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

#### **Exercise–II**

##### **CALL Lab:**

*Understand:* Structure of Syllables–Word Stress–Weak Forms and Strong Forms– Stress pattern in sentences – Intonation.

*Practice:* Basic Rules of Word Accent – Stress Shift-Weak Forms and Strong Forms – Stress pattern in sentences – Intonation - *Testing Exercises*

##### **ICS Lab:**

*Understand:* Features of Good Conversation–Strategies for Effective Communication.

*Practice:* Situational Dialogues–Role Play – Expressions in Various Situations–Making Requests and Seeking Permissions - Telephone Etiquette.

#### **Exercise-III**

##### **CALL Lab:**





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*Understand:* Errors in Pronunciation – Neutralising Mother Tongue Interference (MTI).

*Practice:* Common Indian Variants in Pronunciation–Differences between British and American Pronunciation -*Testing Exercises*

#### **ICS Lab:**

*Understand:* Descriptions – Narrations – Giving Directions and Guidelines–Blog Writing

*Practice:* Giving Instructions–Seeking Clarifications–Asking for and Giving Directions–Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

#### **Exercise–IV**

##### **CALL Lab:**

*Understand:* Listening for General Details.

*Practice:* Listening Comprehension Tests-*Testing Exercises*

##### **ICS Lab:**

*Understand:* Public Speaking–Exposure to Structured Talks-Non-verbal Communication-Presentation Skills.

*Practice:* Making a Short Speech–Extempore – Making a Presentation.

#### **Exercise–V**

##### **CALL Lab:**

*Understand:* Listening for Specific Details.

*Practice:* Listening Comprehension Tests – *Testing Exercises*

##### **ICS Lab:**

*Understand:* Group Discussion

*Practice:* Group Discussion

#### **Minimum Requirement of infrastructural facilities for ELCS Lab:**

##### **1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

##### **System Requirement (Hard ware component):**

*Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:*

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

##### **2. Interactive Communication Skills(ICS)Lab:**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.

**Source of Material (Master Copy):**

- *Exercises in Spoken English. Part 1, 2, 3.* CIEFL and Oxford University Press

**Note:** Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10<sup>th</sup> Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

## REFERENCE BOOKS:

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A work book*. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Work book*. Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Work book for CALL and ICS Lab Activities*. Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.



### 22CS1253: APPLIED PYTHON PROGRAMMING LABORATORY

**B.Tech. I Year II Sem**

**L T P C**  
**0 1 2 2**

**Course Objectives:**

1. To learn python programming language using the data types, input/ output statements.
2. To install and run the Python interpreter
3. To learn control structures.
4. To Understand Lists, Dictionaries in python
5. To Handle Strings and Files inPython

**Course Outcomes:** Upon completing this course, the students will be able to

1. Build basic programs using fundamental programming constructs
2. Write and execute python codes for different applications
3. Capable to implement on hardware boards
4. Able to Implement File Handling.
5. Able to deploy Small Projects using Predefined Libraries.

**LIST OF EXPERIMENTS:**

**Cycle - 1**

1. Downloading and Installing Python and Modules
  - a) Python 3 on Linux  
Follow the instructions given in the URL <https://docs.python-guide.org/starting/install3/linux/>
  - b) Python 3 on Windows  
Follow the instructions given in the URL <https://docs.python.org/3/using/windows.html> (Please remember that Windows installation of Python is harder!)
  - c) pip3 on Windows and Linux  
Install the Python package installer by following the instructions given in the URL <https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/>
  - d) Installing numpy and scipy  
You can install any python3 package using the command `pip3 install <packagename>`
  - e) Installing jupyterlab  
Install from pip using the command `pip install jupyterlab`



2. Introduction to Python3
  - a) Printing your biodata on the screen
  - b) Printing all the primes less than a given number
  - c) Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sum of all its factors (excluding the number itself) is equal to the number itself
3. Defining and Using Functions
  - a) Write a function to read data from a file and display it on the screen
  - b) Define a boolean function *is palindrome*()
  - c) Write a function *collatz(x)* which does the following: if  $x$  is odd,  $x = 3x + 1$ ; if  $x$  is even, then  $x = x/2$ . Return the number of steps it takes for  $x = 1$
  - d) Write a function  $N(m, s) = \exp(-(x-m)^2/(2s^2))/\text{sqrt}(2\pi)s$  that computes the Normal distribution
4. The package numpy
  - a) Creating a matrix of given order  $m \times n$  containing *random numbers* in the range 1 to 99999
  - b) Write a program that adds, subtracts and multiplies two matrices. Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication) should be performed
  - c) Write a program to solve a system of  $n$  linear equations in  $n$  variables using matrix inverse
5. The package scipy and pyplot
  - a) Finding if two sets of data have the same *mean* value
  - b) Plotting data read from a file
  - c) Fitting a function through a set a data points using *polyfit* function
  - d) Plotting a histogram of a given data set
6. The strings package
  - a) Read text from a file and print the number of lines, words and characters
  - b) Read text from a file and return a list of all  $n$  letter words beginning with a vowel
  - c) Finding a secret message hidden in a paragraph of text
  - d) Plot a histogram of words according to their length from text read from a file

### Cycle -2

7. Installing OS on Raspberry Pi
  - a) Installation using PiImager
  - b) Installation using image file



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- Downloading an Image
- Writing the image to an SD card
  - using Linux
  - using Windows
- Booting up

Follow the instructions given in the URL

<https://www.raspberrypi.com/documentation/computers/getting-started.html>

8. Accessing GPIO pins using Python

a) Installing GPIO Zero library.

First, update your repositories list:

```
sudo apt update
```

Then install the package for Python 3:

```
sudo apt install python3-gpiozero
```

b) Blinking an LED connected to one of the GPIO pin

c) Adjusting the brightness of an LED

d) Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.

9. Collecting Sensor Data

a) DHT Sensor interface

- Connect the terminals of DHT GPIO pins of Raspberry Pi.
- Import the DHT library using `import Adafruit_DHT`
- Read sensor data and display it on screen.


**22EE1255: ELECTRICAL CIRCUIT ANALYSIS LABORATORY**
**B.Tech. I Year II Sem.**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Prerequisites:** Elements of Electrical Engineering & Electrical Circuit Analysis

**Course Objectives:**

1. To draw locus diagrams of different electrical systems.
2. To measure three phase Active and Reactive power.
3. To understand concept of resonance.
4. To determine various two port network parameters
5. To determine Frequency Domain analysis using various filters.

**Course Outcomes:** After completion of this course, students will be able to

1. Sketch locus diagrams of different electrical systems
2. Calculate the three phase Active and Reactive power.
3. Verify the resonance in series and parallel circuits
4. **Calculate different two port network parameters**
5. **Analyze various filter circuits**

**The following experiments are required to be conducted as compulsory**

1. To draw the locus Diagrams of RL (R-Varying) and RC (R-Varying) Series Circuits.
2. Verification of Series and Parallel Resonance.
3. Determination of Time response of first order RL and RC circuit for periodic non –sinusoidal inputs – Time Constant and Steady state error.
4. Determination of Two port network parameters – Z and Y parameters.
5. Determination of Two port network parameters – A, B, C, D parameters.
6. Determination of Co-efficient of Coupling and Separation of Self and Mutualinductance in a Coupled Circuits.
7. Frequency domain analysis of Low-pass filter.
8. Frequency domain analysis of Band-pass filter

**In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted**

1. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequency spectrum.
2. Measurement of Active Power for Star and Delta connected balanced loads.
3. Measurement of Reactive Power for Star and Delta connected balanced loads.
4. Frequency domain analysis of High-pass filter.
5. Determination of Two port network parameters – Hybrid parameters..
6. To draw the locus Diagrams of RL (L-Varying) and RC (C-Varying) Series Circuits.
7. Determination of Time response of first order RLC circuit for periodic non – sinusoidal inputs – Time Constant and Steady state error.

**TEXTBOOKS:**

1. Van Valkenburg M.E, “Network Analysis”, Prentice Hall of India, 3<sup>rd</sup> Edition, 2000.
2. Ravish R Singh, “Network Analysis and Synthesis”, McGrawHill, 2<sup>nd</sup> Edition, 2019.

**REFERENCE BOOKS:**

1. B. Subramanyam, “Electric Circuit Analysis”, Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A. Riedel, “Electric Circuits”, Pearson, 11<sup>th</sup> Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, “Circuits and Networks: Analysis and Synthesis”, McGrawHill, 5<sup>th</sup> Edition, 2017.
4. Jagan N.C, Lakshrninarayana C., “Network Analysis”, B.S. Publications, 3<sup>rd</sup> Edition, 2014.
5. William Hayt H, Kimmerly Jack E. and Steven Durbin M, “Engineering Circuit Analysis”, McGraw Hill, 6<sup>th</sup> Edition, 2002.
6. Chakravarthy A., “Circuit Theory”, Dhanpat Rai & Co., First Edition, 1999.


**22MC0002: ENVIRONMENTAL SCIENCE**
**B.Tech. I Year II Sem.**
**L T P C**  
**3 0 0 0**
**Course Objectives:**

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

**Course Outcomes:**

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I**

**Ecosystems:** Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II**

**Natural Resources: Classification of Resources:** Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III**

**Biodiversity and Biotic Resources:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV**

**Environmental Pollution and Control Technologies: Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste





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management, composition and characteristics of e-Waste and its management.  
**Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

#### UNIT - V

**Environmental Policy, Legislation & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan

(EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

#### TEXT BOOKS:

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

#### REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.



**VIGNANA BHARATHI**<sup>®</sup>  
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Aushapur (V), Ghatkesar (M), Medchal – Dist. Telangana State – 501 301.

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**DEPARTMENT  
OF  
CIVIL ENGINEERING  
(R22 B. TECH. CE)**

**ACADEMIC YEAR : 2023-24**

**I B.TECH (CIVIL ENGINEERING)**

**COURSE STRUCTURE  
&  
SYLLABUS**

**B.TECH. CIVIL ENGINEERING**

EFFECTIVE FROM ACADEMIC YEAR 2023 - 24 ADMITTED BATCH

**R22 COURSE STRUCTURE AND SYLLABUS****I YEAR I – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1.	22BS1111	Matrices and Calculus	3	1	0	4
2.	22BS1113	Applied Physics	3	1	0	4
3.	22CS1114	C Programming and Data Structures	3	0	0	3
4.	22HS1112	English for Skill Enhancement	2	0	0	2
5.	22CE1155	Elements of Civil Engineering	0	0	2	1
6.	22BS1153	Applied Physics Laboratory	0	0	3	1.5
7.	22CS1154	C Programming and Data Structures Laboratory	0	0	2	1
8.	22HS1152	English Language and Communication Skills Laboratory	0	0	2	1
9.	22ME1156	Engineering Workshop	0	1	3	2.5
10.	22MC0002	Environmental Science	3	0	0	0
11.	22MC0001	Induction Program				
<b>Total</b>			<b>14</b>	<b>3</b>	<b>12</b>	<b>20</b>

**I YEAR II – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1.	22BS1211	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2.	22BS1212	Engineering Chemistry	3	1	0	4
3.	22CE1214	Applied Mechanics	3	0	0	3
4.	22CE1215	Surveying	2	0	0	2
5.	22ME1255	Computer Aided Engineering Graphics	1	0	4	3
6.	22BS1252	Engineering Chemistry Laboratory	0	0	2	1
7.	22CS1251	Python Programming Laboratory	0	1	2	2
8.	22CE1253	Surveying Laboratory –I	0	0	2	1
<b>Total</b>			<b>12</b>	<b>3</b>	<b>10</b>	<b>20</b>



**R22 B.Tech**

**CE**

**2023-2024**

**I Year – I Semester**


**22BS1111: MATRICES AND CALCULUS**
**I B Tech. I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Prerequisite(s):** Mathematical knowledge at Pre university level.

**Course Objectives:** Develop ability to learn the concept of

1. Rank of the matrix and apply the same to know the consistency for the linear system of equations.
2. Eigen values and Eigen vectors to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems, Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and Finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

**Course Outcomes:** After successful completion of this course, the student should be able to

1. Write the matrix representation of a set of linear equations, find the rank and apply the same to analyse the solution of the system of equations.
2. Reduce the quadratic form to canonical form using orthogonal transformations by finding Eigenvalues and Eigen vectors.
3. Solve the applications on the mean value theorems, Evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints using partial differentiation.
5. Evaluate the multiple integrals and apply the concept to find areas and volumes.

**UNIT - I: Matrices**

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

**UNIT - II: Eigen values and Eigen vectors**

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

**UNIT - III: Calculus**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proof). Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates for known curves (circle, parabola, ellipse), Definition of Improper Integral: Beta and Gamma functions and their applications.

**UNIT - IV: Multivariable Calculus (Partial Differentiation and applications)**



Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

**UNIT-V: Multivariable Calculus (Integration)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form for known curves (circle, parabola, ellipse), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

**REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.


**22BS1113: APPLIED PHYSICS**
**B. Tech. I Year I SEM**
**L T P C**  
**3 1 0 4**
**Course Objectives:**

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibers.

**Course Outcomes:**

At the end of the course the student will be able to:

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic and energy materials for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

**UNIT - I: QUANTUM PHYSICS AND SOLIDS**

**Quantum Mechanics:** Introduction to quantum physics, blackbody radiation, Wein's and Rayleigh-Jean's law, Planck's radiation law (Qualitative) - photoelectric effect de-Broglie hypothesis and matter waves- Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

Solids: Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative) Bloch's theorem -Kronig-Penney model (Qualitative) origin of energy bands- classification of solids.

**UNIT - II: SEMICONDUCTORS AND DEVICES**

Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)–LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.



### UNIT - III: DIELECTRIC, AND MAGNETIC AND ENERGY MATERIALS

**Dielectric Materials:** Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials.

**Magnetic Materials:** Basic definitions – classification of Magnetic materials – Domain theory of ferromagnetism in hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance.

**Energy Materials:** Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors.

### UNIT - IV: NANOTECHNOLOGY

Nanoscale, quantum confinement, surface to volume ratio, **bottom-up fabrication:** sol-gel, precipitation, combustion methods – **top-down fabrication:** ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nanomaterials.

### UNIT - V: LASER AND FIBER OPTICS

**Lasers:** Laser beam characteristics-three quantum processes-Einstein coefficients and their relations-lasing action - pumping methods, CO<sub>2</sub> laser, Nd: YAG laser- semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

### TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.



**REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.

R22-B.TECH-  
CIVIL


**22CS1114: C PROGRAMMING AND DATA STRUCTURES**
**B.Tech. I Year I Sem**
**L T P C**  
 3 0 0 3

**Course Objectives:**

1. Learn adequate knowledge by problem solving techniques.
2. Understand programming skills using the fundamentals and basics of C Language.
3. Improve problem solving skills using arrays, strings, and functions.
4. Understand the dynamics of memory by pointers.
5. Study files creation process with access permissions.

**Course Outcomes:**

1. Explore the basic concepts in C Programming Language.
2. Develop modular and readable C Programs
3. Understand the basic concepts such as Abstract Data Types, Linear and Non-Linear Data structures.
4. Apply data structures such as stacks, queues in problem solving
5. To understand and analyze various searching and sorting algorithms.

**UNIT – I**

**Introduction to Computers** – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

**Introduction to C Language** – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output

**Structure of a C Program** – Operators, Bit-wise operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Statements.

**UNIT – II**

**Statements** – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Recursion.

**Designing Structured Programs**- Functions, basics, user defined functions, inter function communication, standard functions.

**Arrays** – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays.

**UNIT – III**

**Pointers** – Introduction, Pointers for inter function communication, pointers to pointers, compatibility.



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**Pointer Applications** – Passing an array to a function, Memory allocation functions: malloc(),calloc(),realloc(),free(), array of pointers

**Strings** – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion.

#### UNIT – IV

**Derived types** – The Typedef, enumerated types, Structures – Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.

**Input and Output** – Text vs Binary streams, standard library functions for files, converting file types, File programs – copy, merge files.

#### UNIT – V:

Searching and Sorting Techniques- Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms)

**Data Structures** – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

#### TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

#### REFERENCE BOOKS:

1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3. Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.


**22HS1112: ENGLISH FOR SKILL ENHANCEMENT**

 L T P C  
 2 0 0 2

**B.Tech. I Year I Sem.**

**Course Objectives:** This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Learn remedial and functional grammar related to various grammar items.
4. Prepare the students for examinations such as IELTS and TOEFL by sharpening their reading and writing skills
5. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:** Students will be able to:

1. Use a wide range of vocabulary and sentence structures and also acquire basic proficiency in reading and writing modules of English.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

**UNIT-I**

Chapter entitled '*Toasted English*' by R.K. Narayan from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** The Concept of Word Formation – The Use of Prefixes and Suffixes- Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance – Techniques for Effective Reading.

**Writing:** Sentence Structures – Use of Phrases and Clauses in Sentences – Importance of Proper Punctuation – Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence- Organizing Principles of Paragraphs in Documents.



## UNIT-II

Chapter entitled '**Appro JRD**' by **Sudha Murthy** from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

**Writing:** Nature and Style of Writing - Defining/Describing People, Objects, Places and Events – Classifying – Providing Examples or Evidence.

## UNIT-III

Chapter entitled '**Lessons from Online Learning**' by **F.Haider Alvi, Deborah Hurstetal** from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Confused – Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

**Writing:** Format of a Formal Letter – Writing Formal Letters e.g. Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

## UNIT-IV

Chapter entitled '**Art and Literature**' by **Abdul Kalam** from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Exercises for Practice

**Writing:** Writing Practices – Essay Writing – Writing Introduction and Conclusion – Précis Writing.

## UNIT-V

Chapter entitled '**Go, Kiss the World**' by **Subroto Bagchi** from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.



<b>Vocabulary:</b>	Technical Vocabulary and their Usage
<b>Grammar:</b>	Common Errors in English ( <i>Covering all the other aspects of grammar which were not covered in the previous units</i> )
<b>Reading:</b>	Reading Comprehension – Exercises for Practice
<b>Writing:</b>	Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats - Structure of Reports (Manuscript Format) - Types of Reports - Writing a Report.

Note: Listening and Speaking Skills which are given under Unit -6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- **Note: 1.** As the syllabus of English given in AICTE *Model Curriculum-2018 for B.Tech First Year is **Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- **Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

### TEXTBOOK:

1. “English: Language, Context and Culture” by Orient Black Swan Pvt. Ltd, Hyderabad.2022. Print.

### REFERENCEBOOKS:

- 1.Effective Academic Writing by Liss and Davis (OUP)
- 2.Richards, Jack C. (2022) Interchange Series. Introduction,1,2,3. Cambridge University Press
- 3.Wood, F. T. (2007). Remedial English Grammar. Macmillan.
- 4.Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2<sup>nd</sup> ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
- 6.Vishwamohan, Aysha.(2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition



### 22CE1155: ELEMENTS OF CIVIL ENGINEERING

**B.Tech. I Year I Sem.**

L	T	P	C
0	0	2	1

**Pre-requisites: Nil**

**Course objectives:**

1. To provide practical knowledge about physical properties of minerals.
2. To provide practical knowledge about physical properties of rocks.
3. To determine the characteristics of cement.
4. To determine the characteristics of Fine aggregates.
5. To determine the characteristics of coarse aggregates.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Understands the method and ways of investigations required for Civil Engineering projects
2. Identify the various rocks, minerals depending on geological classifications
3. Evaluate the properties of cement its suitability for construction
4. Evaluate the properties of fine aggregates and determine its suitability for construction.
5. Evaluate the properties of coarse aggregates and determine its suitability for construction.

**List of Experiments:**

1. **Identification of Minerals** – Silica Group, Feldspar Group, Crystalline Group, Carbonate Group, Pyroxene Group, Mica Group, Amphibole Group.
2. **Identification of Rocks** – Igneous Petrology, Sedimentary Petrology, Metamorphic Petrology.
3. 1. Study of topographical features from Geological maps. Identification of symbols in maps.  
2. Simple structural Geology Problems (Folds, Faults & Unconformities)
4. **Tests on Cement**
  - a. Fineness test & Normal Consistency test.
  - b. Specific gravity test, Initial and Final setting time of cement.
5. **Tests on Fine Aggregates**
  - a. Specific Gravity test.
  - b. Bulking of sand & Fineness modulus of Fine aggregate.
6. **Tests on Coarse Aggregate**
  - a. Specific Gravity test.
  - b. Fineness modulus of Coarse aggregate.

**TEXT BOOK:**

1. IS 383 :1993 “Specification for Coarse and Fine Aggregates from Natural Sources for Concrete”.


**22BS1153: APPLIED PHYSICS LAB**
**B. Tech. I Year I SEM**
**L T P C**
**0 0 3 1.5**
**Course Objectives:**

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Understand the method of least square fitting
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Study the behavior of passive components.

**Course Outcomes:**

The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Carried out data analysis
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Learn the characteristics of passive components like L, C and R and their applications.

**LIST OF EXPERIMENTS:**

1. Understanding the method of least squares – torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. Characteristics of series and parallel LCR circuits.
5. V-I characteristics of a p-n junction diode and Zener diode
6. Input and output characteristics of BJT (CE, CB & CC configurations)
7. a). V-I and L-I characteristics of light emitting diode (LED)  
b). V-I characteristics of a Laser diode
8. V-I Characteristics of solar cell
9. a). Determination of the beam divergence of the given LASER beam  
b). Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. Determination of Energy gap of a semiconductor.
11. Determination of time constant of RC Circuit.
12. Study B-H curve of a magnetic material.

*Note: Any 8 experiments are to be performed.*

**REFERENCE BOOK:**

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.





### 22CS1154: C PROGRAMMING AND DATA STRUCTURES LABORATORY

**B.Tech. I Year I Sem (R22)**

**L T P C**  
**0 0 2 1**

#### Course Objectives:

1. To learn C-language Programs using the data types, input/ output statements and control statements.
2. Describe the importance of modular programming and arrays using C-Language Program.
3. Understand the concept and use of pointers for memory management techniques, structure, union, and enumerated types.
4. Understand the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams.

#### Course Outcomes:

1. Ability to design and test programs to solve mathematical and scientific problems.
2. Ability to write structured programs using control structures and functions.
3. Able to Implement C programs using arrays & pointers.
4. Able to Use the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Able to execute programs that read and write text, binary files using the formatting and character I/O functions.

#### List of Experiments:

##### WEEK-1:

- a. Write a C program to find simple interest and compound interest.
- b. Write a C program to convert Celsius to Fahrenheit.
- c. Write a C Program to swap two numbers.
- d. Write a C program to perform all arithmetic operations (+, -, \*, / , %).
- e. Write a simple program that prints the results of all the operators available in C (Including pre/ post increment, bitwise and/or/not , etc.). Read required operand Values from standard input.

##### WEEK-2:

- a. Write a C program to find the sum of individual digits of a positive integer.
- b. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
- c. Write a C program to generate the first n terms of the sequence.

##### WEEK-3:

- a. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
- b. Write a C program to find the roots of a quadratic equation.
- c. Write a C program to find the factorial of a given integer.

**WEEK-4:**

- a. Write a C program to find the GCD (greatest common divisor) of two given integers.
- b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement)
- c. Write a C program to solve Towers of Hanoi problem.

**WEEK-5:**

- a. Write a C program to find both the largest and smallest number in a list of integers.
- b. Write a C program that uses functions to perform the following:
  - i) Addition of Two Matrices
  - ii) Multiplication of Two Matrices

**WEEK-6:**

- a. Write a C program that uses functions to perform the following operations:
- b. To insert a sub-string in to a given main string from a given position.
- c. To delete n Characters from a given position in a given string.

**WEEK-7:**

- a. Write a C program to determine if the given string is a palindrome or not
- b. Write a C program that displays the position or index in the string S where the string T begins, or - 1 if S doesn't contain T.

**WEEK-8:**

- a. Write a C program to count the lines, words and characters in a given text.
- b. Write a C program to generate Pascal's triangle.
- c. Write a C program to construct a pyramid of numbers

**WEEK-9:**

- a. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:  $1+x+x^2+x^3+\dots+x^n$   
 For example: if n is 3 and x is 5, then the program computes 1+5+25+125. Print x, n, the sum  
 Perform error checking.

For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if  $n < 0$ , then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.

- b. 2's complement of a number is obtained by scanning it from right to left and complementing

all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

**WEEK-10:**

- a. Write a C program to convert a Roman numeral to its decimal equivalent.
- b. Write a C program that uses functions to perform the following operations:
  - i) Reading a complex number
  - ii) Writing a complex number
  - iii) Addition of two complex numbers
  - iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

**WEEK-11:**

- a. Write a C program which copies one file to another.
- b. Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)
- c. Write a C program to display the contents of a file.
- d. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)

**WEEK-12:**

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

- i) Bubble sort      ii) Selection sort      iii) Insertion sort

**WEEK-13:**

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers:

- i) Linear search      ii) Binary search

**WEEK 14:**

Write a C program that uses functions to perform the following operations on singly linkedlist.:

- i) Creation      ii) Insertion      iii) Deletion      iv) Traversal

**WEEK-15:**

Write C programs that implements the following data structures

- i) Stacks (push,pop,display)      ii) queues(insert,delete,display)

**TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.


**22HS1152 - ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY**
**B.Tech. I Year I Sem.**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

**Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

**Course Outcomes:** Students will be able to:

1. Make use of various online and web resources for independent language learning.
2. Understand the nuances of English language through audio-visual experience and group activities.
3. Neutralize their accent for intelligibility for enabling them to communicate with a global audience.
4. Speak with clarity and confidence which in turn improves their academic performance in the other courses.
5. Face and interact with various stakeholders leading to the enhancement of their employability skills.

**Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. **Computer Assisted Language Learning (CALL) Lab**
- b. **Interactive Communication Skills (ICS) Lab**

**Listening Skills:**
**Objectives**

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.*

- Listening for general content
- Listening to fill up information



- Intensive listening
- Listening for specific information

### **Speaking Skills:**

#### Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
  - Oral practice
  - Describing objects/situations/people
  - Roleplay – Individual/Group activities
  - Just A Mine (JAM) Sessions

The following course contents prescribed for the **English Language and Communication Skills Lab.**

#### **Exercise–I**

##### **CALL Lab:**

Understand: Listening Skill- Its importance – Purpose - Process - Types - Barriers - Effective Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants –Minimal Pairs - Consonant Clusters - Past Tense Marker and Plural Marker - Testing Exercises

##### **ICS Lab:**

Understand: Spoken vs. Written language – Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

#### **Exercise–II CALL Lab:**

Understand: Structure of Syllables–Word Stress–Weak Forms and Strong Forms– Stress pattern in sentences – Intonation.

Practice: Basic Rules of Word Accent – Stress Shift - Weak Forms and Strong Forms – Stress pattern in sentences – Intonation - Testing Exercises

##### **ICS Lab:**

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role Play – Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

#### **Exercise-III CALL Lab:**

Understand: Errors in Pronunciation – Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

##### **ICS Lab:**

Understand: Descriptions – Narrations – Giving Directions and Guidelines – Blog Writing

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions –Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

#### **Exercise–IV**

##### **CALL Lab:**

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - Testing Exercises

**ICS Lab:**

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication - Presentation Skills.

Practice: Making a Short Speech – Extempore – Making a Presentation.

**Exercise–V CALL Lab:**

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests – Testing Exercises

**ICS Lab:**

Understand: Group Discussion

Practice: Group Discussion

**Minimum Requirement of infrastructural facilities for ELCSLab:****1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

**System Requirement (Hardware component):**

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i. Computers with Suitable Configuration
- ii. High Fidelity Headphones

**1. Interactive Communication Skills (ICS) Lab:**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

**Source of Material (Master Copy):**

- *Exercises in Spoken English. Part 1, 2, 3.* CIEFL and Oxford University Press

**Note:** Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10<sup>th</sup> Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL&GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

**REFERENCE BOOKS:**

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook.* Cengage



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Learning India Pvt. Ltd.

2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook*. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook*. Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient Black Swan Pvt.Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.

R22-B.TECH-  
CIVIL


**22ME1156: ENGINEERING WORKSHOP**
**B.Tech. I Year I Sem.**
**L T P C**  
**0 1 3 2.5**
**Pre-requisites:** Practical skill

**Course Objectives:**

1. To Study about different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

**Course Outcomes:** At the end of the course, the student will be able to:

1. CO1: Study and practice on machine tools and their operations
2. CO2: Practice on manufacturing of components using work shop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO4: Apply basic electrical engineering knowledge for house wiring practice.
5. CO 5: Study and Practice of arc welding process

**TRADES FOR EXERCISES:**
**At least two exercises from each trade:**

- I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
- III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
- IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
- V. Welding Practice – (Arc Welding & Gas Welding)
- VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

**TRADES FOR DEMONSTRATION & EXPOSURE:**

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and WoodWorking

**TEXT BOOKS:**

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.





**REFERENCE BOOKS:**

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

R22-B.TECH-  
CIVIL



**VIGNANA BHARATHI**  
Institute of Technology

(A UGC Autonomous Institution, Approved by AICTE, Accredited by NBA & NAAC-A Grade, Affiliated to JNTUH)

**22MC0001: INDUCTION PROGRAM**

R22-B.TECH-  
CIVIL


**22MC0002: ENVIRONMENTAL SCIENCE**
**B.Tech. I Year I Sem.**
**L T P C**  
**3 0 0 0**
**Course Objectives:**

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

**Course Outcomes:**

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I**

**Ecosystems:** Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II**

**Natural Resources: Classification of Resources:** Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III**

**Biodiversity and Biotic Resources:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV**

**Environmental Pollution and Control Technologies: Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.



Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

#### UNIT - V

**Environmental Policy, Legislation & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan

(EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

#### TEXT BOOKS:

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

#### REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.



# **R22 B.Tech**

# **CE**

**2023-2024**

**I Year – II Semester**

R22-B.TECH  
CIVIL


**22BS1211- ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**
**I B.Tech. II Semester**

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<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** Develop ability to learn

1. Methods of solving the Ordinary Differential Equations of first order.
2. Methods of solving the higher order Ordinary Differential Equations.
3. Concept, properties of Laplace transforms & using the same to solve ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to vector integration.

**Course outcomes:** After successful completion of this course, student should be able to

1. Identify the type of first order Ordinary Differential Equation and solve them by appropriate method.
2. Apply the concept of higher order Ordinary Differential Equations to solve real world problems.
3. Solve ordinary differential equations by using Laplace transform techniques.
4. Calculate scalar potential for a vector and directional derivative of a scalar point function using vector differentiation.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

**UNIT-I: FIRST ORDER ODE**

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

**UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER**

Second and higher order linear differential equations with constant coefficients: non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin bx$ ,  $\cos bx$ , polynomials in  $x^k$ ,  $ve^{ax}$  and  $x V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

**UNIT-III: LAPLACE TRANSFORMS**

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, second shifting theorem (without proof), Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

**UNIT-IV: VECTOR DIFFERENTIATION**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives,



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Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

### **UNIT-V: VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition,
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.


**22BS1212: ENGINEERING CHEMISTRY**
**L T P C**  
 3 1 0 4

**Course Objectives:**

1. To acquire knowledge about desalination of brackish water and treatment of municipal water
2. To include the fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
4. To understand the significance of green chemistry and green synthesis and to imbibe the green chemistry principles.
5. To acquire required knowledge about engineering materials like smart materials, lubricants, and biodiesel.

**Course Outcomes:**

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4. The student can use real examples to illustrate how the principles of *green chemistry* can be applied to chemical process in engineering
5. They can predict potential applications of engineering materials and practical utility in order to become good engineers and entrepreneurs.

**UNIT - I: Water and its treatment:**

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation

- Determination of  $F^-$  ion by ion-selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion-exchange processes. Desalination of water – Reverse osmosis.

**UNIT – II Battery Chemistry & Corrosion**

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and





Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT - III: Polymeric materials:

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokolrubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction intrans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Green Chemistry and Engineering for sustainable Development

Definition and history of Green chemistry, Concept and principles (Prevention, Atom Economy, Less Hazardous Chemical Syntheses, Designing Safer Chemicals, Safer Solvents and Auxiliaries, Design for Energy Efficiency, Use of Renewable Feedstock, Reduce, Derivatives, Catalysis, Design for Degradation, Real-time Analysis for Pollution Prevention, Inherently Safer Chemistry for Accident Prevention) of Green Chemistry with suitable examples.

UNIT - V: Engineering Materials:

**Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinylamides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Bio Diesel:** Sources and applications of Biodiesel

**TEXT BOOKS:**

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
5. Engineering Chemistry by K Sesha Maheswaramma and Mridula Chugh, Pearson Publications.

**REFERENCE BOOKS:**

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)


**22CE1214: APPLIED MECHANICS**
**B.Tech. I Year II Sem.**
**L T P C**  
 3 0 0 3

**Course Objectives:** The objectives of this course are to

1. Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
2. Perform analysis of bodies lying on rough surfaces.
3. Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
4. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies.
5. Explain the concepts of work-energy method and its applications to translation, rotation and plane motion and the concept of vibrations

**Course Outcomes:** At the end of the course, students will be able to

1. Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
2. Find the location of centroid and solve problem of bodies subjected to friction.
3. Calculate moment of inertia of a given section.
4. Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotational motion and rigid body motion.
5. Understand concepts of work-energy method and its applications

**UNIT - I**

**Introduction to Engineering Mechanics** - Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space  
 – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

**UNIT - II**

**Friction:** Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, ladder friction  
 Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus.

**UNIT - III**

**Area moment of inertia-** Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem.

**Mass Moment of Inertia:** Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia– Mass moment of inertia of composite bodies.

**UNIT - IV**

Kinematics of Particles: Kinematics of particles – Rectilinear motion – Curvilinear motion – Projectiles. Kinetics of Particles: Kinetics of particles – Newton’s Second Law – Differential equations of rectilinear and curvilinear motion – Dynamic equilibrium – Inertia force – D. Alembert’s Principle applied for rectilinear and curvilinear motion.

**UNIT - V**

Work - Energy Principle: Equation of translation, principle of conservation of energy, work - energy principle applied to particle motion and connected systems, fixed axis rotation. Impulse – Momentum Principle: Introduction, linear impulse momentum, principle of conservation of linear momentum, elastic impact and types of impact, loss of kinetic energy, coefficient of restitution.

**TEXT BOOKS:**

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer’s Engineering Mechanics – Statics & Dynamics

**REFERENCE BOOKS:**

1. Timoshenko S.P and Young D.H., “Engineering Mechanics”, McGraw Hill International Edition, 1983.
2. Andrew Pytel, Jaan Kiusalaas, “Engineering Mechanics”, Cengage Learning, 2014.
3. Beer F.P & Johnston E.R Jr. Vector, “Mechanics for Engineers”, TMH, 2004.
4. Hibbeler R. C & Ashok Gupta, “Engineering Mechanics”, Pearson Education, 2010.
5. Tayal A.K., “Engineering Mechanics – Statics & Dynamics”, Umesh Publications, 2011.
6. Basudeb Bhattacharyya, “Engineering Mechanics”, Oxford University Press, 2008.
7. Meriam. J. L., “Engineering Mechanics”, Volume-II Dynamics, John Wiley & Sons, 2008.
8. P.C Dumir et al. “Engineering Mechanics”, University press


**22CE1215: SURVEYING**
**B.Tech. I Year II Sem.**
**L T P C**  
**2 0 0 2**
**Course Objectives:**

1. Determining relative position between two or more points in a horizontal plane using chain and compass
2. Determining the elevations by using Levelling Instruments.
3. Determining area and Volumes by using various methods
4. Determining the relation between two or more points in both horizontal and vertical plane using Theodolite.
5. Exploring the various of advanced surveying tools like EDM, Total station and G.P.S & Photogrammetry.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Calculate angles, distances and levels
2. Identify data collection methods and prepare field notes
3. Understand the working principles of survey instruments
4. Estimate measurement errors and apply corrections
5. Interpret survey data and compute areas and volumes

**UNIT - I**

**Introduction and Basic Concepts:** Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

**Measurement of Distances and Directions**

**Linear distances-** Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods- E.D.M. method.

**Prismatic Compass-** Bearings, included angles, Local Attraction, Magnetic Declination and dip.

**UNIT - II**

**Levelling and Contouring Leveling-** Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

**Contouring-** Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

**Computation of Areas and Volumes**

**Areas** - Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter.

**Volumes** - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

**UNIT - III**



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**Theodolite Surveying:** Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical angle, Trigonometrical levelling when base is accessible and inaccessible.

**Traversing:** Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

#### UNIT - IV

**Tacheometric Surveying:** Principles of Tacheometry, stadia and tangential methods of Tacheometry.

**Curves:** Types of curves and their necessity, elements of simple curve, setting out of simple Curves,

#### UNIT - V

**Modern Surveying Methods:** Total Station and Global Positioning System: Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPS observations. Applications of GPS.

#### TEXT BOOKS:

1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.
2. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and Practice, Springer -Verlag Publishers, 2001.

#### REFERENCE BOOKS:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000.
2. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
3. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - LaxmiPublications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Surveying by Bhavikatti; Vikas publishing house ltd.
6. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. Surveying and leveling by R. Agor Khanna Publishers 2015.


**22ME1255: COMPUTER AIDED ENGINEERING GRAPHICS**
**B.Tech. I Year II Sem.**
**L T P C**  
 1 0 4 3

**Course Objectives:**

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products
3. To draw sectional views and pictorial views for various types of solids.
4. To develop the lateral surfaces of basic engineering objects
5. To impart knowledge about standard principles of orthographic projection and isometric views of different objects.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D and 3D objects
2. sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

**UNIT – I:**
**Introduction to Engineering Graphics:** Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola

– General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

**UNIT- II:**
**Orthographic Projections:** Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

**UNIT – III:**

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

**UNIT – IV:**

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

**UNIT – V:**

**Isometric Projections:** Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

**TEXT BOOKS:**

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

**REFERENCE BOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

**Note:** - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.




**22BS1252: ENGINEERING CHEMISTRY LAB**
**L T P C**  
**0 0 2 1**

**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
5. Students will be able to visualize the experiments virtually for better understanding

**Course Outcomes:** The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.
5. Can perform the experiments making use of working models

**List of Experiments:**

**I. Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.

**II. Conductometry:** Estimation of the concentration of an acid by Conductometry.

**III. Potentiometry:** Estimation of the amount of  $\text{Fe}^{+2}$  by Potentiometry.

**IV. pH Metry:** Determination of an acid concentration using pH meter.

**V. Preparations:**

1. Preparation of Bakelite.
2. Preparation Nylon – 6.

**VI. Lubricants:**

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

**VII. Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

**VIII. Virtual lab experiments**

1. Construction of Fuel cell and its working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

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### 22CS1251: PYTHON PROGRAMMING LAB

**B.Tech. I Year II Sem.**

**L T P C**  
**0 1 2 2**

**Course Objectives:**

1. To learn python programming language using the data types, input/ output statements.
2. To install and run the Python interpreter
3. To learn control structures.
4. To Understand Lists, Dictionaries in python
5. To Handle Strings and Files inPython

**Course Outcomes:** After completion of the course, the student should be able to

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Verify programs using modular approach, file I/O, Python standard library
4. Implement Digital Systems using Python
5. Capable to implement on hardwareboards

Note: The lab experiments will be like the following experiment examples

**Week -1:**

1. i) Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.  
i) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3. i) Write a program to calculate compound interest when principal, rate and number of periods are given.  
ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points
4. Read name, address, email and phone number of a person through keyboard and print the details.

**Week - 2:**

1. Print the below triangle using for loop.  
5  
4 4  
3 3 3  
2 2 2 2  
1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)


**Week - 3:**

1. i) Write a program to convert a list and tuple into arrays.  
 ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

**Week - 4:**

1. Write a function called is\_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has\_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.

Write a function called remove\_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.

- i). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
- ii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'  
 ii) Remove the given word in all the places in a string?  
 iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?
4. Write a recursive function that generates all binary strings of n-bit length

**Week - 5:**

1. i) Write a python program that defines a matrix and prints  
 ii) Write a python program to perform addition of two square matrices  
 iii) Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

**Week-6:**

1. a. Write a function called draw\_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.  
 b. Add an attribute named color to your Rectangle objects and modify draw\_rectangle so that it uses the color attribute as the fill color.



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- c. Write a function called `draw_point` that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.
- d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called `draw_circle` that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

### Week- 7:

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences
4. Write a function that reads a file *file1* and displays the number of words, number of vowels, blankspaces, lower case letters and uppercase letters.

### Week - 8:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
4. Write a program to implement Half Adder, Full Adder, and Parallel Adder
5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

### TEXT BOOKS:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

### REFERENCE BOOKS:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and WebApplications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W. Chun, Pearson
6. Introduction to Python, Kenneth A. Lambert, Cengage



**22CE1253: SURVEYING LABORATORY– I**

**B.Tech. I Year II Sem.**

**L T P C**  
0 0 2 1

**Course Objective:**

1. Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
2. Student will be able to learn and understand various instrument used in surveying.
3. Student will learn and understand how to calculate Area of plot and Ground.
4. Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.
5. Student will learn and understand determine inaccessible distance between two points

**Course Outcomes:** At the end of the course student will be able to:

1. Prepare Map And Plan For Required Site With Suitable Scale.
2. Prepare Contour Map And Estimate The Quantity Of Earthwork Required For Formation Level For Road And Railway Alignment.
3. Judge Which Type of Instrument To Be Used For Carrying Out Survey For A Particular Area And Estimate The Area.
4. Judge The Profile of Ground By Observing The Available Existing Contour Map.
5. Determine Inaccessible Distance Between Two Points

**CYCLE - I**

1. Chaining of a line using chain, measurements of area by cross staff survey.
2. Measurement of distance between two points when there is an obstacle for both chaining and ranging. Compass survey
3. Traversing by compass and adjustments in included angles and measurement of area -graphical adjustments.
4. Distance between two inaccessible points by compass. Plane Table Surveying
5. Measurement & Plotting of the area by Radiation method.
6. Determination of Positions objects by Intersection Method – Plane Table Survey.
7. Traverse by Plane table Survey.

**CYCLE – II**

**Leveling**

8. Measurement of elevation of various given points.
9. Elevation difference between two given points by reciprocal leveling.
10. Longitudinal Leveling
11. Cross – section Leveling
12. Plotting of Contours by Indirect Method



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Aushapur (V), Ghatkesar (M), Medchal – Dist. Telangana State – 501 301.

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**DEPARTMENT  
OF  
COMPUTER SCIENCE &  
ENGINEERING**

**(R22 B. TECH. CSE)**

**ACADEMIC YEAR : 2023-24**

**I B.TECH (CSE)  
COURSE STRUCTURE  
&  
SYLLABUS**



**B.TECH. COMPUTER SCIENCE AND ENGINEERING**  
**EFFECTIVE FROM ACADEMIC YEAR 2022 - 23 ADMITTED BATCH**  
**R22 COURSE STRUCTURE AND SYLLABUS**

**I YEAR I – SEMESTER**

S.No.	Course Code	Course	Category	L	T	P	Credits
1.	22BS1111	Matrices and Calculus	BS	3	1	0	4
2.	22BS1112	Engineering Chemistry	BS	3	1	0	4
3.	22CS1113	Programming for Problem Solving	ES	3	0	0	3
4.	22EE1114	Basic Electrical Engineering	ES	2	0	0	2
5.	22ME1155	Computer Aided Engineering Graphics	ES	1	0	4	3
6.	22CS1156	Elements of Computer Science & Engineering	BS	0	0	2	1
7.	22BS1152	Engineering Chemistry Laboratory	ES	0	0	2	1
8.	22CS1153	Programming for Problem Solving Laboratory	ES	0	0	2	1
9.	22EE1154	Basic Electrical Engineering Laboratory	ES	0	0	2	1
10.	22MC0001	Induction Program	BS				
		<b>Total</b>		<b>12</b>	<b>2</b>	<b>12</b>	<b>20</b>

**I YEAR II – SEMESTER**

S.No.	Course Code	Course	Category	L	T	P	Credits
1.	22BS1211	Ordinary Differential Equations and Vector Calculus	BS	3	1	0	4
2.	22BS1213	Applied Physics	BS	3	1	0	4
3.	22ME1256	Engineering Workshop	ES	0	1	3	2.5
4.	22HS1212	English for Skill Enhancement	HS	2	0	0	2
5.	22EC1215	Electronic Devices and Circuits	ES	2	0	0	2
6.	22BS1253	Applied Physics Laboratory	BS	0	0	3	1.5
7.	22CS1251	Python Programming Laboratory	ES	0	1	2	2
8.	22HS1252	English Language and Communication Skills Laboratory	HS	0	0	2	1
9.	22IT1255	IT Workshop	ES	0	0	2	1
10.	22MC0002	Environmental Science	BS	3	0	0	0
		<b>Total</b>		<b>13</b>	<b>4</b>	<b>12</b>	<b>20</b>





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**R22 B.Tech**

**CSE**

**2023-2024**

**I Year – I Semester**



## 22BS1111-MATRICES AND CALCULUS

**I B Tech. I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Prerequisite(s):** Mathematical knowledge at Pre university level.

**Course Objectives:** Develop ability to learn the concept of

1. Rank of the matrix and apply the same to know the consistency for the linear system of equations.
2. Eigen values and Eigen vectors to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems, Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and Finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

**Course Outcomes:** After successful completion of this course, the student should be able to

1. Write the matrix representation of a set of linear equations, find the rank and apply the same to analyse the solution of the system of equations.
2. Reduce the quadratic form to canonical form using orthogonal transformations by finding Eigenvalues and Eigen vectors.
3. Solve the applications on the mean value theorems, Evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints using partial differentiation.
5. Evaluate the multiple integrals and apply the concept to find areas and volumes.

### UNIT - I: MATRICES

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

### UNIT - II: EIGEN VALUES AND EIGEN VECTORS

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### UNIT - III: CALCULUS

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proof). Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates for known curves (circle, parabola, ellipse), Definition of Improper Integral: Beta and Gamma functions and their applications.

### UNIT - IV: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and



three variables using method of Lagrange multipliers.

**UNIT-V: MULTIVARIABLE CALCULUS (INTEGRATION)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form for known curves (circle, parabola, ellipse), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

**REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



## 22BS1112: ENGINEERING CHEMISTRY

I B Tech. I Semester

L T P C  
3 1 0 4

### Course Objectives:

1. To acquire knowledge about desalination of brackish water and treatment of municipal water
2. To include the fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
4. To understand the significance of green chemistry and green synthesis and to imbibe the green chemistry principles.
5. To acquire required knowledge about engineering materials like smart materials, lubricants, and biodiesel.

### Course Outcomes:

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4. The student can use real examples to illustrate how the principles of *green chemistry* can be applied to chemical process in engineering
5. They can predict potential applications of engineering materials and practical utility in order to become good engineers and entrepreneurs.

### UNIT - I: WATER AND ITS TREATMENT:

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation Determination of F<sup>-</sup> ion by ion-selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion-exchange processes. Desalination of water – Reverse osmosis.

### UNIT – II BATTERY CHEMISTRY & CORROSION

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences



between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

### UNIT - III: POLYMERIC MATERIALS:

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokolrubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction intrans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

### UNIT - IV: GREEN CHEMISTRY AND ENGINEERING FOR SUSTAINABLE DEVELOPMENT:

Definition and history of Green chemistry, Concept and principles (Prevention, Atom Economy, Less Hazardous Chemical Syntheses, Designing Safer Chemicals, Safer Solvents and Auxiliaries, Design for Energy Efficiency, Use of Renewable Feedstock, Reduce, Derivatives, Catalysis, Design for Degradation, Real-time Analysis for Pollution Prevention, Inherently Safer Chemistry for Accident Prevention) of Green Chemistry with suitable examples.

### UNIT - V: ENGINEERING MATERIALS:

#### **Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinylamides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Bio Diesel:** Sources and applications of Biodiesel

### TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K.



Shashikala, Pearson Publications, 2021.

5. Engineering Chemistry by K Sesha Maheswaramma and Mridula Chugh, Pearson Publications.

**REFERENCE BOOKS:**

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

R22-R22-B.TECH-CSE



## 22CS1113: PROGRAMMING FOR PROBLEM SOLVING

I B.Tech. I Semester

L T P C

3 0 0 3

### Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems.
5. To learn the fundamentals of searching and sorting.

### Course Outcomes: The student will learn

1. To write algorithms and to draw flowcharts for solving problems, To convert the algorithms/flowcharts to C programs.
2. To code and test a given logic in the C programming language.
3. To decompose a problem into functions and to develop modular reusable code.
4. To use arrays, pointers, strings and structures to write C programs.
5. To implement Searching and sorting problems.

## UNIT - I: INTRODUCTION TO PROGRAMMING

Compilers, compiling and executing a program.

**Representation of Algorithm** - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number  
Flowchart/Pseudo code with examples, Program design and structured programming

**Introduction to C Programming Language:** variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, **Operators:** Ternary operator, Bitwise operations: Bitwise AND, OR, XOR and NOT operators, expressions and precedence, Expression evaluation, type conversion.

**Conditional Branching and Loops:** Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, goto, Iteration with for, while, do- while loops

**I/O:** Simple input and output with scanf() and printf(), formatted I/O.

## UNIT - II: ARRAYS AND FUNCTIONS

**Arrays:** one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

**Functions:** Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions.

**Storage classes:** auto, extern, static and register.

**Recursion:** Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Some C standard functions and libraries.

## UNIT - III: POINTERS, STRINGS & STRUCTURES.

**Pointers:** Idea of pointers, Defining pointers, usage of self-referential structures in linked list (no



implementation), passing pointers to functions, idea of call by reference.

**Strings:** Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen( ), strcat( ), strcpy( ), strstr( ) etc.), arrays of strings

**Structures:** Defining structures, initializing structures, unions, Array of structures  
Pointers to Arrays and Structures, Use of Pointers in self-referential structures,  
Enumeration data type.

#### **UNIT - IV: FILE HANDLING IN C, PREPROCESSOR COMMANDS**

**Files:** Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek( ), ftell( ) and rewind( ) functions.

**Preprocessor Commands:** Commonly used Preprocessor commands like File inclusion, macros substitution, conditional compilation (include, define, undef, if, ifdef, ifndef )  
Introduction to stdin, stdout and stderr. Command line arguments

#### **UNIT - V: SEARCHING AND SORTING TECHNIQUES:**

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms).

#### **TEXT BOOKS:**

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

#### **REFERENCE BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming





## 22EE1114: BASIC ELECTRICAL ENGINEERING

I B.Tech. I Semester

L T P C  
2 0 0 2

**Prerequisites:** Mathematics

### Course Objectives:

1. To study and understand DC circuits.
2. To study and understand Single & Three phase AC circuits.
3. To study and understand the Single Phase Transformers.
4. To study and understand the different types of DC and AC machines.
5. To have the knowledge of various electrical installations and the concept of power factor improvement.

**Course Outcomes:** After completion of this course, students will be able to

1. Analyze DC circuits using various techniques
2. Analyze Single & Three phase AC circuits
3. Discuss the working principles and estimate the performance of Single Phase Transformers
4. Discuss the Construction and working principle of different types of DC and AC machines.
5. Classify various components of Low Voltage Electrical Installations and identify the importance of power factor improvement

**UNIT-I: D.C. CIRCUITS:** Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation (Series, Parallel, Series and Parallel circuits, Nodal Analysis and Mesh Analysis). Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**UNIT-II: A.C. CIRCUITS:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series circuits only), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

**UNIT-III: SINGLE PHASE TRANSFORMERS:** Working Principle and construction of Transformer, Types, Ideal and practical transformer, EMF Equation, equivalent circuit, losses in transformers, regulation and efficiency.

### UNIT-IV: ELECTRICAL MACHINES

**D. C. Generator:** Constructional details of D C Machine, Working Principle of D C Generator, EMF Equation, Types, Numerical Problems.

**D. C. Motor:** Working Principle of D C Motor, Types, Torque Equation, Numerical Problems Performance Characteristics of dc shunt motor.

**Three Phase Induction Motor:** Generation of rotating magnetic field, Construction and



working of a three-phase induction motor, Significance of torque-slip characteristics.

**Synchronous Generator:** Construction and working of synchronous generator.

**UNIT-V: ELECTRICAL INSTALLATIONS:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement.

**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989



**22ME1155: COMPUTER AIDED ENGINEERING GRAPHICS**

**I B.Tech. I Semester**

**L T P C**

**1 0 4 3**

**Course Objectives:**

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products
3. To draw sectional views and pictorial views for various types of solids.
4. To develop the lateral surfaces of basic engineering objects
5. To impart knowledge about standard principles of orthographic projection and isometric views of different objects.

**Course Out comes:** At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D and 3D objects
2. Sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

**UNIT – I:**

**INTRODUCTION TO ENGINEERING GRAPHICS:** Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola

– General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

**UNIT- II:**

**ORTHOGRAPHIC PROJECTIONS:** Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

**UNIT – III:**

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

**UNIT – IV:**

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

**UNIT – V:**

**ISOMETRIC PROJECTIONS:** Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids –



Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

**TEXT BOOKS:**

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

**REFERENCE BOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

**Note:** - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.



**22CS1156: ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objective:**

1. To learn the fundamentals of computers.
2. To provide an overview of the subjects of computer science and engineering.
3. To learn the operating system, database management system, computer networks.
4. To understand the software development process.
5. To learn the various autonomous system

**Course Outcomes:**

1. Know the working principles of functional units of a basic Computer
2. Understand program development, the use of data structures and algorithms in problems solving.
3. Know the need and types of operating system, data base systems.
4. Understand the significance of networks, internet, WWW and cybersecurity.
5. Understand Autonomous systems, the application of artificial intelligence.

**UNIT-I**

**BASICS OF A COMPUTER** – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, applications software, packages, frameworks, IDEs.

**UNIT-II**

**SOFTWARE DEVELOPMENT** – waterfall model, Agile, Types of computer languages – Programming, markup, scripting, Program development steps, flowcharts, algorithms, data structures – definition, types of data structures

**UNIT-III**

**OPERATING SYSTEMS:** Functions of operating systems, types of operating systems, Device & Resource management

**Database Management Systems:** Data models, RDBMS, SQL, Database Transactions, data centers, cloud services

**UNIT-IV**

**COMPUTER NETWORKS:** Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, vehicular networks, 5G communications.

WorldWideWeb–Basics, role of HTML, CSS, XML, Tools for web designing, social media, online social networks.

Security–information security, cyber security, cyber laws

**UNIT-V**

**AUTONOMOUS SYSTEMS:** IoT, Robotics, Drones, Artificial Intelligence–Learning, Game Development, natural language processing, image and video processing, Cloud Basics.



**TEXTBOOK:**

1. Invitation to Computer Science, G.Michael Schneider, Macalester College, Judith L.Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

**REFERENCEBOOKS:**

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage.

R22-B.TECH-CSE



**22BS1152: ENGINEERING CHEMISTRY LABORATORY**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
5. Students will be able to visualize the experiments virtually for better understanding

**Course Outcomes:** The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.
5. Can perform the experiments making use of working models

**List of Experiments:**

- I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
- II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
- III. **Potentiometry:** Estimation of the amount of  $\text{Fe}^{+2}$  by Potentiometry.
- IV. **pH Metry:** Determination of an acid concentration using pH meter.
- V. Preparations:
  1. Preparation of Bakelite.
  2. Preparation Nylon – 6.
- VI. **Lubricants:**
  1. Estimation of acid value of given lubricant oil.
  2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
- VII. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
- VIII. Virtual lab experiments
  1. Construction of Fuel cell and its working.
  2. Smart materials for Biomedical applications
  3. Batteries for electrical vehicles.
  4. Functioning of solar cell and its applications.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition



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3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

R22-R22-B.TECH-CSE





**22CS1153: PROGRAMMING FOR PROBLEM SOLVING LAB**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

1. To learn C-language Programs using the data types, input/ output statements and control statements.
2. Describe the importance of modular programming and arrays using C-Language Program.
3. Understand the concept and use of pointers for memory management techniques
4. Understand structure, union, and enumerated types.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams.

**Course Outcomes:**

1. Ability to design and test programs to solve mathematical and scientific problems.
2. Ability to write structured programs using control structures and functions.
3. Able to Implement C programs using arrays & pointers.
4. Able to Use the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Able to execute programs that read and write text, binary files using the formatting and character I/O functions.

**EXPERIMENTS**

**WEEK-1:**

- a. Write a C program to find simple interest and compound interest.
- b. Write a C program to convert Celsius to Fahrenheit.
- c. Write a C Program to swap two numbers.
- d. Write a C program to perform all arithmetic operations (+, -, \*, /, %).
- e. Write a simple program that prints the results of all the operators available in C (Including pre/ post increment, bitwise and/or/not, etc.). Read required operand Values from standard input.

**WEEK-2:**

- a. Write a simple program that converts one given data type to another using auto Conversion and casting. Take the values from standard input.
- b. Write a C program to check whether the given number is even or odd using Conditional Operator.
- c. Write a C program to find the Largest of two numbers.
- d. Write a C program to print ascending order of three given integers.

**WEEK-3:**

- a. Write a C program to Check the given year is leap year or not.
- b. Write a C program to find the roots of quadratic equation.
- c. Write a C Program to implement arithmetic calculator using switch case.
- d. Write a program that declares Class awarded for a given percentage of marks, where (use else if ladder and switch) <40%= Failed, 40% to <60% = Second class, 60% to



**WEEK-4:**

- a. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:  
5 x 1 = 5  
5 x 2 = 10  
5 x 3 = 15
- b. Write a program that shows the binary equivalent of a given positive number between 0 and 255.
- c. Write a C program to find sum of individual digits of the given integer.
- d. Write a C program to find factorial of a given number.

**WEEK-5:**

- a. Write a program that finds if a given number is a prime number
- b. Write a C program to check whether the given number is palindrome or not.
- c. Write a C program to print Fibonacci series.
- d. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:  $1+x+x^2+x^3+\dots+x^n$ .

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

**WEEK-6:**

- a. Write a C program to calculate the following, where x is a fractional value.  
 $1-x/2 +x^2/4-x^3/6$ .
- b. Write a C program to display the prime numbers from 1 to n(where n value is Given by user)
- c. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *       2 3        2 2        * *
1 2 3      * * *     4 5 6      3 3 3      * * *
                                     4 4 4 4    * *
                                     *          *
```

- d. Write a C program to construct the Pascal triangle

**WEEK-7:**

- a. Write a C program to find largest, smallest numbers and average in a list of array elements.
- b. Write a C program to find mean, variance, standard deviation for a given list of elements.
- c. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.



**WEEK-8:**

- a. Write a C program to transpose a matrix.
- b. Write a C program to perform the Addition of Two Matrices.
- c. Write a C program to perform the Multiplication of Two Matrices.

**WEEK-9:**

Write programs using non recursive and recursive functions for the following

- a. Find GCD.
- b. Find the factorial of a given number.
- c. Generate the Fibonacci series.
- d. Find  $x^n$

**WEEK-10:**

- a. Write a C program to swap two integers using following methods.
  - i. call by value
  - ii. call by reference
- b. Write a program for reading elements using a pointer into an array and display the Values using array.
- c. Write a program for display values reverse order from an array using a pointer.
- d. Write a program through a pointer variable to sum of n elements from an array.

**WEEK-11:**

- a. Write a C program to insert a sub-string into a given main string from a given position.
- b. Write a C program to delete n characters from a given position in a given string.
- c. Write a C program to arrange given n strings in alphabetical order.
- d. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

**WEEK-12:**

- a. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
- b. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba etc.)
- c. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
- d. Write a C program to count the lines, words and characters in a given text.

**WEEK-13:**

- a. Write a C program to find total and average marks for five subjects of three students using structures.
- b. Write a C program to demonstrate nested structures.
- c. Write a C program to display the contents of a file to standard output device.
- d. Write a C program which copies one file to another into another file.
- e. Write a C program to merge two files into a third file.  
(i.e., the contents of the first file followed by those of the second are put in the third file)

**WEEK-14:**



- a. Write a C program to reverse the contents of a file.
- b. Write a C program that does the following:  
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)  
Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek () function)  
The program should then read all 10 values and print them back.
- c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
- d. Write a C program that uses non recursive function to search for a Key value in a Given list of integers using linear search method.
- e. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.

**WEEK-15:**

- a. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- b. Write a C program that sorts the given array of integers using selection sort in
- c. descending order Write a C program that sorts the given array of integers using insertion sort in ascending order

**TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.



**22EE1154: BASIC ELECTRICAL ENGINEERING LABORATORY**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Prerequisites:** Basic Electrical Engineering

**Course Objectives:**

1. To measure the electrical parameters for different types of DC circuits using conventional and theorems approach.
2. To measure the electrical parameters for different types of AC circuits
3. To study the transient response of various R, L and C circuits using different excitations.
4. To determine the performance of Single Phase Transformers.
5. To determine the performance of different types of DC and AC machines.

**Course Outcomes: After completion of this course, students will be able to**

1. Verify the basic conventional approach and theorems for Electrical circuits through different experiments.
2. Calculate the electrical parameters for different types of AC circuits
3. Analyze the transient responses of R, L and C circuits for different input conditions.
4. Evaluate the performance calculations of Single Phase Transformers through various testing methods.
5. Evaluate the performance calculations of DC and AC machines through various testing methods.

**List of experiments/demonstrations:**

**PART- A (compulsory)**

1. Verification of KVL and KCL
2. Verification of Thevenin's theorem
3. Verification of Norton's theorem
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

**PART-B (any two experiments from the given list)**

1. Verification of Superposition theorem
2. Transient Response of Series RL and RC circuits for DC excitation
3. Load Test on Single Phase Transformer (Calculate Efficiency)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. No-Load Characteristics of a Three-phase Alternator



**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.



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**22MC0001: INDUCTION PROGRAM**

R22-R22-B.TECH-CSE



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**R22 B.Tech**

**CSE**

**2022-2023**

**I Year – II Semester**  
**syllabus**





## 22BS1211- ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I B.Tech. II Semester

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** Develop ability to learn

1. Methods of solving the Ordinary Differential Equations of first order.
2. Methods of solving the higher order Ordinary Differential Equations.
3. Concept, properties of Laplace transforms & using the same to solve ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to vector integration.

**Course outcomes:** After successful completion of this course, student should be able to

1. Identify the type of first order Ordinary Differential Equation and solve them by appropriate method.
2. Apply the concept of higher order Ordinary Differential Equations to solve real world problems.
3. Solve ordinary differential equations by using Laplace transform techniques.
4. Calculate scalar potential for a vector and directional derivative of a scalar point function using vector differentiation.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

### UNIT-I: FIRST ORDER ODE

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

### UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second and higher order linear differential equations with constant coefficients: non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin bx$ ,  $\cos bx$ , polynomials in  $x^k$ ,  $ve^{ax}$  and  $x V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

Applications: Electric Circuits

### UNIT-III: LAPLACE TRANSFORMS

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, second shifting theorem (without proof), Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.



#### **UNIT-IV: VECTOR DIFFERENTIATION**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

#### **UNIT-V: VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition,
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.



## 22BS1213: APPLIED PHYSICS

I B. Tech. II Semester

L T P C  
3 1 0 4

### Course Objectives:

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibers.

### Course Outcomes:

At the end of the course the student will be able to:

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic and energy materials for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

### UNIT - I: QUANTUM PHYSICS AND SOLIDS

**Quantum Mechanics:** Introduction to quantum physics, blackbody radiation, Wein's and Rayleigh-Jean's law, Planck's radiation law (Qualitative) - photoelectric effect de-Broglie hypothesis and matter waves- Davisson and Germer experiment -Heisenberg uncertainty principle - Born interpretation of the wave function - time independent Schrodinger wave equation - particle in one dimensional potential box.

**Solids:** Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative) Bloch's theorem - Kronig-Penney model (Qualitative) origin of energy bands- classification of solids.

### UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic and extrinsic semiconductors - Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)-LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

### UNIT - III: DIELECTRIC, AND MAGNETIC AND ENERGY MATERIALS

**Dielectric Materials:** Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials.

**Magnetic Materials:** Basic definitions - classification of Magnetic materials - Domain theory of ferromagnetism in hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance.



**Energy Materials:** Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors.

#### **UNIT - IV: NANOTECHNOLOGY**

Nanoscale, quantum confinement, surface to volume ratio, **bottom-up fabrication:** sol-gel, precipitation, combustion methods – **top-down fabrication:** ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nanomaterials.

#### **UNIT - V: LASER AND FIBER OPTICS**

**Lasers:** Laser beam characteristics-three quantum processes-Einstein coefficients and their relations-lasing action - pumping methods, CO<sub>2</sub> laser, Nd: YAG laser- semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

#### **TEXT BOOKS:**

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.

#### **REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.



## 22ME1256: ENGINEERING WORKSHOP

**I B.Tech. II Semester**

**L T P C**

**0 1 3 2.5**

**Pre-requisites:** Practical skill

**Course Objectives:**

1. To Study about different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

**Course Outcomes:** At the end of the course, the student will be able to:

1. CO1: Study and practice on machine tools and their operations
2. CO2: Practice on manufacturing of components using work shop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO4: Apply basic electrical engineering knowledge for house wiring practice.
5. CO 5: Study and Practice of arc welding process

### 1. TRADES FOR EXERCISES:

**At least two exercises from each trade:**

- I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
- III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
- IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
- V. Welding Practice – (Arc Welding & Gas Welding)
- VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

### 2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

### TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.



**REFERENCE BOOKS:**

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

R22-R22-B.TECH-CSE



**22HS1212 : ENGLISH FOR SKILL ENHANCEMENT**

**I B.Tech. II Semester**

**L T P C**  
**2 0 0 2**

**Course Objectives:** This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Learn remedial and functional grammar related to various grammar items.
4. Prepare the students for examinations such as IELTS and TOEFL by sharpening their reading and writing skills
5. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:** Students will be able to:

1. Use a wide range of vocabulary and sentence structures and also acquire basic proficiency in reading and writing modules of English.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

**UNIT-I**

Chapter entitled '*Toasted English*' by R.K. Narayan from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** The Concept of Word Formation – The Use of Prefixes and Suffixes- Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance – Techniques for Effective Reading.

**Writing:** Sentence Structures – Use of Phrases and Clauses in Sentences – Importance of Proper Punctuation – Techniques for Writing precisely – Paragraph Writing –Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

**UNIT-II**

Chapter entitled '*Appro JRD*' by Sudha Murthy from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice



**Writing:** Nature and Style of Writing - Defining/Describing People, Objects, Places and Events

– Classifying – Providing Examples or Evidence.

### UNIT-III

Chapter entitled ‘Lessons from Online Learning’ by F.Haider Alvi, Deborah Hurstetal from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Confused – Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

**Writing:** Format of a Formal Letter – Writing Formal Letters e.g. Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

### UNIT-IV

Chapter entitled ‘Art and Literature’ by Abdul Kalam from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Exercises for Practice

**Writing:** Writing Practices – Essay Writing – Writing Introduction and Conclusion – Précis Writing.

### UNIT-V

Chapter entitled ‘Go, Kiss the World’ by Subroto Bagchi from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Technical Vocabulary and their Usage

**Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

**Reading:** Reading Comprehension – Exercises for Practice

**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats - Structure of Reports (Manuscript Format) - Types of Reports - Writing a Report.

**Note:** Listening and Speaking Skills which are given under Unit -6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- **Note:** 1. As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is *Open-ended*, besides following the prescribed textbook, it is





required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

- **Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

**TEXTBOOK:**

1. “English: Language, Context and Culture” by Orient Black Swan Pvt. Ltd, Hyderabad.2022. Print.

**REFERENCEBOOKS:**

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction,1,2,3. Cambridge University Press
3. Wood, F. T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2<sup>nd</sup> ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha.(2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.



## 22EC1215: ELECTRONIC DEVICES AND CIRCUITS

I B.Tech. II Semester

L T P C

2 0 0 2

### Course Objectives:

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of devices.
3. To know the switching characteristics of devices.
4. To know the special purpose devices such as SCR, UJT.
5. To know the MOSFET and its characteristics

### Course Outcomes: Upon completion of the Course, the students will be able to:

1. Acquire the knowledge of various electronic devices and their use on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.
4. Know the configurations of Transistors
5. Acquire the knowledge of various device characteristics.

### UNIT - I

**Diodes:** Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

### UNIT - II

**Diode Applications:** Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

### UNIT - III

**Bipolar Junction Transistor (BJT):** Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

### UNIT - IV

**Junction Field Effect Transistor (FET):** Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

### UNIT - V

**Special Purpose Devices:** Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

### TEXT BOOKS:

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11<sup>th</sup> Edition, 2009, Pearson.

### REFERENCE BOOKS:

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5<sup>th</sup> Edition, Oxford.
2. ChinmoySaha, Arindam Halder, DebaatiGanguly - Basic Electronics-Principles and Applications, Cambridge, 2018.



## 22BS1253: APPLIED PHYSICS LABORATORY

I B. Tech. II Semester

L T P C

0 0 3 1.5

### Course Objectives:

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Understand the method of least square fitting
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Study the behavior of passive components.

### Course Outcomes:

The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Carried out data analysis
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Learn the characteristics of passive components like L, C and R and their applications.

### LIST OF EXPERIMENTS:

1. Understanding the method of least squares – torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. Characteristics of series and parallel LCR circuits.
5. V-I characteristics of a p-n junction diode and Zener diode
6. Input and output characteristics of BJT (CE, CB & CC configurations)
7. a). V-I and L-I characteristics of light emitting diode (LED)  
b). V-I characteristics of a Laser diode
8. V-I Characteristics of solar cell
9. a). Determination of the beam divergence of the given LASER beam  
b). Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. Determination of Energy gap of a semiconductor.
11. Determination of time constant of RC Circuit.
12. Study B-H curve of a magnetic material.

**Note: Any 8 experiments are to be performed.**

### REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.



**I B.Tech. II Semester**

**L T P C**

**0 1 2 2**

**Course Objectives:**

1. To learn python programming language using the data types, input/ output statements.
2. To install and run the Python interpreter
3. To learn control structures.
4. To Understand Lists, Dictionaries in python
5. To Handle Strings and Files inPython

**Course Outcomes:** After completion of the course, the student should be able to

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Verify programs using modular approach, file I/O, Python standard library
4. Implement Digital Systems using Python
5. Capable to implement on hardwareboards

Note: The lab experiments will be like the following experiment examples

**Week -1:**

1. i) Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.  
ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3.
  - i) Write a program to calculate compound interest when principal, rate and numbers of periods are given.
  - ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points

**Week-2:**

1. Read name, address, email and phone number of a person through keyboard and print the details.
2. Write a program to demonstrate different number data types in Python.
3. Write a program to perform different Arithmetic Operations on numbers in Python.

**Week - 3:**

1. Print the below triangle using for loop. 5  
4 4  
3 3 3  
2 2 2 2  
1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or



uppercase character or a special character (use 'if-else-if' ladder)

3. Python Program to Print the Fibonacci sequence using while loop

#### Week-4:

1. Python program to print all prime numbers in a given interval (use break)
2. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

#### Week - 5:

1. i) Write a program to convert a list and tuple into arrays.  
ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

#### Week - 6:

1. Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has a duplicate that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
  - i). Write a function called remove duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
  - ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
  - iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'  
ii) Remove the given word in all the places in a string?  
iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

#### Week-7:

1. Writes a recursive function that generates all binary strings of n-bit length
2. Write a program to define a lambda function(**rev\_upper**) to convert a string to its upper-case and reverse it.
3. Write a python program to find factorial of a number using Recursion.

#### Week - 8:

1. i) Write a python program that defines a matrix and prints  
ii) Write a python program to perform addition of two square matrices  
iii) Write a python program to perform multiplication of two square matrices



2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

#### Week - 9:

1. Write a Python program to show how to use else clause with try and except clauses
2. Write a Python Module Program to implement Arithmetic operators, Bitwise operators, Logical operators in python as functions in one module.
3. Write a python program to specify scope and Lifetime of variables in python Functions.

#### Week-10:

1. a. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.  
b. Add an attribute named color to your Rectangle objects and modify draw rectangle so that it uses the color attribute as the fill color.  
c. Write a function called draw point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.  
d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

#### Week- 11

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences

#### Week - 12:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR

#### Week - 13:

1. Write a program to implement Half Adder, Full Adder, and Parallel Adder
2. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.
3. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

#### Week - 14:

1. Write a script named **copyfile.py**. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
2. Write a GUI program to create a window for calculator and implement basic arithmetic operations in that window.



3. Write a python program to perform addition of two matrices using NUMPY package

**TEXT BOOKS:**

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

**REFERENCE BOOKS:**

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1<sup>st</sup> Ed. 2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python, Kenneth A. Lambert, Cengage



## 22HS1252: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

I B. Tech. II Semester

L T P C

0 0 2 1

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

### **Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

### **Course Outcomes:** Students will be able to:

1. Make use of various online and web resources for independent language learning.
2. Understand the nuances of English language through audio-visual experience and group activities.
3. Neutralize their accent for intelligibility for enabling them to communicate with a global audience.
4. Speak with clarity and confidence which in turn improves their academic performance in the other courses.
5. Face and interact with various stakeholders leading to the enhancement of their employability skills.

### **Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. **Computer Assisted Language Learning (CALL) Lab**
- b. **Interactive Communication Skills (ICS) Lab**

### **Listening Skills:**

#### Objectives

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress*





and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

### ***Speaking Skills:***

Objectives

1. To involve students in speaking activities in various contexts
  2. To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice
  - Describing objects/situations/people
  - Roleplay – Individual/Group activities
  - Just A Mine (JAM) Sessions

The following course contents prescribed for the **English Language and Communication Skills Lab.**

#### ***Exercise-I***

##### ***CALL Lab:***

*Understand:* Listening Skill- Its importance – Purpose - Process - Types - Barriers - Effective Listening. *Practice:* Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs - Consonant Clusters - Past Tense Marker and Plural Marker -

*Testing Exercises*

##### ***ICS Lab:***

*Understand:* Spoken vs. Written language – Formal and Informal English.

*Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

#### ***Exercise-II***

##### ***CALL Lab:***

*Understand:* Structure of Syllables–Word Stress–Weak Forms and Strong Forms– Stress pattern in sentences – Intonation.

*Practice:* Basic Rules of Word Accent – Stress Shift - Weak Forms and Strong Forms – Stress pattern in sentences – Intonation - *Testing Exercises*

##### ***ICS Lab:***

*Understand:* Features of Good Conversation – Strategies for Effective Communication.

*Practice:* Situational Dialogues – Role Play – Expressions in Various Situations – Making Requests and Seeking Permissions - Telephone Etiquette.

#### ***Exercise-III***

##### ***CALL Lab:***

*Understand:* Errors in Pronunciation – Neutralising Mother Tongue Interference (MTI).

*Practice:* Common Indian Variants in Pronunciation – Differences between British and American Pronunciation - *Testing Exercises*



**ICS Lab:**

*Understand:* Descriptions – Narrations – Giving Directions and Guidelines – Blog Writing

*Practice:* Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

**Exercise-IV**

**CALL Lab:**

*Understand:* Listening for General Details.

*Practice:* Listening Comprehension Tests - *Testing Exercises*

**ICS Lab:**

*Understand:* Public Speaking – Exposure to Structured Talks - Non-verbal Communication - Presentation Skills.

*Practice:* Making a Short Speech – Extempore – Making a Presentation.

**Exercise-V**

**CALL Lab:**

*Understand:* Listening for Specific Details.

*Practice:* Listening Comprehension Tests – *Testing Exercises*

**ICS Lab:**

*Understand:* Group Discussion

*Practice:* Group Discussion

**Minimum Requirement of infrastructural facilities for ELCS Lab:**

**1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

**System Requirement (Hardware component):**

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

**2. Interactive Communication Skills (ICS) Lab:**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

**Source of Material (Master Copy):**

- *Exercises in Spoken English. Part 1, 2, 3.* CIEFL and Oxford University Press

**Note:** Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.



**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10<sup>th</sup> Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL&GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- DigitalAll
- Orell Digital Language Lab (Licensed Version)

**REFERENCEBOOKS:**

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook*. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook*. Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient Black Swan Pvt.Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.



**22IT1255: IT WORKSHOP**

**I B.Tech. II Semester**

**L T P C**

**0 0 2 1**

**Course Objectives:** The IT Workshop for engineers is a training lab course spread over 60 hours.

1. The modules include training on PC Hardware, Internet & World Wide Web
2. To learn Hardware troubleshooting.
3. To understand the productivity tools including Word, Excel, PowerPoint and Publisher.
4. To learn the Safeguard computer systems from viruses/worms
5. To learn the LaTeX and Word.

**Course Outcomes:**

1. Perform Hardware troubleshooting
2. Understand Hardware components and inter dependencies
3. Safeguard computer systems from viruses/worms
4. Document/ Presentation preparation
5. Perform calculations using spreadsheets

**PC Hardware**

**Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Internet & World Wide Web**

**Task1: Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.



**Task 2: Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task 3: Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

**Task 4: Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms, PGF(ref.9) Case study of Wayback Machine web robot for Cyberforensics for Secure Digital India

### **LaTeX and WORD**

**Task 1 – Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 2: Using LaTeX and Word** to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Task 3: Creating project abstract** Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Task 4: Creating a Newsletter:** Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

### **EXCEL**

**Excel Orientation:** The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text



**Task 2 : Calculating GPA** - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

**Task 3:** Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

### **POWERPOINT**

**Task 1:** Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

**Task 2:** Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

**Task 3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides. Prepare and demonstrate (.ppt file) for the “Call to the Nation” quotations under "Faith and Strength", "Education and Society", "Powers of the Mind", "Man: The Maker of his Own Destiny", "India: Our Motherland" from the sources

<https://sites.google.com/view/chandraksekharaiyah/call-to-the-nation-book>

[https://www.ramakrishnavivekananda.info/vivekananda/complete\\_works.htm](https://www.ramakrishnavivekananda.info/vivekananda/complete_works.htm)

### **REFERENCE BOOKS:**

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*
3. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education*.
4. PC Hardware - A Handbook – Kate J. Chase *PHI* (Microsoft)
5. LaTeX Companion – Leslie Lamport, *PHI/Pearson*.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – *CISCO Press, Pearson Education*.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan  
– *CISCO Press, Pearson Education*.
8. "Swami Vivekananda - Call to the Nation", ISBN: 978-81-7505-018-1.  
<http://sites.google.com/view/pgovernanceforum>



**22MC0002: ENVIRONMENTAL SCIENCE**

**I B.Tech. II Semester**

**L T P C**  
**3 0 0 0**

**Course Objectives:**

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

**Course Outcomes:**

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I**

**ECOSYSTEMS:** Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II**

**NATURAL RESOURCES: CLASSIFICATION OF RESOURCES:** Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III**

**BIODIVERSITY AND BIOTIC RESOURCES:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV**

**ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES:** **Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution**



**control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

#### **UNIT - V**

**ENVIRONMENTAL POLICY, LEGISLATION & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

#### **TEXT BOOKS:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

#### **REFERENCE BOOKS:**

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.





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**DEPARTMENT  
OF  
COMPUTER SCIENCE AND  
BUSINESS SYSTEM  
(R22 B. TECH. CSB)**

**ACADEMIC YEAR: 2023-24**

**I B.TECH (CSB)  
COURSE STRUCTURE  
&  
SYLLABUS**



**B.TECH. COMPUTER SCIENCE AND BUSINESS SYSTEM**  
**EFFECTIVE FROM ACADEMIC YEAR 2023 - 24 ADMITTED BATCH**  
**R22 COURSE STRUCTURE AND SYLLABUS**

**I YEAR I – SEMESTER**

S.No.	Course Code	Course	Category	L	T	P	Credits
1.	22BS1111	Matrices and Calculus	BS	3	1	0	4
2.	22BS1112	Engineering Chemistry	BS	3	1	0	4
3.	22CS1113	Programming for Problem Solving	ES	3	0	0	3
4.	22EE1114	Basic Electrical Engineering	ES	2	0	0	2
5.	22ME1155	Computer Aided Engineering Graphics	ES	1	0	4	3
6.	22CS1156	Elements of Computer Science & Engineering	BS	0	0	2	1
7.	22BS1152	Engineering Chemistry Laboratory	ES	0	0	2	1
8.	22CS1153	Programming for Problem Solving Laboratory	ES	0	0	2	1
9.	22EE1154	Basic Electrical Engineering Laboratory	ES	0	0	2	1
10.	22MC0001	Induction Program	BS				
		<b>Total</b>		<b>12</b>	<b>2</b>	<b>12</b>	<b>20</b>

**I YEAR II – SEMESTER**

S.No.	Course Code	Course	Category	L	T	P	Credits
1.	22BS1211	Ordinary Differential Equations and Vector Calculus	BS	3	1	0	4
2.	22BS1213	Applied Physics	BS	3	1	0	4
3.	22ME1256	Engineering Workshop	ES	0	1	3	2.5
4.	22HS1212	English for Skill Enhancement	HS	2	0	0	2
5.	22EC1215	Electronic Devices and Circuits	ES	2	0	0	2
6.	22BS1253	Applied Physics Laboratory	BS	0	0	3	1.5
7.	22CS1251	Python Programming Laboratory	ES	0	1	2	2
8.	22HS1252	English Language and Communication Skills Laboratory	HS	0	0	2	1
9.	22IT1255	IT Workshop	ES	0	0	2	1
10.	22MC0002	Environmental Science	BS	3	0	0	0
		<b>Total</b>		<b>13</b>	<b>4</b>	<b>12</b>	<b>20</b>



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**R22 B.Tech**

**CSB**

**2023-2024**

**I Year – I Semester**



## 22BS1111-MATRICES AND CALCULUS

**I B Tech. I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Prerequisite(s):** Mathematical knowledge at Pre university level.

**Course Objectives:** Develop ability to learn the concept of

1. Rank of the matrix and apply the same to know the consistency for the linear system of equations.
2. Eigen values and Eigen vectors to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems, Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and Finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

**Course Outcomes:** After successful completion of this course, the student should be able to

1. Write the matrix representation of a set of linear equations, find the rank and apply the same to analyse the solution of the system of equations.
2. Reduce the quadratic form to canonical form using orthogonal transformations by finding Eigenvalues and Eigen vectors.
3. Solve the applications on the mean value theorems, Evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints using partial differentiation.
5. Evaluate the multiple integrals and apply the concept to find areas and volumes.

### **UNIT - I: MATRICES**

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

### **UNIT - II: EIGEN VALUES AND EIGEN VECTORS**

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### **UNIT - III: CALCULUS**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proof). Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates for known curves (circle, parabola, ellipse), Definition of Improper Integral: Beta and Gamma functions and their applications.

### **UNIT - IV: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)**

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and



three variables using method of Lagrange multipliers.

**UNIT-V: MULTIVARIABLE CALCULUS (INTEGRATION)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form for known curves (circle, parabola, ellipse), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

**REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



**22BS1112: ENGINEERING CHEMISTRY**

**I B Tech. I Semester**

**L T P C**  
**3 1 0 4**

**Course Objectives:**

1. To acquire knowledge about desalination of brackish water and treatment of municipal water
2. To include the fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
4. To understand the significance of green chemistry and green synthesis and to imbibe the green chemistry principles.
5. To acquire required knowledge about engineering materials like smart materials, lubricants, and biodiesel.

**Course Outcomes:**

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4. The student can use real examples to illustrate how the principles of *green chemistry* can be applied to chemical process in engineering
5. They can predict potential applications of engineering materials and practical utility in order to become good engineers and entrepreneurs.

**UNIT - I: WATER AND ITS TREATMENT:**

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation Determination of F<sup>-</sup> ion by ion-selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion-exchange processes. Desalination of water – Reverse osmosis.

**UNIT – II BATTERY CHEMISTRY & CORROSION**

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences



between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

### UNIT - III: POLYMERIC MATERIALS:

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokolrubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction intrans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

### UNIT - IV: GREEN CHEMISTRY AND ENGINEERING FOR SUSTAINABLE DEVELOPMENT:

Definition and history of Green chemistry, Concept and principles (Prevention, Atom Economy, Less Hazardous Chemical Syntheses, Designing Safer Chemicals, Safer Solvents and Auxiliaries, Design for Energy Efficiency, Use of Renewable Feedstock, Reduce, Derivatives, Catalysis, Design for Degradation, Real-time Analysis for Pollution Prevention, Inherently Safer Chemistry for Accident Prevention) of Green Chemistry with suitable examples.

### UNIT - V: ENGINEERING MATERIALS:

#### **Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinylamides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Bio Diesel:** Sources and applications of Biodiesel

### TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K.



Shashikala, Pearson Publications, 2021.

5. Engineering Chemistry by K Sesha Maheswaramma and Mridula Chugh, Pearson Publications.

**REFERENCE BOOKS:**

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)





## 22CS1113: PROGRAMMING FOR PROBLEM SOLVING

I B.Tech. I Semester

L T P C

3 0 0 3

### Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems.
5. To learn the fundamentals of searching and sorting.

### Course Outcomes: The student will learn

1. To write algorithms and to draw flowcharts for solving problems, To convert the algorithms/flowcharts to C programs.
2. To code and test a given logic in the C programming language.
3. To decompose a problem into functions and to develop modular reusable code.
4. To use arrays, pointers, strings and structures to write C programs.
5. To implement Searching and sorting problems.

## UNIT - I: INTRODUCTION TO PROGRAMMING

Compilers, compiling and executing a program.

**Representation of Algorithm** - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number  
Flowchart/Pseudo code with examples, Program design and structured programming

**Introduction to C Programming Language:** variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, **Operators:** Ternary operator, Bitwise operations: Bitwise AND, OR, XOR and NOT operators, expressions and precedence, Expression evaluation, type conversion.

**Conditional Branching and Loops:** Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, goto, Iteration with for, while, do- while loops

**I/O:** Simple input and output with scanf() and printf(), formatted I/O.

## UNIT - II: ARRAYS AND FUNCTIONS

**Arrays:** one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

**Functions:** Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions.

**Storage classes:** auto, extern, static and register.

**Recursion:** Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Some C standard functions and libraries.

## UNIT - III: POINTERS, STRINGS & STRUCTURES.

**Pointers:** Idea of pointers, Defining pointers, usage of self-referential structures in linked list (no



implementation), passing pointers to functions, idea of call by reference.

**Strings:** Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen( ), strcat( ), strcpy( ), strstr( ) etc.), arrays of strings

**Structures:** Defining structures, initializing structures, unions, Array of structures  
Pointers to Arrays and Structures, Use of Pointers in self-referential structures,  
Enumeration data type.

#### **UNIT - IV: FILE HANDLING IN C, PREPROCESSOR COMMANDS**

**Files:** Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek( ), ftell( ) and rewind( ) functions.

**Preprocessor Commands:** Commonly used Preprocessor commands like File inclusion, macros substitution, conditional compilation (include, define, undef, if, ifdef, ifndef )  
Introduction to stdin, stdout and stderr. Command line arguments

#### **UNIT - V: SEARCHING AND SORTING TECHNIQUES:**

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms).

#### **TEXT BOOKS:**

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

#### **REFERENCE BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming



**22EE1114: BASIC ELECTRICAL ENGINEERING**

**I B.Tech. I Semester**

**L T P C**  
**2 0 0 2**

**Prerequisites:** Mathematics

**Course Objectives:**

1. To study and understand DC circuits.
2. To study and understand Single & Three phase AC circuits.
3. To study and understand the Single Phase Transformers.
4. To study and understand the different types of DC and AC machines.
5. To have the knowledge of various electrical installations and the concept of power factor improvement.

**Course Outcomes:** After completion of this course, students will be able to

1. Analyze DC circuits using various techniques
2. Analyze Single & Three phase AC circuits
3. Discuss the working principles and estimate the performance of Single Phase Transformers
4. Discuss the Construction and working principle of different types of DC and AC machines.
5. Classify various components of Low Voltage Electrical Installations and identify the importance of power factor improvement

**UNIT-I: D.C. CIRCUITS:** Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation (Series, Parallel, Series and Parallel circuits, Nodal Analysis and Mesh Analysis). Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**UNIT-II: A.C. CIRCUITS:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series circuits only), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

**UNIT-III: SINGLE PHASE TRANSFORMERS:** Working Principle and construction of Transformer, Types, Ideal and practical transformer, EMF Equation, equivalent circuit, losses in transformers, regulation and efficiency.

**UNIT-IV: ELECTRICAL MACHINES**

**D. C. Generator:** Constructional details of D C Machine, Working Principle of D C Generator, EMF Equation, Types, Numerical Problems.

**D. C. Motor:** Working Principle of D C Motor, Types, Torque Equation, Numerical Problems Performance Characteristics of dc shunt motor.

**Three Phase Induction Motor:** Generation of rotating magnetic field, Construction and



working of a three-phase induction motor, Significance of torque-slip characteristics.

**Synchronous Generator:** Construction and working of synchronous generator.

**UNIT-V: ELECTRICAL INSTALLATIONS:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement.

**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989



## 22ME1155: COMPUTER AIDED ENGINEERING GRAPHICS

I B.Tech. I Semester

L T P C

1 0 4 3

### Course Objectives:

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products
3. To draw sectional views and pictorial views for various types of solids.
4. To develop the lateral surfaces of basic engineering objects
5. To impart knowledge about standard principles of orthographic projection and isometric views of different objects.

### Course Out comes: At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D and 3D objects
2. Sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

### UNIT – I:

**INTRODUCTION TO ENGINEERING GRAPHICS:** Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

### UNIT- II:

**ORTHOGRAPHIC PROJECTIONS:** Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

### UNIT – III:

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

### UNIT – IV:

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

### UNIT – V:

**ISOMETRIC PROJECTIONS:** Principles of Isometric Projection – Isometric Scale – Isometric



Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

**TEXT BOOKS:**

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapooan, Vikas: S.Chand and company Ltd.

**REFERENCE BOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

**Note:** - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.



**22CS1156: ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objective:**

1. To learn the fundamentals of computers.
2. To provide an overview of the subjects of computer science and engineering.
3. To learn the operating system, database management system, computer networks.
4. To understand the software development process.
5. To learn the various autonomous system

**Course Outcomes:**

1. Know the working principles of functional units of a basic Computer
2. Understand program development, the use of data structures and algorithms in problem solving.
3. Know the need and types of operating system, data base systems.
4. Understand the significance of networks, internet, WWW and cybersecurity.
5. Understand Autonomous systems, the application of artificial intelligence.

**UNIT-I**

**BASICS OF A COMPUTER** – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, application software, packages, frameworks, IDEs.

**UNIT-II**

**SOFTWARE DEVELOPMENT** – waterfall model, Agile, Types of computer languages – Programming, markup, scripting, Program development steps, flowcharts, algorithms, data structures – definition, types of data structures

**UNIT-III**

**OPERATING SYSTEMS:** Functions of operating systems, types of operating systems, Device & Resource management

**Database Management Systems:** Data models, RDBMS, SQL, Database Transactions, data centers, cloud services

**UNIT-IV**

**COMPUTER NETWORKS:** Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, vehicular networks, 5G communications.

WorldWideWeb–Basics, role of HTML, CSS, XML, Tools for web designing, social media, online social networks.

Security–information security, cyber security, cyber laws

**UNIT-V**

**AUTONOMOUS SYSTEMS:** IoT, Robotics, Drones, Artificial Intelligence–Learning, Game Development, natural language processing, image and video processing, Cloud Basics.



**TEXTBOOK:**

1. Invitation to Computer Science, G.Michael Schneider, Macalester College, Judith L.Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

**REFERENCEBOOKS:**

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage.





**22BS1152: ENGINEERING CHEMISTRY LABORATORY**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
5. Students will be able to visualize the experiments virtually for better understanding

**Course Outcomes:** The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.
5. Can perform the experiments making use of working models

**List of Experiments:**

- I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
- II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
- III. **Potentiometry:** Estimation of the amount of  $\text{Fe}^{+2}$  by Potentiometry.
- IV. **pH Metry:** Determination of an acid concentration using pH meter.
- V. Preparations:
  1. Preparation of Bakelite.
  2. Preparation Nylon – 6.
- VI. **Lubricants:**
  1. Estimation of acid value of given lubricant oil.
  2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
- VII. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
- VIII. Virtual lab experiments
  1. Construction of Fuel cell and its working.
  2. Smart materials for Biomedical applications
  3. Batteries for electrical vehicles.
  4. Functioning of solar cell and its applications.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition



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3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).



**22CS1153: PROGRAMMING FOR PROBLEM SOLVING LAB**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

1. To learn C-language Programs using the data types, input/ output statements and control statements.
2. Describe the importance of modular programming and arrays using C-Language Program.
3. Understand the concept and use of pointers for memory management techniques
4. Understand structure, union, and enumerated types.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams.

**Course Outcomes:**

1. Ability to design and test programs to solve mathematical and scientific problems.
2. Ability to write structured programs using control structures and functions.
3. Able to Implement C programs using arrays & pointers.
4. Able to Use the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Able to execute programs that read and write text, binary files using the formatting and character I/O functions.

**EXPERIMENTS**

**WEEK-1:**

- a. Write a C program to find simple interest and compound interest.
- b. Write a C program to convert Celsius to Fahrenheit.
- c. Write a C Program to swap two numbers.
- d. Write a C program to perform all arithmetic operations (+, -, \*, /, %).
- e. Write a simple program that prints the results of all the operators available in C (Including pre/ post increment, bitwise and/or/not, etc.). Read required operand Values from standard input.

**WEEK-2:**

- a. Write a simple program that converts one given data type to another using auto Conversion and casting. Take the values from standard input.
- b. Write a C program to check whether the given number is even or odd using Conditional Operator.
- c. Write a C program to find the Largest of two numbers.
- d. Write a C program to print ascending order of three given integers.

**WEEK-3:**

- a. Write a C program to Check the given year is leap year or not.
- b. Write a C program to find the roots of quadratic equation.
- c. Write a C Program to implement arithmetic calculator using switch case.
- d. Write a program that declares Class awarded for a given percentage of marks, where (use else if ladder and switch) <40%= Failed, 40% to <60% = Second class, 60% to



**WEEK-4:**

- a. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:  
5 x 1 = 5  
5 x 2 = 10  
5 x 3 = 15
- b. Write a program that shows the binary equivalent of a given positive number between 0 and 255.
- c. Write a C program to find sum of individual digits of the given integer.
- d. Write a C program to find factorial of a given number.

**WEEK-5:**

- a. Write a program that finds if a given number is a prime number
- b. Write a C program to check whether the given number is palindrome or not.
- c. Write a C program to print Fibonacci series.
- d. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:  $1+x+x^2+x^3+\dots+x^n$ .

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

**WEEK-6:**

- a. Write a C program to calculate the following, where x is a fractional value.  
 $1-x/2 +x^2/4-x^3/6$ .
- b. Write a C program to display the prime numbers from 1 to n(where n value is Given by user)
- c. Write a C program to construct a pyramid of numbers as follows:

```
1           *           1           1           *
1 2         * *       2 3         2 2         * *
1 2 3       * * *     4 5 6       3 3 3       * * *
                                     4 4 4 4     * *
                                     *           *
```

- d. Write a C program to construct the Pascal triangle

**WEEK-7:**

- a. Write a C program to find largest, smallest numbers and average in a list of array elements.
- b. Write a C program to find mean, variance, standard deviation for a given list of elements.
- c. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.



**WEEK-8:**

- a. Write a C program to transpose a matrix.
- b. Write a C program to perform the Addition of Two Matrices.
- c. Write a C program to perform the Multiplication of Two Matrices.

**WEEK-9:**

Write programs using non recursive and recursive functions for the following

- a. Find GCD.
- b. Find the factorial of a given number.
- c. Generate the Fibonacci series.
- d. Find  $x^n$

**WEEK-10:**

- a. Write a C program to swap two integers using following methods.
  - i. call by value
  - ii. call by reference
- b. Write a program for reading elements using a pointer into an array and display the Values using array.
- c. Write a program for display values reverse order from an array using a pointer.
- d. Write a program through a pointer variable to sum of n elements from an array.

**WEEK-11:**

- a. Write a C program to insert a sub-string into a given main string from a given position.
- b. Write a C program to delete n characters from a given position in a given string.
- c. Write a C program to arrange given n strings in alphabetical order.
- d. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

**WEEK-12:**

- a. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
- b. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba etc.)
- c. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
- d. Write a C program to count the lines, words and characters in a given text.

**WEEK-13:**

- a. Write a C program to find total and average marks for five subjects of three students using structures.
- b. Write a C program to demonstrate nested structures.
- c. Write a C program to display the contents of a file to standard output device.
- d. Write a C program which copies one file to another into another file.
- e. Write a C program to merge two files into a third file.  
(i.e., the contents of the first file followed by those of the second are put in the third file)

**WEEK-14:**



- a. Write a C program to reverse the contents of a file.
- b. Write a C program that does the following:  
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)  
Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek () function)  
The program should then read all 10 values and print them back.
- c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
- d. Write a C program that uses non recursive function to search for a Key value in a Given list of integers using linear search method.
- e. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.

**WEEK-15:**

- a. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- b. Write a C program that sorts the given array of integers using selection sort in
- c. descending order Write a C program that sorts the given array of integers using insertion sort in ascending order

**TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.



**22EE1154: BASIC ELECTRICAL ENGINEERING LABORATORY**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Prerequisites:** Basic Electrical Engineering

**Course Objectives:**

1. To measure the electrical parameters for different types of DC circuits using conventional and theorems approach.
2. To measure the electrical parameters for different types of AC circuits
3. To study the transient response of various R, L and C circuits using different excitations.
4. To determine the performance of Single Phase Transformers.
5. To determine the performance of different types of DC and AC machines.

**Course Outcomes: After completion of this course, students will be able to**

1. Verify the basic conventional approach and theorems for Electrical circuits through different experiments.
2. Calculate the electrical parameters for different types of AC circuits
3. Analyze the transient responses of R, L and C circuits for different input conditions.
4. Evaluate the performance calculations of Single Phase Transformers through various testing methods.
5. Evaluate the performance calculations of DC and AC machines through various testing methods.

**List of experiments/demonstrations:**

**PART- A (compulsory)**

1. Verification of KVL and KCL
2. Verification of Thevenin's theorem
3. Verification of Norton's theorem
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

**PART-B (any two experiments from the given list)**

1. Verification of Superposition theorem
2. Transient Response of Series RL and RC circuits for DC excitation
3. Load Test on Single Phase Transformer (Calculate Efficiency)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. No-Load Characteristics of a Three-phase Alternator



**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.





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**22MC0001: INDUCTION PROGRAM**

R22-R22-B.TECH I YEAR (CSB) VBIT



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**R22 B.Tech**

**CSB**

**2023-2024**

**I Year – II Semester**



## 22BS1211- ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I B.Tech. II Semester

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** Develop ability to learn

1. Methods of solving the Ordinary Differential Equations of first order.
2. Methods of solving the higher order Ordinary Differential Equations.
3. Concept, properties of Laplace transforms & using the same to solve ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to vector integration.

**Course outcomes:** After successful completion of this course, student should be able to

1. Identify the type of first order Ordinary Differential Equation and solve them by appropriate method.
2. Apply the concept of higher order Ordinary Differential Equations to solve real world problems.
3. Solve ordinary differential equations by using Laplace transform techniques.
4. Calculate scalar potential for a vector and directional derivative of a scalar point function using vector differentiation.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

### UNIT-I: FIRST ORDER ODE

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

### UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second and higher order linear differential equations with constant coefficients: non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin bx$ ,  $\cos bx$ , polynomials in  $x^k$ ,  $ve^{ax}$  and  $x V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

### UNIT-III: LAPLACE TRANSFORMS

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, second shifting theorem (without proof), Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.



#### **UNIT-IV: VECTOR DIFFERENTIATION**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

#### **UNIT-V: VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition,
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.



## 22BS1213: APPLIED PHYSICS

I B. Tech. II Semester

L T P C  
3 1 0 4

### Course Objectives:

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibers.

### Course Outcomes:

At the end of the course the student will be able to:

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic and energy materials for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

### UNIT - I: QUANTUM PHYSICS AND SOLIDS

**Quantum Mechanics:** Introduction to quantum physics, blackbody radiation, Wein's and Rayleigh-Jean's law, Planck's radiation law (Qualitative) - photoelectric effect de-Broglie hypothesis and matter waves- Davisson and Germer experiment -Heisenberg uncertainty principle - Born interpretation of the wave function - time independent Schrodinger wave equation - particle in one dimensional potential box.

**Solids:** Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative) Bloch's theorem - Kronig-Penney model (Qualitative) origin of energy bands- classification of solids.

### UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic and extrinsic semiconductors - Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)-LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

### UNIT - III: DIELECTRIC, AND MAGNETIC AND ENERGY MATERIALS

**Dielectric Materials:** Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials.

**Magnetic Materials:** Basic definitions - classification of Magnetic materials - Domain theory of ferromagnetism in hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance.



**Energy Materials:** Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors.

#### **UNIT - IV: NANOTECHNOLOGY**

Nanoscale, quantum confinement, surface to volume ratio, **bottom-up fabrication:** sol-gel, precipitation, combustion methods – **top-down fabrication:** ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nanomaterials.

#### **UNIT - V: LASER AND FIBER OPTICS**

**Lasers:** Laser beam characteristics-three quantum processes-Einstein coefficients and their relations-lasing action - pumping methods, CO<sub>2</sub> laser, Nd: YAG laser- semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

#### **TEXT BOOKS:**

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.

#### **REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.



## 22ME1256: ENGINEERING WORKSHOP

**I B.Tech. II Semester**

**L T P C**

**0 1 3 2.5**

**Pre-requisites:** Practical skill

**Course Objectives:**

1. To Study about different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

**Course Outcomes:** At the end of the course, the student will be able to:

1. CO1: Study and practice on machine tools and their operations
2. CO2: Practice on manufacturing of components using work shop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO4: Apply basic electrical engineering knowledge for house wiring practice.
5. CO 5: Study and Practice of arc welding process

### 1. TRADES FOR EXERCISES:

**At least two exercises from each trade:**

- I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
- III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
- IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
- V. Welding Practice – (Arc Welding & Gas Welding)
- VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

### 2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

### TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.



**REFERENCE BOOKS:**

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

R22-R22-B.TECH-CSE





**22HS1212 : ENGLISH FOR SKILL ENHANCEMENT**

**I B.Tech. II Semester**

**L T P C**  
**2 0 0 2**

**Course Objectives:** This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Learn remedial and functional grammar related to various grammar items.
4. Prepare the students for examinations such as IELTS and TOEFL by sharpening their reading and writing skills
5. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:** Students will be able to:

1. Use a wide range of vocabulary and sentence structures and also acquire basic proficiency in reading and writing modules of English.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

**UNIT-I**

Chapter entitled '*Toasted English*' by R.K. Narayan from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** The Concept of Word Formation – The Use of Prefixes and Suffixes- Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance – Techniques for Effective Reading.

**Writing:** Sentence Structures – Use of Phrases and Clauses in Sentences – Importance of Proper Punctuation – Techniques for Writing precisely – Paragraph Writing –Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

**UNIT-II**

Chapter entitled '*Appro JRD*' by Sudha Murthy from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice



**Writing:** Nature and Style of Writing - Defining/Describing People, Objects, Places and Events  
– Classifying – Providing Examples or Evidence.

### UNIT-III

Chapter entitled ‘Lessons from Online Learning’ by F.Haider Alvi, Deborah Hurstetal from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Confused – Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

**Writing:** Format of a Formal Letter – Writing Formal Letters e.g. Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

### UNIT-IV

Chapter entitled ‘Art and Literature’ by Abdul Kalam from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Exercises for Practice

**Writing:** Writing Practices – Essay Writing – Writing Introduction and Conclusion – Précis Writing.

### UNIT-V

Chapter entitled ‘Go, Kiss the World’ by Subroto Bagchi from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Technical Vocabulary and their Usage

**Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

**Reading:** Reading Comprehension – Exercises for Practice

**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats - Structure of Reports (Manuscript Format) - Types of Reports - Writing a Report.

**Note:** Listening and Speaking Skills which are given under Unit -6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- **Note:** 1. As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is *Open-ended*, besides following the prescribed textbook, it is



required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

- **Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

**TEXTBOOK:**

1. “English: Language, Context and Culture” by Orient Black Swan Pvt. Ltd, Hyderabad.2022. Print.

**REFERENCEBOOKS:**

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction,1,2,3. Cambridge University Press
3. Wood, F. T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2<sup>nd</sup> ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha.(2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.



**22EC1215: ELECTRONIC DEVICES AND CIRCUITS**

**I B.Tech. II Semester**

**L T P C**

**2 0 0 2**

**Course Objectives:**

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of devices.
3. To know the switching characteristics of devices.
4. To know the special purpose devices such as SCR, UJT.
5. To know the MOSFET and its characteristics

**Course Outcomes: Upon completion of the Course, the students will be able to:**

1. Acquire the knowledge of various electronic devices and their use on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.
4. Know the configurations of Transistors
5. Acquire the knowledge of various device characteristics.

**UNIT - I**

**Diodes:** Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

**UNIT - II**

**Diode Applications:** Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

**UNIT - III**

**Bipolar Junction Transistor (BJT):** Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

**UNIT - IV**

**Junction Field Effect Transistor (FET):** Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

**UNIT - V**

**Special Purpose Devices:** Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

**TEXT BOOKS:**

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11<sup>th</sup> Edition, 2009, Pearson.

**REFERENCE BOOKS:**

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5<sup>th</sup> Edition, Oxford.
2. ChinmoySaha, Arindam Halder, DebaatiGanguly - Basic Electronics-Principles and Applications, Cambridge, 2018.



## 22BS1253: APPLIED PHYSICS LABORATORY

I B. Tech. II Semester

L T P C

0 0 3 1.5

### Course Objectives:

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Understand the method of least square fitting
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Study the behavior of passive components.

### Course Outcomes:

The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Carried out data analysis
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Learn the characteristics of passive components like L, C and R and their applications.

### LIST OF EXPERIMENTS:

1. Understanding the method of least squares – torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. Characteristics of series and parallel LCR circuits.
5. V-I characteristics of a p-n junction diode and Zener diode
6. Input and output characteristics of BJT (CE, CB & CC configurations)
7. a). V-I and L-I characteristics of light emitting diode (LED)  
b). V-I characteristics of a Laser diode
8. V-I Characteristics of solar cell
9. a). Determination of the beam divergence of the given LASER beam  
b). Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. Determination of Energy gap of a semiconductor.
11. Determination of time constant of RC Circuit.
12. Study B-H curve of a magnetic material.

**Note: Any 8 experiments are to be performed.**

### REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.



**Course Objectives:**

1. To learn python programming language using the data types, input/ output statements.
2. To install and run the Python interpreter
3. To learn control structures.
4. To Understand Lists, Dictionaries in python
5. To Handle Strings and Files inPython

**Course Outcomes:** After completion of the course, the student should be able to

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Verify programs using modular approach, file I/O, Python standard library
4. Implement Digital Systems using Python
5. Capable to implement on hardwareboards

Note: The lab experiments will be like the following experiment examples

**Week -1:**

1. i) Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.  
ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3.
  - i) Write a program to calculate compound interest when principal, rate and numbers of periods are given.
  - ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points

**Week-2:**

1. Read name, address, email and phone number of a person through keyboard and print the details.
2. Write a program to demonstrate different number data types in Python.
3. Write a program to perform different Arithmetic Operations on numbers in Python.

**Week - 3:**

1. Print the below triangle using for loop. 5  
4 4  
3 3 3  
2 2 2 2  
1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or



uppercase character or a special character (use 'if-else-if' ladder)

3. Python Program to Print the Fibonacci sequence using while loop

#### Week-4:

1. Python program to print all prime numbers in a given interval (use break)
2. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

#### Week - 5:

1. i) Write a program to convert a list and tuple into arrays.  
ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

#### Week - 6:

1. Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has a duplicate that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
  - i). Write a function called remove duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
  - ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
  - iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'  
ii) Remove the given word in all the places in a string?  
iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

#### Week-7:

1. Writes a recursive function that generates all binary strings of n-bit length
2. Write a program to define a lambda function(**rev\_upper**) to convert a string to its upper-case and reverse it.
3. Write a python program to find factorial of a number using Recursion.

#### Week - 8:

1. i) Write a python program that defines a matrix and prints  
ii) Write a python program to perform addition of two square matrices  
iii) Write a python program to perform multiplication of two square matrices



2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

#### Week - 9:

1. Write a Python program to show how to use else clause with try and except clauses
2. Write a Python Module Program to implement Arithmetic operators, Bitwise operators, Logical operators in python as functions in one module.
3. Write a python program to specify scope and Lifetime of variables in python Functions.

#### Week-10:

1. a. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.  
b. Add an attribute named color to your Rectangle objects and modify draw rectangle so that it uses the color attribute as the fill color.  
c. Write a function called draw point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.  
d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

#### Week- 11

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences

#### Week - 12:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR

#### Week - 13:

1. Write a program to implement Half Adder, Full Adder, and Parallel Adder
2. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.
3. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

#### Week - 14:

1. Write a script named **copyfile.py**. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
2. Write a GUI program to create a window for calculator and implement basic arithmetic operations in that window.





3. Write a python program to perform addition of two matrices using NUMPY package

**TEXT BOOKS:**

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

**REFERENCE BOOKS:**

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1<sup>st</sup> Ed. 2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python, Kenneth A. Lambert, Cengage



## 22HS1252: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

**I B. Tech. II Semester**

**L T P C**

**0 0 2 1**

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

### **Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

### **Course Outcomes:** Students will be able to:

1. Make use of various online and web resources for independent language learning.
2. Understand the nuances of English language through audio-visual experience and group activities.
3. Neutralize their accent for intelligibility for enabling them to communicate with a global audience.
4. Speak with clarity and confidence which in turn improves their academic performance in the other courses.
5. Face and interact with various stakeholders leading to the enhancement of their employability skills.

### **Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. Computer Assisted Language Learning (CALL) Lab**
- b. Interactive Communication Skills (ICS) Lab**

### **Listening Skills:**

#### **Objectives**

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress*



and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

### ***Speaking Skills:***

Objectives

1. To involve students in speaking activities in various contexts
  2. To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice
  - Describing objects/situations/people
  - Roleplay – Individual/Group activities
  - Just A Mine (JAM) Sessions

The following course contents prescribed for the **English Language and Communication Skills Lab.**

#### ***Exercise-I***

##### ***CALL Lab:***

*Understand:* Listening Skill- Its importance – Purpose - Process - Types - Barriers - Effective Listening. *Practice:* Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs - Consonant Clusters - Past Tense Marker and Plural Marker -

*Testing Exercises*

##### ***ICS Lab:***

*Understand:* Spoken vs. Written language – Formal and Informal English.

*Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

#### ***Exercise-II***

##### ***CALL Lab:***

*Understand:* Structure of Syllables–Word Stress–Weak Forms and Strong Forms– Stress pattern in sentences – Intonation.

*Practice:* Basic Rules of Word Accent – Stress Shift - Weak Forms and Strong Forms – Stress pattern in sentences – Intonation - *Testing Exercises*

##### ***ICS Lab:***

*Understand:* Features of Good Conversation – Strategies for Effective Communication.

*Practice:* Situational Dialogues – Role Play – Expressions in Various Situations – Making Requests and Seeking Permissions - Telephone Etiquette.

#### ***Exercise-III***

##### ***CALL Lab:***

*Understand:* Errors in Pronunciation – Neutralising Mother Tongue Interference (MTI).

*Practice:* Common Indian Variants in Pronunciation – Differences between British and American Pronunciation - *Testing Exercises*



**ICS Lab:**

*Understand:* Descriptions – Narrations – Giving Directions and Guidelines – Blog Writing

*Practice:* Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

**Exercise-IV**

**CALL Lab:**

*Understand:* Listening for General Details.

*Practice:* Listening Comprehension Tests - *Testing Exercises*

**ICS Lab:**

*Understand:* Public Speaking – Exposure to Structured Talks - Non-verbal Communication - Presentation Skills.

*Practice:* Making a Short Speech – Extempore – Making a Presentation.

**Exercise-V**

**CALL Lab:**

*Understand:* Listening for Specific Details.

*Practice:* Listening Comprehension Tests – *Testing Exercises*

**ICS Lab:**

*Understand:* Group Discussion

*Practice:* Group Discussion

**Minimum Requirement of infrastructural facilities for ELCS Lab:**

**1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

**System Requirement (Hardware component):**

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

**2. Interactive Communication Skills (ICS) Lab:**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

**Source of Material (Master Copy):**

- *Exercises in Spoken English. Part 1, 2, 3.* CIEFL and Oxford University Press

**Note:** Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.



**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10<sup>th</sup> Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL&GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- DigitalAll
- Orell Digital Language Lab (Licensed Version)

**REFERENCE BOOKS:**

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook*. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook*. Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient Black Swan Pvt.Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.



**22IT1255: IT WORKSHOP**

**I B.Tech. II Semester**

**L T P C**

**0 0 2 1**

**Course Objectives:** The IT Workshop for engineers is a training lab course spread over 60 hours.

1. The modules include training on PC Hardware, Internet & World Wide Web
2. To learn Hardware troubleshooting.
3. To understand the productivity tools including Word, Excel, PowerPoint and Publisher.
4. To learn the Safeguard computer systems from viruses/worms
5. To learn the LaTeX and Word.

**Course Outcomes:**

1. Perform Hardware troubleshooting
2. Understand Hardware components and inter dependencies
3. Safeguard computer systems from viruses/worms
4. Document/ Presentation preparation
5. Perform calculations using spreadsheets

**PC Hardware**

**Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Internet & World Wide Web**

**Task1: Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.



**Task 2: Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task 3: Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

**Task 4: Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms, PGF(ref.9) Case study of Wayback Machine web robot for Cyberforensics for Secure Digital India

### **LaTeX and WORD**

**Task 1 – Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 2: Using LaTeX and Word** to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Task 3: Creating project abstract** Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Task 4: Creating a Newsletter:** Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

### **EXCEL**

**Excel Orientation:** The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text



**Task 2 : Calculating GPA** - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

**Task 3:** Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

### **POWERPOINT**

**Task 1:** Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

**Task 2:** Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

**Task 3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides. Prepare and demonstrate (.ppt file) for the “Call to the Nation” quotations under "Faith and Strength", "Education and Society", "Powers of the Mind", "Man: The Maker of his Own Destiny", "India: Our Motherland" from the sources

<https://sites.google.com/view/chandraksekharaiyah/call-to-the-nation-book>

[https://www.ramakrishnavivekananda.info/vivekananda/complete\\_works.htm](https://www.ramakrishnavivekananda.info/vivekananda/complete_works.htm)

### **REFERENCE BOOKS:**

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*
3. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education*.
4. PC Hardware - A Handbook – Kate J. Chase *PHI* (Microsoft)
5. LaTeX Companion – Leslie Lamport, *PHI/Pearson*.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – *CISCO Press, Pearson Education*.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan  
– *CISCO Press, Pearson Education*.
8. "Swami Vivekananda - Call to the Nation", ISBN: 978-81-7505-018-1.  
<http://sites.google.com/view/pgovernanceforum>





**22MC0002: ENVIRONMENTAL SCIENCE**

**I B.Tech. II Semester**

**L T P C**  
**3 0 0 0**

**Course Objectives:**

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

**Course Outcomes:**

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I**

**ECOSYSTEMS:** Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II**

**NATURAL RESOURCES: CLASSIFICATION OF RESOURCES:** Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III**

**BIODIVERSITY AND BIOTIC RESOURCES:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV**

**ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES:** **Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution**



**control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

## UNIT - V

**ENVIRONMENTAL POLICY, LEGISLATION & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

### TEXT BOOKS:

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

### REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.



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Aushapur (V), Ghatkesar (M), Medchal – Dist. Telangana State – 501 301.

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**DEPARTMENT  
OF  
COMPUTER SCIENCE &  
ENGINEERING (Cyber  
Security)  
(R22 B. TECH. CSC)**

**ACADEMIC YEAR : 2023-24**

**I B.TECH (CSC)  
COURSE STRUCTURE  
&  
SYLLABUS**



**B.TECH. COMPUTER SCIENCE & ENGINEERING**

(Cyber Security)

EFFECTIVE FROM ACADEMIC YEAR 2023 - 24 ADMITTED BATCH

**R22 COURSE STRUCTURE AND SYLLABUS**

**I YEAR I – SEMESTER**

S.No.	Course Code	Course	Category	L	T	P	Credits
1.	22BS1111	Matrices and Calculus	BS	3	1	0	4
2.	22BS1112	Engineering Chemistry	BS	3	1	0	4
3.	22CS1113	Programming for Problem Solving	ES	3	0	0	3
4.	22EE1114	Basic Electrical Engineering	ES	2	0	0	2
5.	22ME1155	Computer Aided Engineering Graphics	ES	1	0	4	3
6.	22CS1156	Elements of Computer Science & Engineering	BS	0	0	2	1
7.	22BS1152	Engineering Chemistry Laboratory	ES	0	0	2	1
8.	22CS1153	Programming for Problem Solving Laboratory	ES	0	0	2	1
9.	22EE1154	Basic Electrical Engineering Laboratory	ES	0	0	2	1
10.	22MC0001	Induction Program	BS				
<b>Total</b>				<b>12</b>	<b>2</b>	<b>12</b>	<b>20</b>

**I YEAR II – SEMESTER**

S.No.	Course Code	Course	Category	L	T	P	Credits
1.	22BS1211	Ordinary Differential Equations and Vector Calculus	BS	3	1	0	4
2.	22BS1213	Applied Physics	BS	3	1	0	4
3.	22ME1256	Engineering Workshop	ES	0	1	3	2.5
4.	22HS1212	English for Skill Enhancement	HS	2	0	0	2
5.	22EC1215	Electronic Devices and Circuits	ES	2	0	0	2
6.	22BS1253	Applied Physics Laboratory	BS	0	0	3	1.5
7.	22CS1251	Python Programming Laboratory	ES	0	1	2	2
8.	22HS1252	English Language and Communication Skills Laboratory	HS	0	0	2	1
9.	22IT1255	IT Workshop	ES	0	0	2	1
10.	22MC0002	Environmental Science	BS	3	0	0	0
<b>Total</b>				<b>13</b>	<b>4</b>	<b>12</b>	<b>20</b>



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**R22 B.Tech**

**CSC**

**2023-2024**

**I Year – I Semester**



## 22BS1111-MATRICES AND CALCULUS

**I B Tech. I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Prerequisite(s):** Mathematical knowledge at Pre university level.

**Course Objectives:** Develop ability to learn the concept of

1. Rank of the matrix and apply the same to know the consistency for the linear system of equations.
2. Eigen values and Eigen vectors to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems, Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and Finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

**Course Outcomes:** After successful completion of this course, the student should be able to

1. Write the matrix representation of a set of linear equations, find the rank and apply the same to analyse the solution of the system of equations.
2. Reduce the quadratic form to canonical form using orthogonal transformations by finding Eigenvalues and Eigen vectors.
3. Solve the applications on the mean value theorems, Evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints using partial differentiation.
5. Evaluate the multiple integrals and apply the concept to find areas and volumes.

### UNIT - I: MATRICES

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

### UNIT - II: EIGEN VALUES AND EIGEN VECTORS

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### UNIT - III: CALCULUS

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proof). Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates for known curves (circle, parabola, ellipse), Definition of Improper Integral: Beta and Gamma functions and their applications.

### UNIT - IV: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and



three variables using method of Lagrange multipliers.

#### **UNIT-V: MULTIVARIABLE CALCULUS (INTEGRATION)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form for known curves (circle, parabola, ellipse), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



## 22BS1112: ENGINEERING CHEMISTRY

I B Tech. I Semester

L T P C  
3 1 0 4

### Course Objectives:

1. To acquire knowledge about desalination of brackish water and treatment of municipal water
2. To include the fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
4. To understand the significance of green chemistry and green synthesis and to imbibe the green chemistry principles.
5. To acquire required knowledge about engineering materials like smart materials, lubricants, and biodiesel.

### Course Outcomes:

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4. The student can use real examples to illustrate how the principles of *green chemistry* can be applied to chemical process in engineering
5. They can predict potential applications of engineering materials and practical utility in order to become good engineers and entrepreneurs.

### UNIT - I: WATER AND ITS TREATMENT:

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation Determination of F<sup>-</sup> ion by ion-selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion-exchange processes. Desalination of water – Reverse osmosis.

### UNIT – II BATTERY CHEMISTRY & CORROSION

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences





between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

### UNIT - III: POLYMERIC MATERIALS:

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokolrubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction intrans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

### UNIT - IV: GREEN CHEMISTRY AND ENGINEERING FOR SUSTAINABLE DEVELOPMENT:

Definition and history of Green chemistry, Concept and principles (Prevention, Atom Economy, Less Hazardous Chemical Syntheses, Designing Safer Chemicals, Safer Solvents and Auxiliaries, Design for Energy Efficiency, Use of Renewable Feedstock, Reduce, Derivatives, Catalysis, Design for Degradation, Real-time Analysis for Pollution Prevention, Inherently Safer Chemistry for Accident Prevention) of Green Chemistry with suitable examples.

### UNIT - V: ENGINEERING MATERIALS:

#### **Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinylamides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Bio Diesel:** Sources and applications of Biodiesel

### TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K.



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Shashikala, Pearson Publications, 2021.

5. Engineering Chemistry by K Sesha Maheswaramma and Mridula Chugh, Pearson Publications.

**REFERENCE BOOKS:**

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)



## 22CS1113: PROGRAMMING FOR PROBLEM SOLVING

I B.Tech. I Semester

L T P C

3 0 0 3

### Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems.
5. To learn the fundamentals of searching and sorting.

### Course Outcomes: The student will learn

1. To write algorithms and to draw flowcharts for solving problems, To convert the algorithms/flowcharts to C programs.
2. To code and test a given logic in the C programming language.
3. To decompose a problem into functions and to develop modular reusable code.
4. To use arrays, pointers, strings and structures to write C programs.
5. To implement Searching and sorting problems.

## UNIT - I: INTRODUCTION TO PROGRAMMING

Compilers, compiling and executing a program.

**Representation of Algorithm** - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number  
Flowchart/Pseudo code with examples, Program design and structured programming

**Introduction to C Programming Language:** variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, **Operators:** Ternary operator, Bitwise operations: Bitwise AND, OR, XOR and NOT operators, expressions and precedence, Expression evaluation, type conversion.

**Conditional Branching and Loops:** Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, goto, Iteration with for, while, do- while loops

**I/O:** Simple input and output with scanf() and printf(), formatted I/O.

## UNIT - II: ARRAYS AND FUNCTIONS

**Arrays:** one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

**Functions:** Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions.

**Storage classes:** auto, extern, static and register.

**Recursion:** Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Some C standard functions and libraries.

## UNIT - III: POINTERS, STRINGS & STRUCTURES.

**Pointers:** Idea of pointers, Defining pointers, usage of self-referential structures in linked list (no



implementation), passing pointers to functions, idea of call by reference.

**Strings:** Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen( ), strcat( ), strcpy( ), strstr( ) etc.), arrays of strings

**Structures:** Defining structures, initializing structures, unions, Array of structures  
Pointers to Arrays and Structures, Use of Pointers in self-referential structures,  
Enumeration data type.

#### **UNIT - IV: FILE HANDLING IN C, PREPROCESSOR COMMANDS**

**Files:** Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek( ), ftell( ) and rewind( ) functions.

**Preprocessor Commands:** Commonly used Preprocessor commands like File inclusion, macros substitution, conditional compilation (include, define, undef, if, ifdef, ifndef )  
Introduction to stdin, stdout and stderr. Command line arguments

#### **UNIT - V: SEARCHING AND SORTING TECHNIQUES:**

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms).

#### **TEXT BOOKS:**

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

#### **REFERENCE BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming



**22EE1114: BASIC ELECTRICAL ENGINEERING**

**I B.Tech. I Semester**

**L T P C**  
**2 0 0 2**

**Prerequisites:** Mathematics

**Course Objectives:**

1. To study and understand DC circuits.
2. To study and understand Single & Three phase AC circuits.
3. To study and understand the Single Phase Transformers.
4. To study and understand the different types of DC and AC machines.
5. To have the knowledge of various electrical installations and the concept of power factor improvement.

**Course Outcomes:** After completion of this course, students will be able to

1. Analyze DC circuits using various techniques
2. Analyze Single & Three phase AC circuits
3. Discuss the working principles and estimate the performance of Single Phase Transformers
4. Discuss the Construction and working principle of different types of DC and AC machines.
5. Classify various components of Low Voltage Electrical Installations and identify the importance of power factor improvement

**UNIT-I: D.C. CIRCUITS:** Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation (Series, Parallel, Series and Parallel circuits, Nodal Analysis and Mesh Analysis). Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**UNIT-II: A.C. CIRCUITS:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series circuits only), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

**UNIT-III: SINGLE PHASE TRANSFORMERS:** Working Principle and construction of Transformer, Types, Ideal and practical transformer, EMF Equation, equivalent circuit, losses in transformers, regulation and efficiency.

**UNIT-IV: ELECTRICAL MACHINES**

**D. C. Generator:** Constructional details of D C Machine, Working Principle of D C Generator, EMF Equation, Types, Numerical Problems.

**D. C. Motor:** Working Principle of D C Motor, Types, Torque Equation, Numerical Problems Performance Characteristics of dc shunt motor.

**Three Phase Induction Motor:** Generation of rotating magnetic field, Construction and



working of a three-phase induction motor, Significance of torque-slip characteristics.

**Synchronous Generator:** Construction and working of synchronous generator.

**UNIT-V: ELECTRICAL INSTALLATIONS:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement.

**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989



## 22ME1155: COMPUTER AIDED ENGINEERING GRAPHICS

I B.Tech. I Semester

L T P C

1 0 4 3

### Course Objectives:

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products
3. To draw sectional views and pictorial views for various types of solids.
4. To develop the lateral surfaces of basic engineering objects
5. To impart knowledge about standard principles of orthographic projection and isometric views of different objects.

### Course Out comes: At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D and 3D objects
2. Sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

### UNIT – I:

**INTRODUCTION TO ENGINEERING GRAPHICS:** Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

### UNIT- II:

**ORTHOGRAPHIC PROJECTIONS:** Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

### UNIT – III:

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

### UNIT – IV:

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

### UNIT – V:

**ISOMETRIC PROJECTIONS:** Principles of Isometric Projection – Isometric Scale – Isometric



Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

**TEXT BOOKS:**

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapooan, Vikas: S.Chand and company Ltd.

**REFERENCE BOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

**Note:** - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.





**22CS1156: ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objective:**

1. To learn the fundamentals of computers.
2. To provide an overview of the subjects of computer science and engineering.
3. To learn the operating system, database management system, computer networks.
4. To understand the software development process.
5. To learn the various autonomous system

**Course Outcomes:**

1. Know the working principles of functional units of a basic Computer
2. Understand program development, the use of data structures and algorithms in problem solving.
3. Know the need and types of operating system, data base systems.
4. Understand the significance of networks, internet, WWW and cybersecurity.
5. Understand Autonomous systems, the application of artificial intelligence.

**UNIT-I**

**BASICS OF A COMPUTER** – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, application software, packages, frameworks, IDEs.

**UNIT-II**

**SOFTWARE DEVELOPMENT** – waterfall model, Agile, Types of computer languages – Programming, markup, scripting, Program development steps, flowcharts, algorithms, data structures – definition, types of data structures

**UNIT-III**

**OPERATING SYSTEMS:** Functions of operating systems, types of operating systems, Device & Resource management

**Database Management Systems:** Data models, RDBMS, SQL, Database Transactions, data centers, cloud services

**UNIT-IV**

**COMPUTER NETWORKS:** Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, vehicular networks, 5G communications.

WorldWideWeb–Basics, role of HTML, CSS, XML, Tools for web designing, social media, online social networks.

Security–information security, cyber security, cyber laws

**UNIT-V**

**AUTONOMOUS SYSTEMS:** IoT, Robotics, Drones, Artificial Intelligence–Learning, Game Development, natural language processing, image and video processing, Cloud Basics.



**TEXTBOOK:**

1. Invitation to Computer Science, G.Michael Schneider, Macalester College, Judith L.Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

**REFERENCEBOOKS:**

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage.



**22BS1152: ENGINEERING CHEMISTRY LABORATORY**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
5. Students will be able to visualize the experiments virtually for better understanding

**Course Outcomes:** The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.
5. Can perform the experiments making use of working models

**List of Experiments:**

- I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
- II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
- III. **Potentiometry:** Estimation of the amount of  $\text{Fe}^{+2}$  by Potentiometry.
- IV. **pH Metry:** Determination of an acid concentration using pH meter.
- V. Preparations:
  1. Preparation of Bakelite.
  2. Preparation Nylon – 6.
- VI. **Lubricants:**
  1. Estimation of acid value of given lubricant oil.
  2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
- VII. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
- VIII. Virtual lab experiments
  1. Construction of Fuel cell and its working.
  2. Smart materials for Biomedical applications
  3. Batteries for electrical vehicles.
  4. Functioning of solar cell and its applications.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition



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3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

R22-R22-B.TECH-CSC



**22CS1153: PROGRAMMING FOR PROBLEM SOLVING LAB**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

1. To learn C-language Programs using the data types, input/ output statements and control statements.
2. Describe the importance of modular programing and arrays using C-Language Program.
3. Understand the concept and use of pointers for memory management techniques
4. Understand structure, union, and enumerated types.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams.

**Course Outcomes:**

1. Ability to design and test programs to solve mathematical and scientific problems.
2. Ability to write structured programs using control structures and functions.
3. Able to Implement C programs using arrays & pointers.
4. Able to Use the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Able to execute programs that read and write text, binary files using the formatting and character I/O functions.

**EXPERIMENTS**

**WEEK-1:**

- a. Write a C program to find simple interest and compound interest.
- b. Write a C program to convert Celsius to Fahrenheit.
- c. Write a C Program to swap two numbers.
- d. Write a C program to perform all arithmetic operations (+, -, \*, /, %).
- e. Write a simple program that prints the results of all the operators available in C (Including pre/ post increment, bitwise and/or/not, etc.). Read required operand Values from standard input.

**WEEK-2:**

- a. Write a simple program that converts one given data type to another using auto Conversion and casting. Take the values from standard input.
- b. Write a C program to check whether the given number is even or odd using Conditional Operator.
- c. Write a C program to find the Largest of two numbers.
- d. Write a C program to print ascending order of three given integers.

**WEEK-3:**

- a. Write a C program to Check the given year is leap year or not.
- b. Write a C program to find the roots of quadratic equation.
- c. Write a C Program to implement arithmetic calculator using switch case.
- d. Write a program that declares Class awarded for a given percentage of marks, where (use else if ladder and switch) <40%= Failed, 40% to <60% = Second class, 60% to



**WEEK-4:**

- Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:  
 $5 \times 1 = 5$   
 $5 \times 2 = 10$   
 $5 \times 3 = 15$
- Write a program that shows the binary equivalent of a given positive number between 0 and 255.
- Write a C program to find sum of individual digits of the given integer.
- Write a C program to find factorial of a given number.

**WEEK-5:**

- Write a program that finds if a given number is a prime number
- Write a C program to check whether the given number is palindrome or not.
- Write a C program to print Fibonacci series.
- Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:  $1+x+x^2+x^3+\dots+x^n$ .

For example: if n is 3 and x is 5, then the program computes  $1+5+25+125$ .

**WEEK-6:**

- Write a C program to calculate the following, where x is a fractional value.  
 $1-x/2 +x^2/4-x^3/6$ .
- Write a C program to display the prime numbers from 1 to n(where n value is Given by user)
- Write a C program to construct a pyramid of numbers as follows:

1	*	1	1	*
1 2	**	2 3	2 2	**
1 2 3	***	4 5 6	3 3 3	***
			4 4 4 4	**
				*

- Write a C program to construct the Pascal triangle

**WEEK-7:**

- Write a C program to find largest, smallest numbers and average in a list of array elements.
- Write a C program to find mean, variance, standard deviation for a given list of elements.
- Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.



**WEEK-8:**

- a. Write a C program to transpose a matrix.
- b. Write a C program to perform the Addition of Two Matrices.
- c. Write a C program to perform the Multiplication of Two Matrices.

**WEEK-9:**

Write programs using non recursive and recursive functions for the following

- a. Find GCD.
- b. Find the factorial of a given number.
- c. Generate the Fibonacci series.
- d. Find  $x^n$

**WEEK-10:**

- a. Write a C program to swap two integers using following methods.
  - i. call by value
  - ii. call by reference
- b. Write a program for reading elements using a pointer into an array and display the Values using array.
- c. Write a program for display values reverse order from an array using a pointer.
- d. Write a program through a pointer variable to sum of n elements from an array.

**WEEK-11:**

- a. Write a C program to insert a sub-string into a given main string from a given position.
- b. Write a C program to delete n characters from a given position in a given string.
- c. Write a C program to arrange given n strings in alphabetical order.
- d. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

**WEEK-12:**

- a. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
- b. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba etc.)
- c. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
- d. Write a C program to count the lines, words and characters in a given text.

**WEEK-13:**

- a. Write a C program to find total and average marks for five subjects of three students using structures.
- b. Write a C program to demonstrate nested structures.
- c. Write a C program to display the contents of a file to standard output device.
- d. Write a C program which copies one file to another into another file.
- e. Write a C program to merge two files into a third file.  
(i.e., the contents of the first file followed by those of the second are put in the third file)

**WEEK-14:**



- a. Write a C program to reverse the contents of a file.
- b. Write a C program that does the following:  
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)  
Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek () function)  
The program should then read all 10 values and print them back.
- c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
- d. Write a C program that uses non recursive function to search for a Key value in a Given list of integers using linear search method.
- e. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.

#### **WEEK-15:**

- a. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- b. Write a C program that sorts the given array of integers using selection sort in
- c. descending order Write a C program that sorts the given array of integers using insertion sort in ascending order

#### **TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.





**22EE1154: BASIC ELECTRICAL ENGINEERING LABORATORY**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Prerequisites:** Basic Electrical Engineering

**Course Objectives:**

1. To measure the electrical parameters for different types of DC circuits using conventional and theorems approach.
2. To measure the electrical parameters for different types of AC circuits
3. To study the transient response of various R, L and C circuits using different excitations.
4. To determine the performance of Single Phase Transformers.
5. To determine the performance of different types of DC and AC machines.

**Course Outcomes: After completion of this course, students will be able to**

1. Verify the basic conventional approach and theorems for Electrical circuits through different experiments.
2. Calculate the electrical parameters for different types of AC circuits
3. Analyze the transient responses of R, L and C circuits for different input conditions.
4. Evaluate the performance calculations of Single Phase Transformers through various testing methods.
5. Evaluate the performance calculations of DC and AC machines through various testing methods.

**List of experiments/demonstrations:**

**PART- A (compulsory)**

1. Verification of KVL and KCL
2. Verification of Thevenin's theorem
3. Verification of Norton's theorem
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

**PART-B (any two experiments from the given list)**

1. Verification of Superposition theorem
2. Transient Response of Series RL and RC circuits for DC excitation
3. Load Test on Single Phase Transformer (Calculate Efficiency)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. No-Load Characteristics of a Three-phase Alternator



**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.



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**22MC0001: INDUCTION PROGRAM**

R22-R22-B.TECH-CSC



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**R22 B.Tech**

**CSC**

**2023-2024**

**I Year – II Semester**



## 22BS1211- ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I B.Tech. II Semester

L	T	P	C
3	1	-	4

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** Develop ability to learn

1. Methods of solving the Ordinary Differential Equations of first order.
2. Methods of solving the higher order Ordinary Differential Equations.
3. Concept, properties of Laplace transforms & using the same to solve ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to vector integration.

**Course outcomes:** After successful completion of this course, student should be able to

1. Identify the type of first order Ordinary Differential Equation and solve them by appropriate method.
2. Apply the concept of higher order Ordinary Differential Equations to solve real world problems.
3. Solve ordinary differential equations by using Laplace transform techniques.
4. Calculate scalar potential for a vector and directional derivative of a scalar point function using vector differentiation.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

### UNIT-I: FIRST ORDER ODE

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

### UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second and higher order linear differential equations with constant coefficients: non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin bx$ ,  $\cos bx$ , polynomials in  $x^k$ ,  $ve^{ax}$  and  $x V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

### UNIT-III: LAPLACE TRANSFORMS

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, second shifting theorem (without proof), Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.



#### **UNIT-IV: VECTOR DIFFERENTIATION**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

#### **UNIT-V: VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition,
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.



## 22BS1213: APPLIED PHYSICS

I B. Tech. II Semester

L T P C  
3 1 0 4

### Course Objectives:

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibers.

### Course Outcomes:

At the end of the course the student will be able to:

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic and energy materials for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

### UNIT - I: QUANTUM PHYSICS AND SOLIDS

**Quantum Mechanics:** Introduction to quantum physics, blackbody radiation, Wein's and Rayleigh-Jean's law, Planck's radiation law (Qualitative) - photoelectric effect de-Broglie hypothesis and matter waves- Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

**Solids:** Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative) Bloch's theorem - Kronig-Penney model (Qualitative) origin of energy bands- classification of solids.

### UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)–LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

### UNIT - III: DIELECTRIC, AND MAGNETIC AND ENERGY MATERIALS

**Dielectric Materials:** Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials.

**Magnetic Materials:** Basic definitions – classification of Magnetic materials – Domain theory of ferromagnetism in hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance.



**Energy Materials:** Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors.

#### **UNIT - IV: NANOTECHNOLOGY**

Nanoscale, quantum confinement, surface to volume ratio, **bottom-up fabrication:** sol-gel, precipitation, combustion methods – **top-down fabrication:** ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nanomaterials.

#### **UNIT - V: LASER AND FIBER OPTICS**

**Lasers:** Laser beam characteristics-three quantum processes-Einstein coefficients and their relations-lasing action - pumping methods, CO<sub>2</sub> laser, Nd: YAG laser- semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

#### **TEXT BOOKS:**

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.

#### **REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.





## 22ME1256: ENGINEERING WORKSHOP

**I B.Tech. II Semester**

**L T P C**

**0 1 3 2.5**

**Pre-requisites:** Practical skill

**Course Objectives:**

1. To Study about different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

**Course Outcomes:** At the end of the course, the student will be able to:

1. CO1: Study and practice on machine tools and their operations
2. CO2: Practice on manufacturing of components using work shop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO4: Apply basic electrical engineering knowledge for house wiring practice.
5. CO 5: Study and Practice of arc welding process

### 1. TRADES FOR EXERCISES:

**At least two exercises from each trade:**

- I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
- III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
- IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
- V. Welding Practice – (Arc Welding & Gas Welding)
- VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

### 2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

### TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.



**REFERENCE BOOKS:**

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

R22-R22-B.TECH-CSC



**22HS1212 : ENGLISH FOR SKILL ENHANCEMENT**

**I B.Tech. II Semester**

**L T P C**  
**2 0 0 2**

**Course Objectives:** This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Learn remedial and functional grammar related to various grammar items.
4. Prepare the students for examinations such as IELTS and TOEFL by sharpening their reading and writing skills
5. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:** Students will be able to:

1. Use a wide range of vocabulary and sentence structures and also acquire basic proficiency in reading and writing modules of English.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

**UNIT-I**

Chapter entitled '*Toasted English*' by R.K. Narayan from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** The Concept of Word Formation – The Use of Prefixes and Suffixes- Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance – Techniques for Effective Reading.

**Writing:** Sentence Structures – Use of Phrases and Clauses in Sentences – Importance of Proper Punctuation – Techniques for Writing precisely – Paragraph Writing –Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

**UNIT-II**

Chapter entitled '*Appro JRD*' by Sudha Murthy from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice



**Writing:** Nature and Style of Writing - Defining/Describing People, Objects, Places and Events

– Classifying – Providing Examples or Evidence.

### UNIT-III

Chapter entitled ‘Lessons from Online Learning’ by F.Haider Alvi, Deborah Hurstetal from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Confused – Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

**Writing:** Format of a Formal Letter – Writing Formal Letters e.g. Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

### UNIT-IV

Chapter entitled ‘Art and Literature’ by Abdul Kalam from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Exercises for Practice

**Writing:** Writing Practices – Essay Writing – Writing Introduction and Conclusion – Précis Writing.

### UNIT-V

Chapter entitled ‘Go, Kiss the World’ by Subroto Bagchi from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Technical Vocabulary and their Usage

**Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

**Reading:** Reading Comprehension – Exercises for Practice

**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats - Structure of Reports (Manuscript Format) - Types of Reports - Writing a Report.

**Note:** Listening and Speaking Skills which are given under Unit -6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- **Note:** 1. As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is *Open-ended*, besides following the prescribed textbook, it is



required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

- **Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

**TEXTBOOK:**

1. “English: Language, Context and Culture” by Orient Black Swan Pvt. Ltd, Hyderabad.2022. Print.

**REFERENCEBOOKS:**

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction,1,2,3. Cambridge University Press
3. Wood, F. T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2<sup>nd</sup> ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha.(2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.



## 22EC1215: ELECTRONIC DEVICES AND CIRCUITS

I B.Tech. II Semester

L T P C

2 0 0 2

### Course Objectives:

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of devices.
3. To know the switching characteristics of devices.
4. To know the special purpose devices such as SCR, UJT.
5. To know the MOSFET and its characteristics

### Course Outcomes: Upon completion of the Course, the students will be able to:

1. Acquire the knowledge of various electronic devices and their use on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.
4. Know the configurations of Transistors
5. Acquire the knowledge of various device characteristics.

### UNIT - I

**Diodes:** Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

### UNIT - II

**Diode Applications:** Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

### UNIT - III

**Bipolar Junction Transistor (BJT):** Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

### UNIT - IV

**Junction Field Effect Transistor (FET):** Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

### UNIT - V

**Special Purpose Devices:** Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

### TEXT BOOKS:

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11<sup>th</sup> Edition, 2009, Pearson.

### REFERENCE BOOKS:

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5<sup>th</sup> Edition, Oxford.
2. ChinmoySaha, Arindam Halder, DebaatiGanguly - Basic Electronics-Principles and Applications, Cambridge, 2018.



## 22BS1253: APPLIED PHYSICS LABORATORY

I B. Tech. II Semester

L T P C

0 0 3 1.5

### Course Objectives:

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Understand the method of least square fitting
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Study the behavior of passive components.

### Course Outcomes:

The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Carried out data analysis
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Learn the characteristics of passive components like L, C and R and their applications.

### LIST OF EXPERIMENTS:

1. Understanding the method of least squares – torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. Characteristics of series and parallel LCR circuits.
5. V-I characteristics of a p-n junction diode and Zener diode
6. Input and output characteristics of BJT (CE, CB & CC configurations)
7. a). V-I and L-I characteristics of light emitting diode (LED)  
b). V-I characteristics of a Laser diode
8. V-I Characteristics of solar cell
9. a). Determination of the beam divergence of the given LASER beam  
b). Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. Determination of Energy gap of a semiconductor.
11. Determination of time constant of RC Circuit.
12. Study B-H curve of a magnetic material.

**Note: Any 8 experiments are to be performed.**

### REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.



**22CS1251: PYTHON PROGRAMMING LABORATORY**

**I B.Tech. II Semester**

**L T P C**

**0 1 2 2**

**Course Objectives:**

1. To learn python programming language using the data types, input/ output statements.
2. To install and run the Python interpreter
3. To learn control structures.
4. To Understand Lists, Dictionaries in python
5. To Handle Strings and Files inPython

**Course Outcomes:** After completion of the course, the student should be able to

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Verify programs using modular approach, file I/O, Python standard library
4. Implement Digital Systems using Python
5. Capable to implement on hardwareboards

Note: The lab experiments will be like the following experiment examples

**Week -1:**

1. i) Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.  
ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3.
  - i) Write a program to calculate compound interest when principal, rate and numbers of periods are given.
  - ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points

**Week-2:**

1. Read name, address, email and phone number of a person through keyboard and print the details.
2. Write a program to demonstrate different number data types in Python.
3. Write a program to perform different Arithmetic Operations on numbers in Python.

**Week - 3:**

1. Print the below triangle using for loop. 5  
4 4  
3 3 3  
2 2 2 2  
1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or





uppercase character or a special character (use 'if-else-if' ladder)

3. Python Program to Print the Fibonacci sequence using while loop

#### Week-4:

1. Python program to print all prime numbers in a given interval (use break)
2. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

#### Week - 5:

1. i) Write a program to convert a list and tuple into arrays.  
ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

#### Week - 6:

1. Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has a duplicate that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
  - i). Write a function called remove duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
  - ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
  - iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'  
ii) Remove the given word in all the places in a string?  
iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

#### Week-7:

1. Writes a recursive function that generates all binary strings of n-bit length
2. Write a program to define a lambda function(**rev\_upper**) to convert a string to its upper-case and reverse it.
3. Write a python program to find factorial of a number using Recursion.

#### Week - 8:

1. i) Write a python program that defines a matrix and prints  
ii) Write a python program to perform addition of two square matrices  
iii) Write a python program to perform multiplication of two square matrices



2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

#### Week - 9:

1. Write a Python program to show how to use else clause with try and except clauses
2. Write a Python Module Program to implement Arithmetic operators, Bitwise operators, Logical operators in python as functions in one module.
3. Write a python program to specify scope and Lifetime of variables in python Functions.

#### Week-10:

1. a. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.  
b. Add an attribute named color to your Rectangle objects and modify draw rectangle so that it uses the color attribute as the fill color.  
c. Write a function called draw point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.  
d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

#### Week- 11

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences

#### Week - 12:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR

#### Week - 13:

1. Write a program to implement Half Adder, Full Adder, and Parallel Adder
2. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.
3. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

#### Week - 14:

1. Write a script named **copyfile.py**. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
2. Write a GUI program to create a window for calculator and implement basic arithmetic operations in that window.



3. Write a python program to perform addition of two matrices using NUMPY package

**TEXT BOOKS:**

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

**REFERENCE BOOKS:**

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1<sup>st</sup> Ed. 2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python, Kenneth A. Lambert, Cengage



## 22HS1252: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

I B. Tech. II Semester

L T P C

0 0 2 1

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

### **Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

### **Course Outcomes:** Students will be able to:

1. Make use of various online and web resources for independent language learning.
2. Understand the nuances of English language through audio-visual experience and group activities.
3. Neutralize their accent for intelligibility for enabling them to communicate with a global audience.
4. Speak with clarity and confidence which in turn improves their academic performance in the other courses.
5. Face and interact with various stakeholders leading to the enhancement of their employability skills.

### **Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. **Computer Assisted Language Learning (CALL) Lab**
- b. **Interactive Communication Skills (ICS) Lab**

### **Listening Skills:**

#### Objectives

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress*



and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

### ***Speaking Skills:***

Objectives

1. To involve students in speaking activities in various contexts
  2. To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice
  - Describing objects/situations/people
  - Roleplay – Individual/Group activities
  - Just A Mine (JAM) Sessions

The following course contents prescribed for the **English Language and Communication Skills Lab.**

#### ***Exercise-I***

##### ***CALL Lab:***

*Understand:* Listening Skill- Its importance – Purpose - Process - Types - Barriers - Effective Listening. *Practice:* Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs - Consonant Clusters - Past Tense Marker and Plural Marker -

*Testing Exercises*

##### ***ICS Lab:***

*Understand:* Spoken vs. Written language – Formal and Informal English.

*Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

#### ***Exercise-II***

##### ***CALL Lab:***

*Understand:* Structure of Syllables–Word Stress–Weak Forms and Strong Forms– Stress pattern in sentences – Intonation.

*Practice:* Basic Rules of Word Accent – Stress Shift - Weak Forms and Strong Forms – Stress pattern in sentences – Intonation - *Testing Exercises*

##### ***ICS Lab:***

*Understand:* Features of Good Conversation – Strategies for Effective Communication.

*Practice:* Situational Dialogues – Role Play – Expressions in Various Situations – Making Requests and Seeking Permissions - Telephone Etiquette.

#### ***Exercise-III***

##### ***CALL Lab:***

*Understand:* Errors in Pronunciation – Neutralising Mother Tongue Interference (MTI).

*Practice:* Common Indian Variants in Pronunciation – Differences between British and American Pronunciation - *Testing Exercises*



**ICS Lab:**

*Understand:* Descriptions – Narrations – Giving Directions and Guidelines – Blog Writing

*Practice:* Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

**Exercise-IV**

**CALL Lab:**

*Understand:* Listening for General Details.

*Practice:* Listening Comprehension Tests - *Testing Exercises*

**ICS Lab:**

*Understand:* Public Speaking – Exposure to Structured Talks - Non-verbal Communication - Presentation Skills.

*Practice:* Making a Short Speech – Extempore – Making a Presentation.

**Exercise-V**

**CALL Lab:**

*Understand:* Listening for Specific Details.

*Practice:* Listening Comprehension Tests – *Testing Exercises*

**ICS Lab:**

*Understand:* Group Discussion

*Practice:* Group Discussion

**Minimum Requirement of infrastructural facilities for ELCS Lab:**

**1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

**System Requirement (Hardware component):**

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

**2. Interactive Communication Skills (ICS) Lab:**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

**Source of Material (Master Copy):**

- *Exercises in Spoken English. Part 1, 2, 3.* CIEFL and Oxford University Press

**Note:** Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.



**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10<sup>th</sup> Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL&GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- DigitalAll
- Orell Digital Language Lab (Licensed Version)

**REFERENCE BOOKS:**

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook*. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook*. Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient Black Swan Pvt.Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.



**22IT1255: IT WORKSHOP**

**I B.Tech. II Semester**

**L T P C**

**0 0 2 1**

**Course Objectives:** The IT Workshop for engineers is a training lab course spread over 60 hours.

1. The modules include training on PC Hardware, Internet & World Wide Web
2. To learn Hardware troubleshooting.
3. To understand the productivity tools including Word, Excel, PowerPoint and Publisher.
4. To learn the Safeguard computer systems from viruses/worms
5. To learn the LaTeX and Word.

**Course Outcomes:**

1. Perform Hardware troubleshooting
2. Understand Hardware components and inter dependencies
3. Safeguard computer systems from viruses/worms
4. Document/ Presentation preparation
5. Perform calculations using spreadsheets

**PC Hardware**

**Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Internet & World Wide Web**

**Task1: Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.





**Task 2: Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task 3: Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

**Task 4: Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms, PGF(ref.9) Case study of Wayback Machine web robot for Cyberforensics for Secure Digital India

### **LaTeX and WORD**

**Task 1 – Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 2: Using LaTeX and Word** to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Task 3: Creating project abstract** Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Task 4: Creating a Newsletter:** Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

### **EXCEL**

**Excel Orientation:** The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text



**Task 2 : Calculating GPA** - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

**Task 3:** Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

### **POWERPOINT**

**Task 1:** Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

**Task 2:** Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

**Task 3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides. Prepare and demonstrate (.ppt file) for the “Call to the Nation” quotations under "Faith and Strength", "Education and Society", "Powers of the Mind", "Man: The Maker of his Own Destiny", "India: Our Motherland" from the sources

<https://sites.google.com/view/chandraksekharaiyah/call-to-the-nation-book>

[https://www.ramakrishnavivekananda.info/vivekananda/complete\\_works.htm](https://www.ramakrishnavivekananda.info/vivekananda/complete_works.htm)

### **REFERENCE BOOKS:**

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*
3. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education*.
4. PC Hardware - A Handbook – Kate J. Chase *PHI* (Microsoft)
5. LaTeX Companion – Leslie Lamport, *PHI/Pearson*.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – *CISCO Press, Pearson Education*.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan  
– *CISCO Press, Pearson Education*.
8. "Swami Vivekananda - Call to the Nation", ISBN: 978-81-7505-018-1.  
<http://sites.google.com/view/pgovernanceforum>



**22MC0002: ENVIRONMENTAL SCIENCE**

**I B.Tech. II Semester**

**L T P C**  
**3 0 0 0**

**Course Objectives:**

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

**Course Outcomes:**

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I**

**ECOSYSTEMS:** Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II**

**NATURAL RESOURCES: CLASSIFICATION OF RESOURCES:** Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III**

**BIODIVERSITY AND BIOTIC RESOURCES:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV**

**ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES:**  
**Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution**



**control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

#### **UNIT - V**

**ENVIRONMENTAL POLICY, LEGISLATION & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

#### **TEXT BOOKS:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

#### **REFERENCE BOOKS:**

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.



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Aushapur (V), Ghatkesar (M), Medchal – Dist. Telangana State – 501 301.

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**DEPARTMENT  
OF  
COMPUTER SCIENCE &  
ENGINEERING (DATA  
SCIENCE)  
(R22 B. TECH. CSD)**

**ACADEMIC YEAR : 2023-24**

**I B.TECH (CSD)  
COURSE STRUCTURE  
&  
SYLLABUS**



**B.TECH. COMPUTER SCIENCE & ENGINEERING**

**(DATA SCIENCE)**

**EFFECTIVE FROM ACADEMIC YEAR 2023 - 24 ADMITTED BATCH**

**R22 COURSE STRUCTURE AND SYLLABUS**

**I YEAR I – SEMESTER**

S.No.	Course Code	Course	Category	L	T	P	Credits
1.	22BS1111	Matrices and Calculus	BS	3	1	0	4
2.	22BS1112	Engineering Chemistry	BS	3	1	0	4
3.	22CS1113	Programming for Problem Solving	ES	3	0	0	3
4.	22EE1114	Basic Electrical Engineering	ES	2	0	0	2
5.	22ME1155	Computer Aided Engineering Graphics	ES	1	0	4	3
6.	22CS1156	Elements of Computer Science & Engineering	BS	0	0	2	1
7.	22BS1152	Engineering Chemistry Laboratory	ES	0	0	2	1
8.	22CS1153	Programming for Problem Solving Laboratory	ES	0	0	2	1
9.	22EE1154	Basic Electrical Engineering Laboratory	ES	0	0	2	1
10.	22MC0001	Induction Program	BS				
		<b>Total</b>		<b>12</b>	<b>2</b>	<b>12</b>	<b>20</b>

**I YEAR II – SEMESTER**

S.No.	Course Code	Course	Category	L	T	P	Credits
1.	22BS1211	Ordinary Differential Equations and Vector Calculus	BS	3	1	0	4
2.	22BS1213	Applied Physics	BS	3	1	0	4
3.	22ME1256	Engineering Workshop	ES	0	1	3	2.5
4.	22HS1212	English for Skill Enhancement	HS	2	0	0	2
5.	22EC1215	Electronic Devices and Circuits	ES	2	0	0	2
6.	22BS1253	Applied Physics Laboratory	BS	0	0	3	1.5
7.	22CS1251	Python Programming Laboratory	ES	0	1	2	2
8.	22HS1252	English Language and Communication Skills Laboratory	HS	0	0	2	1
9.	22IT1255	IT Workshop	ES	0	0	2	1
10.	22MC0002	Environmental Science	BS	3	0	0	0
		<b>Total</b>		<b>13</b>	<b>4</b>	<b>12</b>	<b>20</b>



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**R22 B.Tech**

**CSD**

**2023-2024**

**I Year – I Semester**



## 22BS1111-MATRICES AND CALCULUS

**I B Tech. I Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Prerequisite(s):** Mathematical knowledge at Pre university level.

**Course Objectives:** Develop ability to learn the concept of

1. Rank of the matrix and apply the same to know the consistency for the linear system of equations.
2. Eigen values and Eigen vectors to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems, Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and Finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

**Course Outcomes:** After successful completion of this course, the student should be able to

1. Write the matrix representation of a set of linear equations, find the rank and apply the same to analyse the solution of the system of equations.
2. Reduce the quadratic form to canonical form using orthogonal transformations by finding Eigenvalues and Eigen vectors.
3. Solve the applications on the mean value theorems, Evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints using partial differentiation.
5. Evaluate the multiple integrals and apply the concept to find areas and volumes.

### UNIT - I: MATRICES

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

### UNIT - II: EIGEN VALUES AND EIGEN VECTORS

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### UNIT - III: CALCULUS

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proof). Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates for known curves (circle, parabola, ellipse), Definition of Improper Integral: Beta and Gamma functions and their applications.

### UNIT - IV: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and





three variables using method of Lagrange multipliers.

#### **UNIT-V: MULTIVARIABLE CALCULUS (INTEGRATION)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form for known curves (circle, parabola, ellipse), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



## 22BS1112: ENGINEERING CHEMISTRY

**I B Tech. I Semester**

**L T P C**  
**3 1 0 4**

### Course Objectives:

1. To acquire knowledge about desalination of brackish water and treatment of municipal water
2. To include the fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
4. To understand the significance of green chemistry and green synthesis and to imbibe the green chemistry principles.
5. To acquire required knowledge about engineering materials like smart materials, lubricants, and biodiesel.

### Course Outcomes:

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4. The student can use real examples to illustrate how the principles of *green chemistry* can be applied to chemical process in engineering
5. They can predict potential applications of engineering materials and practical utility in order to become good engineers and entrepreneurs.

### UNIT - I: WATER AND ITS TREATMENT:

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation Determination of F<sup>-</sup> ion by ion-selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion-exchange processes. Desalination of water – Reverse osmosis.

### UNIT – II BATTERY CHEMISTRY & CORROSION

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences



between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

### UNIT - III: POLYMERIC MATERIALS:

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokolrubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction intrans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

### UNIT - IV: GREEN CHEMISTRY AND ENGINEERING FOR SUSTAINABLE DEVELOPMENT:

Definition and history of Green chemistry, Concept and principles (Prevention, Atom Economy, Less Hazardous Chemical Syntheses, Designing Safer Chemicals, Safer Solvents and Auxiliaries, Design for Energy Efficiency, Use of Renewable Feedstock, Reduce, Derivatives, Catalysis, Design for Degradation, Real-time Analysis for Pollution Prevention, Inherently Safer Chemistry for Accident Prevention) of Green Chemistry with suitable examples.

### UNIT - V: ENGINEERING MATERIALS:

#### **Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinylamides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Bio Diesel:** Sources and applications of Biodiesel

### TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K.



Shashikala, Pearson Publications, 2021.

5. Engineering Chemistry by K Sesha Maheswaramma and Mridula Chugh, Pearson Publications.

**REFERENCE BOOKS:**

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)



## 22CS1113: PROGRAMMING FOR PROBLEM SOLVING

I B.Tech. I Semester

L T P C

3 0 0 3

### Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems.
5. To learn the fundamentals of searching and sorting.

### Course Outcomes: The student will learn

1. To write algorithms and to draw flowcharts for solving problems, To convert the algorithms/flowcharts to C programs.
2. To code and test a given logic in the C programming language.
3. To decompose a problem into functions and to develop modular reusable code.
4. To use arrays, pointers, strings and structures to write C programs.
5. To implement Searching and sorting problems.

## UNIT - I: INTRODUCTION TO PROGRAMMING

Compilers, compiling and executing a program.

**Representation of Algorithm** - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number  
Flowchart/Pseudo code with examples, Program design and structured programming

**Introduction to C Programming Language:** variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, **Operators:** Ternary operator, Bitwise operations: Bitwise AND, OR, XOR and NOT operators, expressions and precedence, Expression evaluation, type conversion.

**Conditional Branching and Loops:** Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, goto, Iteration with for, while, do- while loops

**I/O:** Simple input and output with scanf() and printf(), formatted I/O.

## UNIT - II: ARRAYS AND FUNCTIONS

**Arrays:** one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

**Functions:** Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions.

**Storage classes:** auto, extern, static and register.

**Recursion:** Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Some C standard functions and libraries.

## UNIT - III: POINTERS, STRINGS & STRUCTURES.

**Pointers:** Idea of pointers, Defining pointers, usage of self-referential structures in linked list (no



implementation), passing pointers to functions, idea of call by reference.

**Strings:** Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen( ), strcat( ), strcpy( ), strstr( ) etc.), arrays of strings

**Structures:** Defining structures, initializing structures, unions, Array of structures  
Pointers to Arrays and Structures, Use of Pointers in self-referential structures,  
Enumeration data type.

#### **UNIT - IV: FILE HANDLING IN C, PREPROCESSOR COMMANDS**

**Files:** Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek( ), ftell( ) and rewind( ) functions.

**Preprocessor Commands:** Commonly used Preprocessor commands like File inclusion, macros substitution, conditional compilation (include, define, undef, if, ifdef, ifndef )  
Introduction to stdin, stdout and stderr. Command line arguments

#### **UNIT - V: SEARCHING AND SORTING TECHNIQUES:**

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms).

#### **TEXT BOOKS:**

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

#### **REFERENCE BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming



## 22EE1114: BASIC ELECTRICAL ENGINEERING

I B.Tech. I Semester

L T P C  
2 0 0 2

**Prerequisites:** Mathematics

### Course Objectives:

1. To study and understand DC circuits.
2. To study and understand Single & Three phase AC circuits.
3. To study and understand the Single Phase Transformers.
4. To study and understand the different types of DC and AC machines.
5. To have the knowledge of various electrical installations and the concept of power factor improvement.

**Course Outcomes:** After completion of this course, students will be able to

1. Analyze DC circuits using various techniques
2. Analyze Single & Three phase AC circuits
3. Discuss the working principles and estimate the performance of Single Phase Transformers
4. Discuss the Construction and working principle of different types of DC and AC machines.
5. Classify various components of Low Voltage Electrical Installations and identify the importance of power factor improvement

**UNIT-I: D.C. CIRCUITS:** Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation (Series, Parallel, Series and Parallel circuits, Nodal Analysis and Mesh Analysis). Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**UNIT-II: A.C. CIRCUITS:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series circuits only), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

**UNIT-III: SINGLE PHASE TRANSFORMERS:** Working Principle and construction of Transformer, Types, Ideal and practical transformer, EMF Equation, equivalent circuit, losses in transformers, regulation and efficiency.

### UNIT-IV: ELECTRICAL MACHINES

**D. C. Generator:** Constructional details of D C Machine, Working Principle of D C Generator, EMF Equation, Types, Numerical Problems.

**D. C. Motor:** Working Principle of D C Motor, Types, Torque Equation, Numerical Problems Performance Characteristics of dc shunt motor.

**Three Phase Induction Motor:** Generation of rotating magnetic field, Construction and



working of a three-phase induction motor, Significance of torque-slip characteristics.

**Synchronous Generator:** Construction and working of synchronous generator.

**UNIT-V: ELECTRICAL INSTALLATIONS:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement.

**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989





**22ME1155: COMPUTER AIDED ENGINEERING GRAPHICS**

**I B.Tech. I Semester**

**L T P C**

**1 0 4 3**

**Course Objectives:**

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products
3. To draw sectional views and pictorial views for various types of solids.
4. To develop the lateral surfaces of basic engineering objects
5. To impart knowledge about standard principles of orthographic projection and isometric views of different objects.

**Course Out comes:** At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D and 3D objects
2. Sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

**UNIT – I:**

**INTRODUCTION TO ENGINEERING GRAPHICS:** Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola

– General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

**UNIT- II:**

**ORTHOGRAPHIC PROJECTIONS:** Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

**UNIT – III:**

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

**UNIT – IV:**

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

**UNIT – V:**

**ISOMETRIC PROJECTIONS:** Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids –



Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

**TEXT BOOKS:**

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

**REFERENCE BOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

**Note:** - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.



**22CS1156: ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objective:**

1. To learn the fundamentals of computers.
2. To provide an overview of the subjects of computer science and engineering.
3. To learn the operating system, database management system, computer networks.
4. To understand the software development process.
5. To learn the various autonomous system

**Course Outcomes:**

1. Know the working principles of functional units of a basic Computer
2. Understand program development, the use of data structures and algorithms in problems solving.
3. Know the need and types of operating system, data base systems.
4. Understand the significance of networks, internet, WWW and cybersecurity.
5. Understand Autonomous systems, the application of artificial intelligence.

**UNIT-I**

**BASICS OF A COMPUTER** – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, applications software, packages, frameworks, IDEs.

**UNIT-II**

**SOFTWARE DEVELOPMENT** – waterfall model, Agile, Types of computer languages – Programming, markup, scripting, Program development steps, flowcharts, algorithms, data structures – definition, types of data structures

**UNIT-III**

**OPERATING SYSTEMS:** Functions of operating systems, types of operating systems, Device & Resource management

**Database Management Systems:** Data models, RDBMS, SQL, Database Transactions, data centers, cloud services

**UNIT-IV**

**COMPUTER NETWORKS:** Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, vehicular networks, 5G communications.

WorldWideWeb–Basics, role of HTML, CSS, XML, Tools for web designing, social media, online social networks.

Security–information security, cyber security, cyber laws

**UNIT-V**

**AUTONOMOUS SYSTEMS:** IoT, Robotics, Drones, Artificial Intelligence–Learning, Game Development, natural language processing, image and video processing, Cloud Basics.



**TEXTBOOK:**

1. Invitation to Computer Science, G.Michael Schneider, Macalester College, Judith L.Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

**REFERENCEBOOKS:**

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage.



**22BS1152: ENGINEERING CHEMISTRY LABORATORY**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
5. Students will be able to visualize the experiments virtually for better understanding

**Course Outcomes:** The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.
5. Can perform the experiments making use of working models

**List of Experiments:**

- I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
- II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
- III. **Potentiometry:** Estimation of the amount of  $\text{Fe}^{+2}$  by Potentiometry.
- IV. **pH Metry:** Determination of an acid concentration using pH meter.
- V. Preparations:
  1. Preparation of Bakelite.
  2. Preparation Nylon – 6.
- VI. **Lubricants:**
  1. Estimation of acid value of given lubricant oil.
  2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
- VII. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
- VIII. Virtual lab experiments
  1. Construction of Fuel cell and its working.
  2. Smart materials for Biomedical applications
  3. Batteries for electrical vehicles.
  4. Functioning of solar cell and its applications.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition



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3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).



**22CS1153: PROGRAMMING FOR PROBLEM SOLVING LAB**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

1. To learn C-language Programs using the data types, input/ output statements and control statements.
2. Describe the importance of modular programming and arrays using C-Language Program.
3. Understand the concept and use of pointers for memory management techniques
4. Understand structure, union, and enumerated types.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams.

**Course Outcomes:**

1. Ability to design and test programs to solve mathematical and scientific problems.
2. Ability to write structured programs using control structures and functions.
3. Able to Implement C programs using arrays & pointers.
4. Able to Use the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Able to execute programs that read and write text, binary files using the formatting and character I/O functions.

**EXPERIMENTS**

**WEEK-1:**

- a. Write a C program to find simple interest and compound interest.
- b. Write a C program to convert Celsius to Fahrenheit.
- c. Write a C Program to swap two numbers.
- d. Write a C program to perform all arithmetic operations (+, -, \*, /, %).
- e. Write a simple program that prints the results of all the operators available in C (Including pre/ post increment, bitwise and/or/not, etc.). Read required operand Values from standard input.

**WEEK-2:**

- a. Write a simple program that converts one given data type to another using auto Conversion and casting. Take the values from standard input.
- b. Write a C program to check whether the given number is even or odd using Conditional Operator.
- c. Write a C program to find the Largest of two numbers.
- d. Write a C program to print ascending order of three given integers.

**WEEK-3:**

- a. Write a C program to Check the given year is leap year or not.
- b. Write a C program to find the roots of quadratic equation.
- c. Write a C Program to implement arithmetic calculator using switch case.
- d. Write a program that declares Class awarded for a given percentage of marks, where (use else if ladder and switch) <40%= Failed, 40% to <60% = Second class, 60% to



**WEEK-4:**

- Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:  
 $5 \times 1 = 5$   
 $5 \times 2 = 10$   
 $5 \times 3 = 15$
- Write a program that shows the binary equivalent of a given positive number between 0 and 255.
- Write a C program to find sum of individual digits of the given integer.
- Write a C program to find factorial of a given number.

**WEEK-5:**

- Write a program that finds if a given number is a prime number
- Write a C program to check whether the given number is palindrome or not.
- Write a C program to print Fibonacci series.
- Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:  $1+x+x^2+x^3+\dots+x^n$ .

For example: if n is 3 and x is 5, then the program computes  $1+5+25+125$ .

**WEEK-6:**

- Write a C program to calculate the following, where x is a fractional value.  
 $1-x/2 +x^2/4-x^3/6$ .
- Write a C program to display the prime numbers from 1 to n(where n value is Given by user)
- Write a C program to construct a pyramid of numbers as follows:

1	*	1	1	*
1 2	**	2 3	2 2	**
1 2 3	***	4 5 6	3 3 3	***
			4 4 4 4	**
				*

- Write a C program to construct the Pascal triangle

**WEEK-7:**

- Write a C program to find largest, smallest numbers and average in a list of array elements.
- Write a C program to find mean, variance, standard deviation for a given list of elements.
- Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.





**WEEK-8:**

- a. Write a C program to transpose a matrix.
- b. Write a C program to perform the Addition of Two Matrices.
- c. Write a C program to perform the Multiplication of Two Matrices.

**WEEK-9:**

Write programs using non recursive and recursive functions for the following

- a. Find GCD.
- b. Find the factorial of a given number.
- c. Generate the Fibonacci series.
- d. Find  $x^n$

**WEEK-10:**

- a. Write a C program to swap two integers using following methods.
  - i. call by value
  - ii. call by reference
- b. Write a program for reading elements using a pointer into an array and display the Values using array.
- c. Write a program for display values reverse order from an array using a pointer.
- d. Write a program through a pointer variable to sum of n elements from an array.

**WEEK-11:**

- a. Write a C program to insert a sub-string into a given main string from a given position.
- b. Write a C program to delete n characters from a given position in a given string.
- c. Write a C program to arrange given n strings in alphabetical order.
- d. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

**WEEK-12:**

- a. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
- b. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba etc.)
- c. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
- d. Write a C program to count the lines, words and characters in a given text.

**WEEK-13:**

- a. Write a C program to find total and average marks for five subjects of three students using structures.
- b. Write a C program to demonstrate nested structures.
- c. Write a C program to display the contents of a file to standard output device.
- d. Write a C program which copies one file to another into another file.
- e. Write a C program to merge two files into a third file.  
(i.e., the contents of the first file followed by those of the second are put in the third file)

**WEEK-14:**



- a. Write a C program to reverse the contents of a file.
- b. Write a C program that does the following:  
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)  
Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek () function)  
The program should then read all 10 values and print them back.
- c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
- d. Write a C program that uses non recursive function to search for a Key value in a Given list of integers using linear search method.
- e. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.

#### **WEEK-15:**

- a. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- b. Write a C program that sorts the given array of integers using selection sort in
- c. descending order Write a C program that sorts the given array of integers using insertion sort in ascending order

#### **TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.



**22EE1154: BASIC ELECTRICAL ENGINEERING LABORATORY**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Prerequisites:** Basic Electrical Engineering

**Course Objectives:**

1. To measure the electrical parameters for different types of DC circuits using conventional and theorems approach.
2. To measure the electrical parameters for different types of AC circuits
3. To study the transient response of various R, L and C circuits using different excitations.
4. To determine the performance of Single Phase Transformers.
5. To determine the performance of different types of DC and AC machines.

**Course Outcomes: After completion of this course, students will be able to**

1. Verify the basic conventional approach and theorems for Electrical circuits through different experiments.
2. Calculate the electrical parameters for different types of AC circuits
3. Analyze the transient responses of R, L and C circuits for different input conditions.
4. Evaluate the performance calculations of Single Phase Transformers through various testing methods.
5. Evaluate the performance calculations of DC and AC machines through various testing methods.

**List of experiments/demonstrations:**

**PART- A (compulsory)**

1. Verification of KVL and KCL
2. Verification of Thevenin's theorem
3. Verification of Norton's theorem
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

**PART-B (any two experiments from the given list)**

1. Verification of Superposition theorem
2. Transient Response of Series RL and RC circuits for DC excitation
3. Load Test on Single Phase Transformer (Calculate Efficiency)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. No-Load Characteristics of a Three-phase Alternator



**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.



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**22MC0001: INDUCTION PROGRAM**

R22-R22 B.TECH I YEAR (IT) VBIT  
CSE



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**R22 B.Tech**

**CSD**

**2023-2024**

**I Year – II Semester**



## 22BS1211- ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I B.Tech. II Semester

L	T	P	C
3	1	-	4

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** Develop ability to learn

1. Methods of solving the Ordinary Differential Equations of first order.
2. Methods of solving the higher order Ordinary Differential Equations.
3. Concept, properties of Laplace transforms & using the same to solve ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to vector integration.

**Course outcomes:** After successful completion of this course, student should be able to

1. Identify the type of first order Ordinary Differential Equation and solve them by appropriate method.
2. Apply the concept of higher order Ordinary Differential Equations to solve real world problems.
3. Solve ordinary differential equations by using Laplace transform techniques.
4. Calculate scalar potential for a vector and directional derivative of a scalar point function using vector differentiation.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

### UNIT-I: FIRST ORDER ODE

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

### UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second and higher order linear differential equations with constant coefficients: non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin bx$ ,  $\cos bx$ , polynomials in  $x^k$ ,  $ve^{ax}$  and  $x V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

Applications: Electric Circuits

### UNIT-III: LAPLACE TRANSFORMS

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, second shifting theorem (without proof), Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.



#### **UNIT-IV: VECTOR DIFFERENTIATION**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

#### **UNIT-V: VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition,
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.





## 22BS1213: APPLIED PHYSICS

I B. Tech. II Semester

L T P C  
3 1 0 4

### Course Objectives:

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibers.

### Course Outcomes:

At the end of the course the student will be able to:

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic and energy materials for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

### UNIT - I: QUANTUM PHYSICS AND SOLIDS

**Quantum Mechanics:** Introduction to quantum physics, blackbody radiation, Wein's and Rayleigh-Jean's law, Planck's radiation law (Qualitative) - photoelectric effect de-Broglie hypothesis and matter waves- Davisson and Germer experiment -Heisenberg uncertainty principle - Born interpretation of the wave function - time independent Schrodinger wave equation - particle in one dimensional potential box.

**Solids:** Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative) Bloch's theorem - Kronig-Penney model (Qualitative) origin of energy bands- classification of solids.

### UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic and extrinsic semiconductors - Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)-LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

### UNIT - III: DIELECTRIC, AND MAGNETIC AND ENERGY MATERIALS

**Dielectric Materials:** Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials.

**Magnetic Materials:** Basic definitions - classification of Magnetic materials - Domain theory of ferromagnetism in hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance.



**Energy Materials:** Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors.

#### **UNIT - IV: NANOTECHNOLOGY**

Nanoscale, quantum confinement, surface to volume ratio, **bottom-up fabrication:** sol-gel, precipitation, combustion methods – **top-down fabrication:** ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nanomaterials.

#### **UNIT - V: LASER AND FIBER OPTICS**

**Lasers:** Laser beam characteristics-three quantum processes-Einstein coefficients and their relations-lasing action - pumping methods, CO<sub>2</sub> laser, Nd: YAG laser- semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

#### **TEXT BOOKS:**

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.

#### **REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.



## 22ME1256: ENGINEERING WORKSHOP

**I B.Tech. II Semester**

**L T P C**

**0 1 3 2.5**

**Pre-requisites:** Practical skill

**Course Objectives:**

1. To Study about different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

**Course Outcomes:** At the end of the course, the student will be able to:

1. CO1: Study and practice on machine tools and their operations
2. CO2: Practice on manufacturing of components using work shop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO4: Apply basic electrical engineering knowledge for house wiring practice.
5. CO 5: Study and Practice of arc welding process

### 1. TRADES FOR EXERCISES:

**At least two exercises from each trade:**

- I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
- III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
- IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
- V. Welding Practice – (Arc Welding & Gas Welding)
- VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

### 2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

### TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.



**REFERENCE BOOKS:**

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

R22-R22 B.TECH-CSD



**22HS1212 : ENGLISH FOR SKILL ENHANCEMENT**

**I B.Tech. II Semester**

**L T P C**  
**2 0 0 2**

**Course Objectives:** This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Learn remedial and functional grammar related to various grammar items.
4. Prepare the students for examinations such as IELTS and TOEFL by sharpening their reading and writing skills
5. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:** Students will be able to:

1. Use a wide range of vocabulary and sentence structures and also acquire basic proficiency in reading and writing modules of English.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

**UNIT-I**

Chapter entitled '*Toasted English*' by R.K. Narayan from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** The Concept of Word Formation – The Use of Prefixes and Suffixes- Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance – Techniques for Effective Reading.

**Writing:** Sentence Structures – Use of Phrases and Clauses in Sentences – Importance of Proper Punctuation – Techniques for Writing precisely – Paragraph Writing –Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

**UNIT-II**

Chapter entitled '*Appro JRD*' by Sudha Murthy from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice



**Writing:** Nature and Style of Writing - Defining/Describing People, Objects, Places and Events  
– Classifying – Providing Examples or Evidence.

### UNIT-III

Chapter entitled ‘Lessons from Online Learning’ by F.Haider Alvi, Deborah Hurstetal from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Confused – Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

**Writing:** Format of a Formal Letter – Writing Formal Letters e.g. Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

### UNIT-IV

Chapter entitled ‘Art and Literature’ by Abdul Kalam from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Exercises for Practice

**Writing:** Writing Practices – Essay Writing – Writing Introduction and Conclusion – Précis Writing.

### UNIT-V

Chapter entitled ‘Go, Kiss the World’ by Subroto Bagchi from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

**Vocabulary:** Technical Vocabulary and their Usage

**Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

**Reading:** Reading Comprehension – Exercises for Practice

**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats - Structure of Reports (Manuscript Format) - Types of Reports - Writing a Report.

**Note:** Listening and Speaking Skills which are given under Unit -6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- **Note:** 1. As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is *Open-ended*, besides following the prescribed textbook, it is



required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

- **Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

**TEXTBOOK:**

1. “English: Language, Context and Culture” by Orient Black Swan Pvt. Ltd, Hyderabad.2022. Print.

**REFERENCEBOOKS:**

1. Effective Academic Writing by Liss and Davis (OUP)
2. Richards, Jack C. (2022) Interchange Series. Introduction,1,2,3. Cambridge University Press
3. Wood, F. T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2<sup>nd</sup> ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha.(2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.



## 22EC1215: ELECTRONIC DEVICES AND CIRCUITS

I B.Tech. II Semester

L T P C

2 0 0 2

### Course Objectives:

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of devices.
3. To know the switching characteristics of devices.
4. To know the special purpose devices such as SCR, UJT.
5. To know the MOSFET and its characteristics

### Course Outcomes: Upon completion of the Course, the students will be able to:

1. Acquire the knowledge of various electronic devices and their use on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.
4. Know the configurations of Transistors
5. Acquire the knowledge of various device characteristics.

### UNIT - I

**Diodes:** Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

### UNIT - II

**Diode Applications:** Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

### UNIT - III

**Bipolar Junction Transistor (BJT):** Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

### UNIT - IV

**Junction Field Effect Transistor (FET):** Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

### UNIT - V

**Special Purpose Devices:** Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

### TEXT BOOKS:

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11<sup>th</sup> Edition, 2009, Pearson.

### REFERENCE BOOKS:

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5<sup>th</sup>Edition, Oxford.
2. ChinmoySaha, Arindam Halder, DebaatiGanguly - Basic Electronics-Principles and Applications, Cambridge, 2018.





## 22BS1253: APPLIED PHYSICS LABORATORY

I B. Tech. II Semester

L T P C

0 0 3 1.5

### Course Objectives:

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Understand the method of least square fitting
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Study the behavior of passive components.

### Course Outcomes:

The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Carried out data analysis
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Learn the characteristics of passive components like L, C and R and their applications.

### LIST OF EXPERIMENTS:

1. Understanding the method of least squares – torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. Characteristics of series and parallel LCR circuits.
5. V-I characteristics of a p-n junction diode and Zener diode
6. Input and output characteristics of BJT (CE, CB & CC configurations)
7. a). V-I and L-I characteristics of light emitting diode (LED)  
b). V-I characteristics of a Laser diode
8. V-I Characteristics of solar cell
9. a). Determination of the beam divergence of the given LASER beam  
b). Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. Determination of Energy gap of a semiconductor.
11. Determination of time constant of RC Circuit.
12. Study B-H curve of a magnetic material.

**Note: Any 8 experiments are to be performed.**

### REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.



**22CS1251: PYTHON PROGRAMMING LABORATORY**

**I B.Tech. II Semester**

**L T P C**

**0 1 2 2**

**Course Objectives:**

1. To learn python programming language using the data types, input/ output statements.
2. To install and run the Python interpreter
3. To learn control structures.
4. To Understand Lists, Dictionaries in python
5. To Handle Strings and Files inPython

**Course Outcomes:** After completion of the course, the student should be able to

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Verify programs using modular approach, file I/O, Python standard library
4. Implement Digital Systems using Python
5. Capable to implement on hardwareboards

Note: The lab experiments will be like the following experiment examples

**Week -1:**

1. i) Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.  
ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3.
  - i) Write a program to calculate compound interest when principal, rate and numbers of periods are given.
  - ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points

**Week-2:**

1. Read name, address, email and phone number of a person through keyboard and print the details.
2. Write a program to demonstrate different number data types in Python.
3. Write a program to perform different Arithmetic Operations on numbers in Python.

**Week - 3:**

1. Print the below triangle using for loop. 5  
4 4  
3 3 3  
2 2 2 2  
1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or



uppercase character or a special character (use 'if-else-if' ladder)

3. Python Program to Print the Fibonacci sequence using while loop

#### Week-4:

1. Python program to print all prime numbers in a given interval (use break)
2. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

#### Week - 5:

1. i) Write a program to convert a list and tuple into arrays.  
ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

#### Week - 6:

1. Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has a duplicate that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
  - i). Write a function called remove duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
  - ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
  - iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'  
ii) Remove the given word in all the places in a string?  
iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

#### Week-7:

1. Writes a recursive function that generates all binary strings of n-bit length
2. Write a program to define a lambda function(**rev\_upper**) to convert a string to its upper-case and reverse it.
3. Write a python program to find factorial of a number using Recursion.

#### Week - 8:

1. i) Write a python program that defines a matrix and prints  
ii) Write a python program to perform addition of two square matrices  
iii) Write a python program to perform multiplication of two square matrices



2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

#### Week - 9:

1. Write a Python program to show how to use else clause with try and except clauses
2. Write a Python Module Program to implement Arithmetic operators, Bitwise operators, Logical operators in python as functions in one module.
3. Write a python program to specify scope and Lifetime of variables in python Functions.

#### Week-10:

1. a. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.  
b. Add an attribute named color to your Rectangle objects and modify draw rectangle so that it uses the color attribute as the fill color.  
c. Write a function called draw point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.  
d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

#### Week- 11

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences

#### Week - 12:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR

#### Week - 13:

1. Write a program to implement Half Adder, Full Adder, and Parallel Adder
2. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.
3. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

#### Week - 14:

1. Write a script named **copyfile.py**. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
2. Write a GUI program to create a window for calculator and implement basic arithmetic operations in that window.



3. Write a python program to perform addition of two matrices using NUMPY package

**TEXT BOOKS:**

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

**REFERENCE BOOKS:**

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1<sup>st</sup> Ed. 2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python, Kenneth A. Lambert, Cengage



## 22HS1252: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

**I B. Tech. II Semester**

**L T P C**

**0 0 2 1**

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

### **Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

### **Course Outcomes:** Students will be able to:

1. Make use of various online and web resources for independent language learning.
2. Understand the nuances of English language through audio-visual experience and group activities.
3. Neutralize their accent for intelligibility for enabling them to communicate with a global audience.
4. Speak with clarity and confidence which in turn improves their academic performance in the other courses.
5. Face and interact with various stakeholders leading to the enhancement of their employability skills.

### **Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. Computer Assisted Language Learning (CALL) Lab**
- b. Interactive Communication Skills (ICS) Lab**

### **Listening Skills:**

#### Objectives

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress*



and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

### ***Speaking Skills:***

Objectives

1. To involve students in speaking activities in various contexts
  2. To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice
  - Describing objects/situations/people
  - Roleplay – Individual/Group activities
  - Just A Mine (JAM) Sessions

The following course contents prescribed for the **English Language and Communication Skills Lab.**

#### ***Exercise-I***

##### ***CALL Lab:***

*Understand:* Listening Skill- Its importance – Purpose - Process - Types - Barriers - Effective Listening. *Practice:* Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs - Consonant Clusters - Past Tense Marker and Plural Marker -

*Testing Exercises*

##### ***ICS Lab:***

*Understand:* Spoken vs. Written language – Formal and Informal English.

*Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

#### ***Exercise-II***

##### ***CALL Lab:***

*Understand:* Structure of Syllables–Word Stress–Weak Forms and Strong Forms– Stress pattern in sentences – Intonation.

*Practice:* Basic Rules of Word Accent – Stress Shift - Weak Forms and Strong Forms – Stress pattern in sentences – Intonation - *Testing Exercises*

##### ***ICS Lab:***

*Understand:* Features of Good Conversation – Strategies for Effective Communication.

*Practice:* Situational Dialogues – Role Play – Expressions in Various Situations – Making Requests and Seeking Permissions - Telephone Etiquette.

#### ***Exercise-III***

##### ***CALL Lab:***

*Understand:* Errors in Pronunciation – Neutralising Mother Tongue Interference (MTI).

*Practice:* Common Indian Variants in Pronunciation – Differences between British and American Pronunciation - *Testing Exercises*



**ICS Lab:**

*Understand:* Descriptions – Narrations – Giving Directions and Guidelines – Blog Writing

*Practice:* Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

**Exercise-IV**

**CALL Lab:**

*Understand:* Listening for General Details.

*Practice:* Listening Comprehension Tests - *Testing Exercises*

**ICS Lab:**

*Understand:* Public Speaking – Exposure to Structured Talks - Non-verbal Communication - Presentation Skills.

*Practice:* Making a Short Speech – Extempore – Making a Presentation.

**Exercise-V**

**CALL Lab:**

*Understand:* Listening for Specific Details.

*Practice:* Listening Comprehension Tests – *Testing Exercises*

**ICS Lab:**

*Understand:* Group Discussion

*Practice:* Group Discussion

**Minimum Requirement of infrastructural facilities for ELCS Lab:**

**1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

**System Requirement (Hardware component):**

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

**2. Interactive Communication Skills (ICS) Lab:**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

**Source of Material (Master Copy):**

- *Exercises in Spoken English. Part 1, 2, 3.* CIEFL and Oxford University Press

**Note:** Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.





**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10<sup>th</sup> Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL&GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- DigitalAll
- Orell Digital Language Lab (Licensed Version)

**REFERENCE BOOKS:**

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook*. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook*. Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient Black Swan Pvt.Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.



**22IT1255: IT WORKSHOP**

**I B.Tech. II Semester**

**L T P C**

**0 0 2 1**

**Course Objectives:** The IT Workshop for engineers is a training lab course spread over 60 hours.

1. The modules include training on PC Hardware, Internet & World Wide Web
2. To learn Hardware troubleshooting.
3. To understand the productivity tools including Word, Excel, PowerPoint and Publisher.
4. To learn the Safeguard computer systems from viruses/worms
5. To learn the LaTeX and Word.

**Course Outcomes:**

1. Perform Hardware troubleshooting
2. Understand Hardware components and inter dependencies
3. Safeguard computer systems from viruses/worms
4. Document/ Presentation preparation
5. Perform calculations using spreadsheets

**PC Hardware**

**Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Internet & World Wide Web**

**Task1: Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.



**Task 2: Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task 3: Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

**Task 4: Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms, PGF(ref.9) Case study of Wayback Machine web robot for Cyberforensics for Secure Digital India

### **LaTeX and WORD**

**Task 1 – Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 2: Using LaTeX and Word** to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Task 3: Creating project abstract** Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Task 4: Creating a Newsletter:** Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

### **EXCEL**

**Excel Orientation:** The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text



**Task 2 : Calculating GPA** - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

**Task 3:** Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

### **POWERPOINT**

**Task 1:** Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

**Task 2:** Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

**Task 3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides. Prepare and demonstrate (.ppt file) for the “Call to the Nation” quotations under "Faith and Strength", "Education and Society", "Powers of the Mind", "Man: The Maker of his Own Destiny", "India: Our Motherland" from the sources

<https://sites.google.com/view/chandraksekharaiyah/call-to-the-nation-book>

[https://www.ramakrishnavivekananda.info/vivekananda/complete\\_works.htm](https://www.ramakrishnavivekananda.info/vivekananda/complete_works.htm)

### **REFERENCE BOOKS:**

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*
3. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education*.
4. PC Hardware - A Handbook – Kate J. Chase *PHI* (Microsoft)
5. LaTeX Companion – Leslie Lamport, *PHI/Pearson*.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – *CISCO Press, Pearson Education*.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan  
– *CISCO Press, Pearson Education*.
8. "Swami Vivekananda - Call to the Nation", ISBN: 978-81-7505-018-1.  
<http://sites.google.com/view/pgovernanceforum>



**22MC0002: ENVIRONMENTAL SCIENCE**

**I B.Tech. II Semester**

**L T P C**  
**3 0 0 0**

**Course Objectives:**

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

**Course Outcomes:**

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I**

**ECOSYSTEMS:** Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II**

**NATURAL RESOURCES: CLASSIFICATION OF RESOURCES:** Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III**

**BIODIVERSITY AND BIOTIC RESOURCES:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV**

**ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES:**  
**Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution**



**control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

#### **UNIT - V**

**ENVIRONMENTAL POLICY, LEGISLATION & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

#### **TEXT BOOKS:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

#### **REFERENCE BOOKS:**

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.



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Aushapur (V), Ghatkesar (M), Medchal – Dist. Telangana State – 501 301.

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**DEPARTMENT OF  
COMPUTER SCIENCE &  
ENGINEERING  
(AI&ML)  
(R22 B. TECH. CSM)**

**ACADAMIC YEAR : 2023-24**

**I B.TECH(CSM)  
COURSE STRUCTURE  
&  
SYLLABUS**



**B.TECH. Computer Science & Engineering(AI&ML)**

**EFFECTIVE FROM ACADEMIC YEAR 2023 - 24 ADMITTED BATCH**

**R22 COURSE STRUCTURE AND SYLLABUS**

**I YEAR I – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1	22BS1111	Matrices and Calculus	3	1	0	4
2	22BS1113	Applied Physics	3	1	0	4
3	22CS1113	Programming for Problem Solving	3	0	0	3
4	22ME1156	Engineering Workshop	0	1	3	2.5
5	22HS1112	English for Skill Enhancement	2	0	0	2
6	22CS1156	Elements of Computer Science & Engineering	0	0	2	1
7	22BS1153	Applied Physics Laboratory	0	0	3	1.5
8	22CS1153	Programming for Problem Solving Laboratory	0	0	2	1
9	22HS1152	English Language and Communication Skills Laboratory	0	0	2	1
10	22MC0002	Environmental Science	3	0	0	0
11	22MC0001	Induction Program				
		<b>Total</b>	<b>14</b>	<b>3</b>	<b>12</b>	<b>20</b>

**I YEAR II – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1	22BS1211	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	22BS1212	Engineering Chemistry	3	1	0	4
3	22ME1255	Computer Aided Engineering Graphics	1	0	4	3
4	22EE1214	Basic Electrical Engineering	2	0	0	2
5	22EC1215	Electronic Devices and Circuits	2	0	0	2
6	22CS1251	Python Programming Laboratory	0	1	2	2
7	22BS1252	Engineering Chemistry Laboratory	0	0	2	1
8	22EE1254	Basic Electrical Engineering Laboratory	0	0	2	1
9	22IT1255	IT Workshop	0	0	2	1
		<b>Total</b>	<b>11</b>	<b>3</b>	<b>12</b>	<b>20</b>





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**R22 B.Tech**

**CSM**

**2022-2023**

**I Year – I Semester**



## 22BS1111-MATRICES AND CALCULUS

I B Tech. I Semester

L	T	P	C
3	1	-	4

**Prerequisite(s):** Mathematical knowledge at Pre university level.

**Course Objectives:** Develop ability to learn the concept of

1. Rank of the matrix and apply the same to know the consistency for the linear system of equations.
2. Eigen values and Eigen vectors to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems, Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and Finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

**Course Outcomes:** After successful completion of this course, the student should be able to

1. Write the matrix representation of a set of linear equations, find the rank and apply the same to analyse the solution of the system of equations.
2. Reduce the quadratic form to canonical form using orthogonal transformations by finding Eigenvalues and Eigen vectors.
3. Solve the applications on the mean value theorems, Evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints using partial differentiation.
5. Evaluate the multiple integrals and apply the concept to find areas and volumes.

### UNIT - I: MATRICES

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

### UNIT - II: EIGEN VALUES AND EIGEN VECTORS

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### UNIT - III: CALCULUS

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proof). Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates for known curves (circle, parabola, ellipse), Definition of Improper Integral: Beta and Gamma functions and their applications.

### UNIT - IV: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian,



Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

#### **UNIT-V: MULTIVARIABLE CALCULUS (INTEGRATION)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form for known curves (circle, parabola, ellipse), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



**22BS1113- APPLIED PHYSICS**

**I B Tech. I Semester**

**L T P C**  
**3 1 0 4**

**Course Objectives:**

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibers.

**Course Outcomes:**

At the end of the course the student will be able to:

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic and energy materials for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

**UNIT - I: QUANTUM PHYSICS AND SOLIDS**

**Quantum Mechanics:** Introduction to quantum physics, blackbody radiation, Wein's and Rayleigh-Jean's law, Planck's radiation law (Qualitative) - photoelectric effect de-Broglie hypothesis and matter waves- Davisson and Germer experiment –Heisenberg uncertainty principle - Born interpretation of the wave function – time independent Schrodinger wave equation - particle in one dimensional potential box.

**Solids:** Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative) Bloch's theorem - Kronig-Penney model (Qualitative) origin of energy bands- classification of solids.

**UNIT - II: SEMICONDUCTORS AND DEVICES**

Intrinsic and extrinsic semiconductors – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor (BJT)–LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and characteristics.

**UNIT - III: DIELECTRIC, AND MAGNETIC AND ENERGY MATERIALS**

**Dielectric Materials:** Basic definitions- types of polarizations (qualitative) - ferroelectric, piezoelectric, and pyroelectric materials.

**Magnetic Materials:** Basic definitions – classification of Magnetic materials – Domain theory of ferromagnetism in hysteresis - soft and hard magnetic materials - magnetostriction, magnetoresistance.



**Energy Materials:** Conductivity of liquid and solid electrolytes- superionic conductors - materials and electrolytes for super capacitors.

#### **UNIT - IV: NANOTECHNOLOGY**

Nanoscale, quantum confinement, surface to volume ratio, **bottom-up fabrication:** sol-gel, precipitation, combustion methods – **top-down fabrication:** ball milling - physical vapor deposition (PVD) - chemical vapor deposition (CVD) - characterization techniques - XRD, SEM & TEM - applications of nanomaterials.

#### **UNIT - V: LASER AND FIBER OPTICS**

**Lasers:** Laser beam characteristics-three quantum processes-Einstein coefficients and their relations-lasing action - pumping methods, CO<sub>2</sub> laser, Nd: YAG laser- semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber- advantages of optical Fibers - total internal reflection- construction of optical fiber - acceptance angle - numerical aperture- classification of optical fibers- losses in optical fiber - optical fiber for communication system - applications.

#### **TEXT BOOKS:**

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.

#### **REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhyaya - Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.



## 22CS1113: PROGRAMMING FOR PROBLEM SOLVING

I B.Tech. I Semester

L T P C  
3 0 0 3

### Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems.
5. To learn the fundamentals of searching and sorting.

### Course Outcomes: The student will learn

1. To write algorithms and to draw flowcharts for solving problems, To convert the algorithms/flowcharts to C programs.
2. To code and test a given logic in the C programming language.
3. To decompose a problem into functions and to develop modular reusable code.
4. To use arrays, pointers, strings and structures to write C programs.
5. To implement Searching and sorting problems.

### UNIT - I: INTRODUCTION TO PROGRAMMING

Compilers, compiling and executing a program.

**Representation of Algorithm** - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number  
Flowchart/Pseudo code with examples, Program design and structured programming

**Introduction to C Programming Language:** variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, **Operators:** Ternary operator, Bitwise operations: Bitwise AND, OR, XOR and NOT operators, expressions and precedence, Expression evaluation, type conversion.

**Conditional Branching and Loops:** Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, goto, Iteration with for, while, do- while loops

**I/O:** Simple input and output with scanf() and printf(), formatted I/O.

### UNIT - II: ARRAYS AND FUNCTIONS

**Arrays:** one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

**Functions:** Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions.

**Storage classes:** auto, extern, static and register.

**Recursion:** Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Some C standard functions and libraries.

### UNIT - III: POINTERS, STRINGS & STRUCTURES.

**Pointers:** Idea of pointers, Defining pointers, usage of self-referential structures in linked list (no



implementation), passing pointers to functions, idea of call by reference.

**Strings:** Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen( ), strcat( ), strcpy( ), strstr( ) etc.), arrays of strings

**Structures:** Defining structures, initializing structures, unions, Array of structures  
Pointers to Arrays and Structures, Use of Pointers in self-referential structures,  
Enumeration data type.

#### **UNIT - IV: FILE HANDLING IN C, PREPROCESSOR COMMANDS**

**Files:** Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek( ), ftell( ) and rewind( ) functions.

**Preprocessor Commands:** Commonly used Preprocessor commands like File inclusion, macros substitution, conditional compilation (include, define, undef, if, ifdef, ifndef )  
Introduction to stdin, stdout and stderr. Command line arguments

#### **UNIT - V: SEARCHING AND SORTING TECHNIQUES:**

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms).

#### **TEXT BOOKS:**

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

#### **REFERENCE BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming



**22ME1156 - ENGINEERING WORKSHOP**

**I B Tech. I Semester**

**L T P C**  
**0 1 3 2.5**

**Pre-requisites:** Practical skill

**Course Objectives:**

1. To Study about different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

**Course Outcomes:** At the end of the course, the student will be able to:

1. CO1: Study and practice on machine tools and their operations
2. CO2: Practice on manufacturing of components using work shop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO4: Apply basic electrical engineering knowledge for house wiring practice.
5. CO 5: Study and Practice of arc welding process

**1. TRADES FOR EXERCISES:**

**At least two exercises from each trade:**

1. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
2. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
3. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
4. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
5. Welding Practice – (Arc Welding & Gas Welding)
6. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
7. Black Smithy – (Round to Square, Fan Hook and S-Hook)

**2. TRADES FOR DEMONSTRATION & EXPOSURE:**

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and WoodWorking

**TEXT BOOKS:**

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

**REFERENCE BOOKS:**

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP





**22HS1112- ENGLISH FOR SKILL ENHANCEMENT**

**I B Tech. I Semester**

**L T P C**  
**0 0 0 2**

**Course Objectives:** This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Learn remedial and functional grammar related to various grammar items.
4. Prepare the students for examinations such as IELTS and TOEFL by sharpening their reading and writing skills
5. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:** Students will be able to:

1. Use a wide range of vocabulary and sentence structures and also acquire basic proficiency in reading and writing modules of English.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

**UNIT-I**

Chapter entitled '*Toasted English*' by **R.K. Narayan** from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** The Concept of Word Formation – The Use of Prefixes and Suffixes-Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance – Techniques for Effective Reading.

**Writing:** Sentence Structures – Use of Phrases and Clauses in Sentences –Importance of Proper Punctuation – Techniques for Writing precisely – Paragraph Writing –Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

**UNIT-II**

Chapter entitled '*Appro JRD*' by **Sudha Murthy** from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.

**Vocabulary:** Words Often Misspelt - Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

**Writing:** Nature and Style of Writing - Defining/Describing People, Objects, Places and Events Classifying – Providing Examples or Evidence.

**UNIT-III**

Chapter entitled '*Lessons from Online Learning*' by **F.Haider Alvi, Deborah Hurstetal** from "*English: Language, Context and Culture*" published by Orient Black Swan, Hyderabad.



- Vocabulary:** Words Often Confused – Words from Foreign Languages and their Use in English.
- Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
- Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.
- Writing:** Format of a Formal Letter – Writing Formal Letters e.g. Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

#### UNIT-IV

Chapter entitled ‘**Art and Literature**’ by **Abdul Kalam** from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

- Vocabulary:** Standard Abbreviations in English
- Grammar:** Redundancies and Clichés in Oral and Written Communication.
- Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Exercises for Practice
- Writing:** Writing Practices – Essay Writing – Writing Introduction and Conclusion – Précis Writing.

#### UNIT-V

Chapter entitled ‘**Go, Kiss the World**’ by **Subroto Bagchi** from “*English: Language, Context and Culture*” published by Orient Black Swan, Hyderabad.

- Vocabulary:** Technical Vocabulary and their Usage
- Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)
- Reading:** Reading Comprehension – Exercises for Practice
- Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats - Structure of Reports (Manuscript Format) - Types of Reports - Writing a Report.

**Note:** Listening and Speaking Skills which are given under Unit -6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

- Note: 1.** As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is *Open-ended*, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

#### TEXTBOOK:

- “English: Language, Context and Culture” by Orient Black Swan Pvt. Ltd, Hyderabad.2022. Print.

#### REFERENCEBOOKS:

- Effective Academic Writing by Liss and Davis (OUP)
- Richards, Jack C. (2022) Interchange Series. Introduction,1,2,3. Cambridge University Press
- Wood, F. T. (2007). Remedial English Grammar. Macmillan.
- Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2<sup>nd</sup> ed.,). Sage Publications India Pvt. Ltd.



5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha.(2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition.

R22-B.TECH-  
CSM



**22CS1156: ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objective:**

1. To learn the fundamentals of computers.
2. To provide an overview of the subjects of computer science and engineering.
3. To learn the operating system, database management system, computer networks.
4. To understand the software development process.
5. To learn the various autonomous system

**Course Outcomes:**

1. Know the working principles of functional units of a basic Computer
2. Understand program development, the use of data structures and algorithms in problem solving.
3. Know the need and types of operating system, data base systems.
4. Understand the significance of networks, internet, WWW and cybersecurity.
5. Understand Autonomous systems, the application of artificial intelligence.

**UNIT-I**

**BASICS OF A COMPUTER** – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – system software, application software, packages, frameworks, IDEs.

**UNIT-II**

**SOFTWARE DEVELOPMENT** – waterfall model, Agile, Types of computer languages – Programming, markup, scripting, Program development steps, flowcharts, algorithms, data structures – definition, types of data structures

**UNIT-III**

**OPERATING SYSTEMS:** Functions of operating systems, types of operating systems, Device & Resource management

**Database Management Systems:** Data models, RDBMS, SQL, Database Transactions, data centers, cloud services

**UNIT-IV**

**COMPUTER NETWORKS:** Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, vehicular networks, 5G communications.

WorldWideWeb–Basics, role of HTML, CSS, XML, Tools for web designing, social media, online social networks.

Security–information security, cyber security, cyber laws

**UNIT-V**

**AUTONOMOUS SYSTEMS:** IoT, Robotics, Drones, Artificial Intelligence–Learning, Game Development, natural language processing, image and video processing, Cloud Basics.

**TEXTBOOK:**



1. Invitation to Computer Science, G.Michael Schneider, Macalester College, Judith L.Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

**REFERENCEBOOKS:**

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage.

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CSM



**22BS1153 - APPLIED PHYSICS LABORATORY**

**B.Tech. I Year I Sem.**

**L T P C**  
**0 0 3 1.5**

**Course Objectives:**

The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Understand the method of least square fitting
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Study the behavior of passive components.

**Course Outcomes:**

The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Carried out data analysis
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Learn the characteristics of passive components like L, C and R and their applications.

**LIST OF EXPERIMENTS:**

1. Understanding the method of least squares – torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. Characteristics of series and parallel LCR circuits.
5. V-I characteristics of a p-n junction diode and Zener diode
6. Input and output characteristics of BJT (CE, CB & CC configurations)
7. a). V-I and L-I characteristics of light emitting diode (LED)  
b). V-I characteristics of a Laser diode
8. V-I Characteristics of solar cell
9. a). Determination of the beam divergence of the given LASER beam  
b). Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. Determination of Energy gap of a semiconductor.
11. Determination of time constant of RC Circuit.
12. Study B-H curve of a magnetic material.

*Note: Any 8 experiments are to be performed.*

**REFERENCE BOOK:**

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.



**22CS1153: PROGRAMMING FOR PROBLEM SOLVING LAB**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

1. To learn C-language Programs using the data types, input/ output statements and control statements.
2. Describe the importance of modular programming and arrays using C-Language Program.
3. Understand the concept and use of pointers for memory management techniques
4. Understand structure, union, and enumerated types.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams.

**Course Outcomes:**

1. Ability to design and test programs to solve mathematical and scientific problems.
2. Ability to write structured programs using control structures and functions.
3. Able to Implement C programs using arrays & pointers.
4. Able to Use the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Able to execute programs that read and write text, binary files using the formatting and character I/O functions.

**EXPERIMENTS**

**WEEK-1:**

- a. Write a C program to find simple interest and compound interest.
- b. Write a C program to convert Celsius to Fahrenheit.
- c. Write a C Program to swap two numbers.
- d. Write a C program to perform all arithmetic operations (+, -, \*, /, %).
- e. Write a simple program that prints the results of all the operators available in C (Including pre/ post increment, bitwise and/or/not, etc.). Read required operand Values from standard input.

**WEEK-2:**

- a. Write a simple program that converts one given data type to another using auto Conversion and casting. Take the values from standard input.
- b. Write a C program to check whether the given number is even or odd using Conditional Operator.
- c. Write a C program to find the Largest of two numbers.
- d. Write a C program to print ascending order of three given integers.

**WEEK-3:**

- a. Write a C program to Check the given year is leap year or not.
- b. Write a C program to find the roots of quadratic equation.
- c. Write a C Program to implement arithmetic calculator using switch case.
- d. Write a program that declares Class awarded for a given percentage of marks,



where (use else if ladder and switch) <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

**WEEK-4:**

- Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:  
5 x 1 = 5  
5 x 2 = 10  
5 x 3 = 15
- Write a program that shows the binary equivalent of a given positive number between 0 and 255.
- Write a C program to find sum of individual digits of the given integer.
- Write a C program to find factorial of a given number.

**WEEK-5:**

- Write a program that finds if a given number is a prime number
- Write a C program to check whether the given number is palindrome or not.
- Write a C program to print Fibonacci series.
- Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:  $1+x+x^2+x^3+\dots+x^n$ .  
For example: if n is 3 and x is 5, then the program computes  $1+5+25+125$ .

**WEEK-6:**

- Write a C program to calculate the following, where x is a fractional value.  
 $1-x/2 +x^2/4-x^3/6$ .
- Write a C program to display the prime numbers from 1 to n(where n value is Given by user)
- Write a C program to construct a pyramid of numbers as follows:

```
1           *           1           1           *
1 2        *  *       2 3         2 2         *  *
1 2 3      *  *  *     4 5 6       3 3 3       *  *  *
                                     4 4 4 4      *  *
                                                         *
```

- Write a C program to construct the Pascal triangle

**WEEK-7:**

- Write a C program to find largest, smallest numbers and average in a list of array elements.
- Write a C program to find mean, variance, standard deviation for a given list of elements.
- Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.





**WEEK-8:**

- a. Write a C program to transpose a matrix.
- b. Write a C program to perform the Addition of Two Matrices.
- c. Write a C program to perform the Multiplication of Two Matrices.

**WEEK-9:**

Write programs using non recursive and recursive functions for the following

- a. Find GCD.
- b. Find the factorial of a given number.
- c. Generate the Fibonacci series.
- d. Find  $x^n$

**WEEK-10:**

- a. Write a C program to swap two integers using following methods.
  - i. call by value
  - ii. call by reference
- b. Write a program for reading elements using a pointer into an array and display the Values using array.
- c. Write a program for display values reverse order from an array using a pointer.
- d. Write a program through a pointer variable to sum of n elements from an array.

**WEEK-11:**

- a. Write a C program to insert a sub-string into a given main string from a given position.
- b. Write a C program to delete n characters from a given position in a given string.
- c. Write a C program to arrange given n strings in alphabetical order.
- d. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

**WEEK-12:**

- a. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
- b. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba etc.)
- c. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
- d. Write a C program to count the lines, words and characters in a given text.

**WEEK-13:**

- a. Write a C program to find total and average marks for five subjects of three students using structures.
- b. Write a C program to demonstrate nested structures.
- c. Write a C program to display the contents of a file to standard output device.
- d. Write a C program which copies one file to another into another file.
- e. Write a C program to merge two files into a third file.  
(i.e., the contents of the first file followed by those of the second are put in the third file)

**WEEK-14:**



- a. Write a C program to reverse the contents of a file.
- b. Write a C program that does the following:  
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)  
Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek () function)  
The program should then read all 10 values and print them back.
- c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
- d. Write a C program that uses non recursive function to search for a Key value in a Given list of integers using linear search method.
- e. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.

#### **WEEK-15:**

- a. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- b. Write a C program that sorts the given array of integers using selection sort in
- c. descending order Write a C program that sorts the given array of integers using insertion sort in ascending order

#### **TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.



**22HS1152 - ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY**

**B.Tech. I Year I Sem.**

**L T P C**  
**0 0 2 1**

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

**Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

**Course Outcomes:** Students will be able to:

1. Make use of various online and web resources for independent language learning.
2. Understand the nuances of English language through audio-visual experience and group activities.
3. Neutralize their accent for intelligibility for enabling them to communicate with a global audience.
4. Speak with clarity and confidence which in turn improves their academic performance in the other courses.
5. Face and interact with various stakeholders leading to the enhancement of their employability skills.

**Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. **Computer Assisted Language Learning (CALL) Lab**
- b. **Interactive Communication Skills (ICS) Lab**

**Listening Skills:**

**Objectives**

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.*

1. Listening for general content
2. Listening to fill up information
3. Intensive listening
4. Listening for specific information



### **Speaking Skills:**

#### Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
5. Oral practice
6. Describing objects/situations/people
7. Roleplay – Individual/Group activities
8. Just A Mine (JAM) Sessions

The following course contents prescribed for the **English Language and Communication Skills Lab.**

#### **Exercise–I**

##### **CALL Lab:**

Understand: Listening Skill- Its importance – Purpose - Process - Types - Barriers - Effective Listening. Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants –Minimal Pairs - Consonant Clusters - Past Tense Marker and Plural Marker - Testing Exercises

##### **ICS Lab:**

Understand: Spoken vs. Written language – Formal and Informal English.  
Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

#### **Exercise–II CALL Lab:**

Understand: Structure of Syllables–Word Stress–Weak Forms and Strong Forms– Stress pattern in sentences – Intonation.  
Practice: Basic Rules of Word Accent – Stress Shift - Weak Forms and Strong Forms – Stress pattern in sentences – Intonation - Testing Exercises

##### **ICS Lab:**

Understand: Features of Good Conversation – Strategies for Effective Communication.  
Practice: Situational Dialogues – Role Play – Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

#### **Exercise-III CALL Lab:**

Understand: Errors in Pronunciation – Neutralising Mother Tongue Interference (MTI).  
Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

##### **ICS Lab:**

Understand: Descriptions – Narrations – Giving Directions and Guidelines – Blog Writing  
Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions –Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

#### **Exercise–IV**

##### **CALL Lab:**

Understand: Listening for General Details.  
Practice: Listening Comprehension Tests - Testing Exercises

##### **ICS Lab:**

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication -



Presentation Skills.

Practice: Making a Short Speech – Extempore – Making a Presentation.

**Exercise–V CALL Lab:**

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests – Testing Exercises

**ICS Lab:**

Understand: Group Discussion

Practice: Group Discussion

**Minimum Requirement of infrastructural facilities for ELCSLab:**

**1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

**System Requirement (Hardware component):**

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- a. Computers with Suitable Configuration
- b. High Fidelity Headphones

**1. Interactive Communication Skills (ICS) Lab:**

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

**Source of Material (Master Copy):**

3. *Exercises in Spoken English. Part1, 2, 3.* CIEFL and Oxford University Press

**Note:** Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

**Suggested Software:**

4. Cambridge Advanced Learners' English Dictionary with CD.
5. Grammar Made Easy by Darling Kindersley.
6. Punctuation Made Easy by Darling Kindersley.
7. Oxford Advanced Learner's Compass, 10<sup>th</sup> Edition.
8. English in Mind (Series1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
9. English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
10. English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
11. TOEFL&GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
12. Digital All
13. Orell Digital Language Lab (Licensed Version)

**REFERENCE BOOKS:**

1. (2022). *English Language Communication Skills – Lab Manual cum Workbook.* Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook.* Oxford University Press



4. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities*. Orient Black Swan Pvt.Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.

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**22MC0001: INDUCTION PROGRAM**

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**Course Objectives:**

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

**Course Outcomes:**

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I : ECOSYSTEMS**

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II : NATURAL RESOURCES: CLASSIFICATION OF RESOURCES**

Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III : BIODIVERSITY AND BIOTIC RESOURCES**

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV : ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES : ENVIRONMENTAL POLLUTION**

Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

**UNIT - V : ENVIRONMENTAL POLICY, LEGISLATION & EIA**

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data





acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

**TEXT BOOKS:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

**REFERENCE BOOKS:**

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.



**VIGNANA BHARATHI**  
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# **R22 B.Tech**

# **CSM**

## **2022-2023**

# **I Year – II Semester**



## 22BS1211- ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I B.Tech. II Semester

L T P C  
3 1 - 4

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** Develop ability to learn

1. Methods of solving the Ordinary Differential Equations of first order.
2. Methods of solving the higher order Ordinary Differential Equations.
3. Concept, properties of Laplace transforms & using the same to solve ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to vector integration.

**Course outcomes:** After successful completion of this course, student should be able to

1. Identify the type of first order Ordinary Differential Equation and solve them by appropriate method.
2. Apply the concept of higher order Ordinary Differential Equations to solve real world problems.
3. Solve ordinary differential equations by using Laplace transform techniques.
4. Calculate scalar potential for a vector and directional derivative of a scalar point function using vector differentiation.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

### UNIT-I: FIRST ORDER ODE

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

### UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second and higher order linear differential equations with constant coefficients: non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin bx$ ,  $\cos bx$ , polynomials in  $x^k$ ,  $ve^{ax}$  and  $x V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits

### UNIT-III: LAPLACE TRANSFORMS

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, second shifting theorem (without proof), Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.



#### **UNIT-IV: VECTOR DIFFERENTIATION**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

#### **UNIT-V: VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition,
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, S<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.



## 22BS1212- ENGINEERING CHEMISTRY

**B.Tech. I Year II Sem.**

**L T P C**  
**3 1 0 4**

### Course Objectives:

1. To acquire knowledge about desalination of brackish water and treatment of municipal water
2. To include the fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
4. To understand the significance of green chemistry and green synthesis and to imbibe the green chemistry principles.
5. To acquire required knowledge about engineering materials like smart materials, lubricants, and biodiesel.

### Course Outcomes:

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4. The student can use real examples to illustrate how the principles of *green chemistry* can be applied to chemical process in engineering
5. They can predict potential applications of engineering materials and practical utility in order to become good engineers and entrepreneurs.

### UNIT - I: WATER AND ITS TREATMENT:

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation, Determination of F<sup>-</sup> ion by ion-selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion-exchange processes. Desalination of water – Reverse osmosis.

### UNIT – II BATTERY CHEMISTRY & CORROSION

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.



### **UNIT - III: POLYMERIC MATERIALS:**

Definition – Classification of polymers with examples – Types of polymerization –addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

### **UNIT - IV: GREEN CHEMISTRY AND ENGINEERING FOR SUSTAINABLE DEVELOPMENT**

Definition and history of Green chemistry, Concept and principles (Prevention, Atom Economy, Less Hazardous Chemical Syntheses, Designing Safer Chemicals, Safer Solvents and Auxiliaries, Design for Energy Efficiency, Use of Renewable Feedstock, Reduce, Derivatives, Catalysis, Design for Degradation, Real-time Analysis for Pollution Prevention, Inherently Safer Chemistry for Accident Prevention) of Green Chemistry with suitable examples.

### **UNIT - V: ENGINEERING MATERIALS:**

#### **Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Bio Diesel:** Sources and applications of Biodiesel

#### **TEXT BOOKS:**

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
5. Engineering Chemistry by K Sesha Maheswaramma and Mridula Chugh, Pearson Publications.

#### **REFERENCE BOOKS:**

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)



## 22ME1255 - COMPUTER AIDED ENGINEERING GRAPHICS

**B.Tech. I Year II Sem.**

**L T P C**

**1 0 4 3**

### **Course Objectives:**

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products
3. To draw sectional views and pictorial views for various types of solids.
4. To develop the lateral surfaces of basic engineering objects
5. To impart knowledge about standard principles of orthographic projection and isometric views of different objects.

**Course Out comes:** At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D and 3D objects
2. Sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

### **UNIT – I: INTRODUCTION TO ENGINEERING GRAPHICS:**

Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

### **UNIT- II: ORTHOGRAPHIC PROJECTIONS:**

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

### **UNIT – III:**

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

### **UNIT – IV:**

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

### **UNIT – V:**

**Isometric Projections:** Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic



projection into isometric view using computer aided drafting.

**TEXT BOOKS:**

- 1 Engineering Drawing N.D. Bhatt / Charotar
- 2 Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

**REFERENCE BOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

**Note:** - External examination is conducted in conventional mode and internal evaluation to be done by both conventional as well as using computer aided drafting.





**B.Tech. I Year II Sem.**

**L T P C**  
**2 0 0 2**

**Prerequisites:** Mathematics

**Course Objectives:**

1. To study and understand DC circuits.
2. To study and understand Single & Three phase AC circuits.
3. To study and understand the Single Phase Transformers.
4. To study and understand the different types of DC and AC machines.
5. To have the knowledge of various electrical installations and the concept of power factor improvement.

**Course Outcomes:** After completion of this course, students will be able to

1. Analyze DC circuits using various techniques
2. Analyze Single & Three phase AC circuits
3. Discuss the working principles and estimate the performance of Single Phase Transformers
4. Discuss the Construction and working principle of different types of DC and AC machines.
5. Classify various components of Low Voltage Electrical Installations and identify the importance of power factor improvement

**UNIT-I: D.C. CIRCUITS:** Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation (Series, Parallel, Series and Parallel circuits, Nodal Analysis and Mesh Analysis). Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**UNIT-II: A.C. CIRCUITS:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series circuits only), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

**UNIT-III: SINGLE PHASE TRANSFORMERS:** Working Principle and construction of Transformer, Types, Ideal and practical transformer, EMF Equation, equivalent circuit, losses in transformers, regulation and efficiency.

**UNIT-IV: ELECTRICAL MACHINES**

**D. C. Generator:** Constructional details of D C Machine, Working Principle of D C Generator, EMF Equation, Types, Numerical Problems.

**D. C. Motor:** Working Principle of D C Motor, Types, Torque Equation, Numerical Problems Performance Characteristics of dc shunt motor.

**Three Phase Induction Motor:** Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics.

**Synchronous Generator:** Construction and working of synchronous generator.



**UNIT-V: ELECTRICAL INSTALLATIONS:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement.

**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

- 1 P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2<sup>nd</sup> Edition, 2019.
- 2 D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
- 3 M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1<sup>st</sup> Edition, 2012.
- 4 Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2<sup>nd</sup> Edition, McGraw Hill, 2021.
- 5 L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
- 6 E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
- 7 V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989



**22EC1215 - ELECTRONIC DEVICES AND CIRCUITS**

**B.Tech. I Year II Sem.**

**L T P C**  
**2 0 0 2**

**Course Objectives:**

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of devices.
3. To know the switching characteristics of devices.
4. To know the special purpose devices such as SCR, UJT.
5. To know the MOSFET and its characteristics

**Course Outcomes: Upon completion of the Course, the students will be able to:**

1. Acquire the knowledge of various electronic devices and their use on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.
4. Know the configurations of Transistors
5. Acquire the knowledge of various device characteristics.

**UNIT - I**

**DIODES:** Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

**UNIT - II**

Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

**UNIT - III**

**BIPOLAR JUNCTION TRANSISTOR (BJT):** Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

**UNIT – IV JUNCTION FIELD EFFECT TRANSISTOR (FET):** Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

**UNIT – V Special Purpose Devices:** Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

**TEXT BOOKS:**

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11<sup>th</sup> Edition, 2009, Pearson.

**REFERENCE BOOKS:**

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5<sup>th</sup>Edition, Oxford.
1. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.



**22CS1251: PYTHON PROGRAMMING LABORATORY**

**I B.Tech. II Semester**

**L T P C**  
**0 1 2 2**

**Course Objectives:**

1. To learn python programming language using the data types, input/ output statements.
2. To install and run the Python interpreter
3. To learn control structures.
4. To Understand Lists, Dictionaries in python
5. To Handle Strings and Files inPython

**Course Outcomes:** After completion of the course, the student should be able to

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Verify programs using modular approach, file I/O, Python standard library
4. Implement Digital Systems using Python
5. Capable to implement on hardwareboards

Note: The lab experiments will be like the following experiment examples

**Week -1:**

1. i) Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.  
ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3.
  - i) Write a program to calculate compound interest when principal, rate and numbers of periods are given.
  - ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points

**Week-2:**

1. Read name, address, email and phone number of a person through keyboard and print the details.
2. Write a program to demonstrate different number data types in Python.
3. Write a program to perform different Arithmetic Operations on numbers in Python.

**Week - 3:**

1. Print the below triangle using for loop. 5  
4 4  
3 3 3  
2 2 2 2



1 1 1 1 1

2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop

#### Week-4:

1. Python program to print all prime numbers in a given interval (use break)
2. Write a python script to print the current date in the following format "Sun May 29 02:26:23 IST 2017"
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

#### Week - 5:

1. i) Write a program to convert a list and tuple into arrays.  
ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

#### Week - 6:

1. Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has a duplicate that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
  - i). Write a function called remove duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
  - ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
  - iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'  
ii) Remove the given word in all the places in a string?  
iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

#### Week-7:

1. Writes a recursive function that generates all binary strings of n-bit length
2. Write a program to define a lambda function(**rev\_upper**) to convert a string to its upper-case and reverse it.
3. Write a python program to find factorial of a number using Recursion.



**Week - 8:**

1. i) Write a python program that defines a matrix and prints  
ii) Write a python program to perform addition of two square matrices  
iii) Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

**Week - 9:**

1. Write a Python program to show how to use else clause with try and except clauses
2. Write a Python Module Program to implement Arithmetic operators, Bitwise operators, Logical operators in python as functions in one module.
3. Write a python program to specify scope and Lifetime of variables in python Functions.

**Week-10:**

1. a. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.  
b. Add an attribute named color to your Rectangle objects and modify draw rectangle so that it uses the color attribute as the fill color.  
c. Write a function called draw point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.  
d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

**Week- 11**

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences

**Week - 12:**

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR

**Week - 13:**

1. Write a program to implement Half Adder, Full Adder, and Parallel Adder
2. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.



3. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

**Week - 14:**

1. Write a script named **copyfile.py**. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
2. Write a GUI program to create a window for calculator and implement basic arithmetic operations in that window.
3. Write a python program to perform addition of two matrices using NUMPY package

**TEXT BOOKS:**

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

**REFERENCE BOOKS:**

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1<sup>st</sup> Ed. 2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python, Kenneth A. Lambert, Cengage



**22BS1252 - ENGINEERING CHEMISTRY LABORATORY**

**B.Tech. I Year II Sem.**

**L T P C**  
**0 0 2 1**

**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
5. Students will be able to visualize the experiments virtually for better understanding

**Course Outcomes:** The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.
5. Can perform the experiments making use of working models

**List of Experiments:**

- I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
- II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
- III. **Potentiometry:** Estimation of the amount of  $\text{Fe}^{+2}$  by Potentiometry.
- IV. **pH Metry:** Determination of an acid concentration using pH meter.
- V. Preparations:
  1. Preparation of Bakelite.
  2. Preparation Nylon – 6.
- VI. **Lubricants:**
  1. Estimation of acid value of given lubricant oil.
  2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
- VII. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
- VIII. Virtual lab experiments
  1. Construction of Fuel cell and its working.
  2. Smart materials for Biomedical applications
  3. Batteries for electrical vehicles.
  4. Functioning of solar cell and its applications.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).





**22EE1254- BASIC ELECTRICAL ENGINEERING LABORATORY**

**B.Tech. I Year II Sem.**

**L T P C**  
**0 0 2 1**

**Prerequisites:** Basic Electrical Engineering

**Course Objectives:**

1. To measure the electrical parameters for different types of DC circuits using conventional and theorems approach.
2. To measure the electrical parameters for different types of AC circuits
3. To study the transient response of various R, L and C circuits using different excitations.
4. To determine the performance of Single Phase Transformers.
5. To determine the performance of different types of DC and AC machines.

**Course Outcomes: After completion of this course, students will be able to**

1. Verify the basic conventional approach and theorems for Electrical circuits through different experiments.
2. Calculate the electrical parameters for different types of AC circuits
3. Analyze the transient responses of R, L and C circuits for different input conditions.
4. Evaluate the performance calculations of Single Phase Transformers through various testing methods.
5. Evaluate the performance calculations of DC and AC machines through various testing methods.

**List of experiments/demonstrations:**

**PART- A (compulsory)**

1. Verification of KVL and KCL
2. Verification of Thevenin's theorem
3. Verification of Norton's theorem
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series
6. Circuits.
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
8. Performance Characteristics of a DC Shunt Motor
9. Torque-Speed Characteristics of a Three-phase Induction Motor.

**PART-B (any two experiments from the given list)**

1. Verification of Superposition theorem
2. Transient Response of Series RL and RC circuits for DC excitation
3. Load Test on Single Phase Transformer (Calculate Efficiency)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. No-Load Characteristics of a Three-phase Alternator

**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshiah, "Basic Electrical Engineering", Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.



**REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, "Basic Electrical Engineering", S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

R22-B.TECH-  
CSM



**22IT1255: IT WORKSHOP**

**I B.Tech. II Semester**

**L T P C**

**0 0 2 1**

**Course Objectives:** The IT Workshop for engineers is a training lab course spread over 60 hours.

1. The modules include training on PC Hardware, Internet & World Wide Web
2. To learn Hardware troubleshooting.
3. To understand the productivity tools including Word, Excel, PowerPoint and Publisher.
4. To learn the Safeguard computer systems from viruses/worms
5. To learn the LaTeX and Word.

**Course Outcomes:**

1. Perform Hardware troubleshooting
2. Understand Hardware components and inter dependencies
3. Safeguard computer systems from viruses/worms
4. Document/ Presentation preparation
5. Perform calculations using spreadsheets

**PC Hardware**

**Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Internet & World Wide Web**

**Task1: Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.



**Task 2: Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task 3: Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

**Task 4: Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms, PGF(ref.9) Case study of Wayback Machine web robot for Cyberforensics for Secure Digital India

### **LaTeX and WORD**

**Task 1 – Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 2: Using LaTeX and Word** to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Task 3: Creating project abstract** Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Task 4: Creating a Newsletter:** Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

### **EXCEL**

**Excel Orientation:** The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text



**Task 2 : Calculating GPA** - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

**Task 3:** Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

### **POWERPOINT**

**Task 1:** Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

**Task 2:** Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

**Task 3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides. Prepare and demonstrate (.ppt file) for the “Call to the Nation” quotations under "Faith and Strength", "Education and Society", "Powers of the Mind", "Man: The Maker of his Own Destiny", "India: Our Motherland" from the sources

<https://sites.google.com/view/chandraksekharaiyah/call-to-the-nation-book>

[https://www.ramakrishnavivekananda.info/vivekananda/complete\\_works.htm](https://www.ramakrishnavivekananda.info/vivekananda/complete_works.htm)

### **REFERENCE BOOKS:**

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*
3. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education.*
4. PC Hardware - A Handbook – Kate J. Chase *PHI (Microsoft)*
5. LaTeX Companion – Leslie Lamport, *PHI/Pearson.*
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – *CISCO Press, Pearson Education.*
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan  
– CISCO Press, *Pearson Education.*
8. "Swami Vivekananda - Call to the Nation", ISBN: 978-81-7505-018-1.  
<http://sites.google.com/view/pgovernanceforum>



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Aushapur (V), Ghatkesar (M), Medchal – Dist. Telangana State – 501 301.

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**DEPARTMENT  
OF  
INFORMATION  
TECHNOLOGY**

**(R22 B. TECH. IT)**

**ACADEMIC YEAR: 2023-24**

**I B.TECH (IT)  
COURSE STRUCTURE  
&  
SYLLABUS**



**B.TECH. INFORMATION TECHNOLOGY**  
**EFFECTIVE FROM ACADEMIC YEAR 2023 - 24 ADMITTED BATCH**  
**R22 COURSE STRUCTURE AND SYLLABUS**

**I YEAR I – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1	22BS1111	Matrices and Calculus	3	1	0	4
2	22BS1113	Applied Physics	3	1	0	4
3	22CS1113	Programming for Problem Solving	3	0	0	3
4	22ME1156	Engineering Workshop	0	1	3	2.5
5	22HS1112	English for Skill Enhancement	2	0	0	2
6	22CS1156	Elements of Computer Science & Engineering	0	0	2	1
7	22BS1153	Applied Physics Laboratory	0	0	3	1.5
8	22CS1153	Programming for Problem Solving Laboratory	0	0	2	1
9	22HS1152	English Language and Communication Skills Laboratory	0	0	2	1
10	22MC0002	Environmental Science	3	0	0	0
11	22MC0001	Induction Program				
		<b>Total</b>	<b>14</b>	<b>3</b>	<b>12</b>	<b>20</b>

**I YEAR II – SEMESTER**

S. No.	Course Code	Course Title	L	T	P	Credits
1	22BS1211	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	22BS1212	Engineering Chemistry	3	1	0	4
3	22ME1255	Computer Aided Engineering Graphics	1	0	4	3
4	22EE1214	Basic Electrical Engineering	2	0	0	2
5	22EC1215	Electronic Devices and Circuits	2	0	0	2
6	22CS1251	Python Programming Laboratory	0	1	2	2
7	22BS1252	Engineering Chemistry Laboratory	0	0	2	1
8	22EE1254	Basic Electrical Engineering Laboratory	0	0	2	1
9	22IT1255	IT Workshop	0	0	2	1
		<b>Total</b>	<b>11</b>	<b>3</b>	<b>12</b>	<b>20</b>



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**R22 B.Tech**

**IT**

**2023-2024**

**I Year – I Semester**





## 22BS1111-MATRICES AND CALCULUS

I B Tech. I Semester

L T P C  
3 1 - 4

**Prerequisite(s):** Mathematical knowledge at Pre university level.

**Course Objectives:** Develop ability to learn the concept of

1. Rank of the matrix and apply the same to know the consistency for the linear system of equations.
2. Eigen values and Eigen vectors to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems, Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and Finding maxima and minima of function of two and three variables.
5. Evaluation of multiple integrals and their applications.

**Course Outcomes:** After successful completion of this course, the student should be able to

1. Write the matrix representation of a set of linear equations, find the rank and apply the same to analyse the solution of the system of equations.
2. Reduce the quadratic form to canonical form using orthogonal transformations by finding Eigenvalues and Eigen vectors.
3. Solve the applications on the mean value theorems, Evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/ without constraints using partial differentiation.
5. Evaluate the multiple integrals and apply the concept to find areas and volumes.

### UNIT - I: MATRICES

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

### UNIT - II: EIGEN VALUES AND EIGEN VECTORS

Linear Transformation and Orthogonal Transformation: Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

### UNIT - III: CALCULUS

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series (without proof). Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates for known curves (circle, parabola, ellipse), Definition of Improper Integral: Beta and Gamma functions and their applications.

### UNIT - IV: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)



Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

#### **UNIT-V: MULTIVARIABLE CALCULUS (INTEGRATION)**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form for known curves (circle, parabola, ellipse), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.



## 22BS1113: APPLIED PHYSICS

**B. Tech. I Year I Sem**

**L T P C**  
**3 1 0 4**

### **Course Objectives:**

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibers.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering applications.
3. Explore the fundamental properties of dielectric, magnetic and energy materials for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

### **UNIT-I: QUANTUM PHYSICS AND SOLIDS**

**Quantum Mechanics:** Introduction to quantum physics, blackbody radiation, Wein's and Rayleigh-Jean's law, Planck's radiation law (Qualitative) –photo electric effect de-Broglie hypothesis and matter waves-Davisson and Germer experiment–Heisenberg uncertainty principle–Born interpretation of the wave function–time independent Schrodinger wave equation-particle in one dimensional potential box.

**Solids:** Free electron theory (Drude & Lorentz, Sommerfeld)(Qualitative) Bloch's theorem-Kronig-Penney model(Qualitative) origin of energy bands-classification of solids.

### **UNIT- II: SEMICONDUCTORS AND DEVICES**

Intrinsic and extrinsic semiconductors–Hall effect- direct and indirect band gap semiconductors-construction, principle of operation and characteristics of P-N Junction diode, Zener diode and bipolar junction transistor(BJT)–LED, PIN diode, avalanche photo diode(APD) and solar cells, their structure, materials, working principle and characteristics.



### UNIT- III: DIELECTRIC AND MAGNETIC AND ENERGY MATERIALS

**Dielectric Materials:** Basic definitions-types of polarizations (qualitative)-ferroelectric, piezoelectric, and pyroelectric materials.

**Magnetic Materials:** Basic definitions – classification of Magnetic materials – Domain theory of ferromagnetism in hysteresis - soft and hard magnetic materials - magnetostriction, magneto-resistance.

**Energy Materials:** Conductivity of liquid and solid electrolytes-super ionic conductors- materials and electrolytes for super capacitors.

### UNIT-IV: NANOTECHNOLOGY

Nanoscale, quantum confinement, surface to volume ratio. **Bottom-up fabrication:** sol-gel, precipitation, combustion methods. **Top-down fabrication:** ball milling-physical vapor deposition (PVD)-chemical vapor deposition (CVD)-characterization techniques - XRD, SEM & TEM- applications of nanomaterials.

### UNIT-V: LASER AND FIBEROPTICS

**Lasers:** Laser beam characteristics-three quantum processes-Einstein coefficients and their relations- lasing action –pumping methods, CO<sub>2</sub> laser, Nd: YAG laser-semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber-advantages of optical Fibers-total internal reflection-construction of optical fiber-acceptance angle-numerical aperture-classification of optical fibers-losses in optical fiber-optical fiber for communication system-applications.

#### TEXTBOOKS:

1. M.N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy "A Text book of Engineering Physics"- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication, 2019
3. Semiconductor Physics and Devices-Basic Principle–Donald A, Neamen, Mc Graw Hill, 4<sup>th</sup> Edition, 2021.
4. B. K .Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2<sup>nd</sup> Edition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1<sup>st</sup> Edition, 2021.

#### REFERENCE BOOKS:



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1. Quantum Physics, H.C. Verma, TBS Publication, 2<sup>nd</sup> Edition 2012.
2. Fundamentals of Physics–Halliday, Resnick and Walker, John Wiley & Sons, 11<sup>th</sup> Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid-State Physics, S.L. Gupta and V.Kumar, Pragathi Prakashan, 2019.
5. A. K. Bhandhopadhyaya -Nano Materials, New Age International, 1<sup>st</sup> Edition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1<sup>st</sup> Edition, 2022.

R22-B.TECH-IT  
CSE



## 22CS1113: PROGRAMMING FOR PROBLEM SOLVING

I B.Tech. I Semester

L T P C

3 0 0 3

### Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems.
5. To learn the fundamentals of searching and sorting.

### Course Outcomes: The student will learn

1. To write algorithms and to draw flowcharts for solving problems, To convert the algorithms/flowcharts to C programs.
2. To code and test a given logic in the C programming language.
3. To decompose a problem into functions and to develop modular reusable code.
4. To use arrays, pointers, strings and structures to write C programs.
5. To implement Searching and sorting problems.

## UNIT - I: INTRODUCTION TO PROGRAMMING

Compilers, compiling and executing a program.

**Representation of Algorithm** - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number  
Flowchart/Pseudo code with examples, Program design and structured programming

**Introduction to C Programming Language:** variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, **Operators:** Ternary operator, Bitwise operations: Bitwise AND, OR, XOR and NOT operators, expressions and precedence, Expression evaluation, type conversion.

**Conditional Branching and Loops:** Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, goto, Iteration with for, while, do- while loops

**I/O:** Simple input and output with scanf() and printf(), formatted I/O.

## UNIT - II: ARRAYS AND FUNCTIONS

**Arrays:** one and two dimensional arrays, creating, accessing and manipulating elements of arrays.

**Functions:** Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions.

**Storage classes:** auto, extern, static and register.

**Recursion:** Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Some C standard functions and libraries.

## UNIT - III: POINTERS, STRINGS & STRUCTURES.

**Pointers:** Idea of pointers, Defining pointers, usage of self-referential structures in linked list (no



implementation), passing pointers to functions, idea of call by reference.

**Strings:** Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen( ), strcat( ), strcpy( ), strstr( ) etc.), arrays of strings

**Structures:** Defining structures, initializing structures, unions, Array of structures  
Pointers to Arrays and Structures, Use of Pointers in self-referential structures,  
Enumeration data type.

#### **UNIT - IV: FILE HANDLING IN C, PREPROCESSOR COMMANDS**

**Files:** Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek( ), ftell( ) and rewind( ) functions.

**Preprocessor Commands:** Commonly used Preprocessor commands like File inclusion, macros substitution, conditional compilation (include, define, undef, if, ifdef, ifndef )  
Introduction to stdin, stdout and stderr. Command line arguments

#### **UNIT - V: SEARCHING AND SORTING TECHNIQUES:**

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms).

#### **TEXT BOOKS:**

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

#### **REFERENCE BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming



**22ME1156: ENGINEERING WORKSHOP**

**B.Tech. I Year I Sem.**

**L T P C**  
**0 1 3 2.5**

**Pre-requisites:** Practical skill

**Course Objectives:**

1. To Study about different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

**Course Outcomes:** At the end of the course, the student will be able to:

1. CO1: Study and practice on machine tools and their operations
2. CO2: Practice on manufacturing of components using work shop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. CO4: Apply basic electrical engineering knowledge for house wiring practice.
5. CO 5: Study and Practice of arc welding process

**1. TRADES FOR EXERCISES:**

**At least two exercises from each trade:**

- I. Carpentry—(T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting—(V-Fit, Dovetail Fit & Semi-circular fit)
- III. Tin-Smithy—(Square Tin, Rectangular Tray & Conical Funnel)
- IV. Foundry—(Preparation of Green Sand Mould using Single Piece and split Pattern)
- V. Welding Practice—(Arc Welding & Gas Welding)
- VI. House-wiring—(Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy—(Round to Square, Fan Hook and S-Hook)

**2. TRADES FOR DEMONSTRATION & EXPOSURE:**

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

**TEXT BOOKS:**

1. Work shop Practice/B. L. Juneja/Cengage
2. Work shop Manual/K. Venugopal/Anuradha.

**REFERENCE BOOKS:**

1. Work shop Manual-P. Kannaiah/K.L. Narayana/Scitech
2. Work shop Manual/Venkat Reddy/BSP





**22HS1112: ENGLISH FOR SKILL ENHANCEMENT**

**B.Tech. I Year I Sem.**

**L T P C**

**2 0 0 2**

**Course Objectives:** This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Learn remedial and functional grammar related to various grammar items.
4. Prepare the students for examinations such as IELTS and TOEFL by sharpening their reading and writing skills
5. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.

**Course Outcomes:** Students will be able to:

1. Use a wide range of vocabulary and sentence structures and also acquire basic proficiency in reading and writing modules of English.
2. Choose appropriate vocabulary and sentence structures for their oral and written communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills from the known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

**UNIT-I**

Chapter entitled '*Toasted English*' by **R. K. Narayan** from "*English: Language, Context and Culture*" published by Orient BlackSwan, Hyderabad.

**Vocabulary:** The Concept of Word Formation – The Use of Prefixes and Suffixes- Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance – Techniques for Effective Reading.

**Writing:** Sentence Structures – Use of Phrases and Clauses in Sentences–Importance of Proper Punctuation – Techniques for Writing precisely–Paragraph Writing– Types, Structures and Features of a Paragraph - Creating Coherence- Organizing Principles of Paragraphs in Documents.

**UNIT-II**

Chapter entitled '*Appro JRD*' by **Sudha Murthy** from "*English: Language, Context and Culture*" published by Orient BlackSwan, Hyderabad.

**Vocabulary:** Words Often Misspelt-Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading–Skimming and Scanning–Exercises for Practice

**Writing:** Nature and Style of Writing-Defining/Describing People, Objects, Places and Events



### UNIT-III

Chapter entitled ‘**Lessons from Online Learning**’ by **F.Haider Alvi, Deborah Hurstetal** from “**English: Language, Context and Culture**” published by Orient BlackSwan, Hyderabad.

**Vocabulary:** Words Often Confused – Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading–Intensive Reading and Extensive Reading–Exercises for Practice.

**Writing:** Format of a Formal Letter – Writing Formal Letters e.g. Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

### UNIT-IV

Chapter entitled ‘**Art and Literature**’ by **Abdul Kalam** from “**English: Language, Context and Culture**” published by Orient BlackSwan, Hyderabad.

**Vocabulary:** Standard Abbreviations in English

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Exercises for Practice

**Writing:** Writing Practices – Essay Writing – Writing Introduction and Conclusion – Précis Writing.

### UNIT-V

Chapter entitled ‘**Go, Kiss the World**’ by **Subroto Bagchi** from “**English: Language, Context and Culture**” published by Orient BlackSwan, Hyderabad.

**Vocabulary:** Technical Vocabulary and their Usage

**Grammar:** Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

**Reading:** Reading Comprehension – Exercises for Practice

**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

**Note:** *Listening and Speaking Skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.*

- **Note: 1.** As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is **Open-ended**, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.
- **Note: 2.** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents. They are advised to teach 40 percent of each topic from the syllabus in blended mode.

### TEXT BOOK:



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1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad.2022. Print.

**REFERENCE BOOKS:**

1. Effective Academic Writing by Liss and Davis(OUP)
2. Richards, Jack C.(2022)Interchange Series. Introduction,1,2,3.Cambridge University Press
3. Wood, F.T.(2007).Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha.(2018).Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2<sup>nd</sup> ed.,). Sage Publications India Pvt. Ltd.
5. (2019). Technical Communication. Wiley India Pvt. Ltd.
6. Vishwamohan, Aysha.(2013).English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael.(2016).Practical English Usage.Oxford University Press.Fourth Edition.

R22-B.TECH-IT  
CSE



**22CS1156: ELEMENTS OF COMPUTER SCIENCE AND ENGINEERING**

**I B.Tech. I Semester**

**L T P C**  
**0 0 2 1**

**Course Objective:**

1. To learn the fundamentals of computers.
2. To provide an overview of the subjects of computer science and engineering.
3. To learn the operating system, database management system, computer networks.
4. To understand the software development process.
5. To learn the various autonomous system

**Course Outcomes:**

1. Know the working principles of functional units of a basic Computer
2. Understand program development, the use of data structures and algorithms in problems solving.
3. Know the need and types of operating system, data base systems.
4. Understand the significance of networks, internet, WWW and cybersecurity.
5. Understand Autonomous systems, the application of artificial intelligence.

**UNIT-I**

**BASICS OF A COMPUTER** – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, applications software, packages, frameworks, IDEs.

**UNIT-II**

**SOFTWARE DEVELOPMENT** – waterfall model, Agile, Types of computer languages – Programming, markup, scripting, Program development steps, flowcharts, algorithms, data structures – definition, types of data structures

**UNIT-III**

**OPERATING SYSTEMS:** Functions of operating systems, types of operating systems, Device & Resource management

**Database Management Systems:** Data models, RDBMS, SQL, Database Transactions, data centers, cloud services

**UNIT-IV**

**COMPUTER NETWORKS:** Advantages of computer networks, LAN, WAN, MAN, internet, WiFi, sensor networks, vehicular networks, 5G communications.

WorldWideWeb–Basics, role of HTML, CSS, XML, Tools for web designing, social media, online social networks.

Security–information security, cyber security, cyber laws

**UNIT-V**

**AUTONOMOUS SYSTEMS:** IoT, Robotics, Drones, Artificial Intelligence–Learning, Game Development, natural language processing, image and video processing, Cloud Basics.



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**TEXTBOOK:**

1. Invitation to Computer Science, G.Michael Schneider, Macalester College, Judith L.Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

**REFERENCEBOOKS:**

1. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
2. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.
3. Computer Fundamentals, Anita Goel, Pearson Education India, 2010.
4. Elements of computer science, Cengage.

R22-B.TECH-IT  
CSE



**22BS1153: APPLIED PHYSICS LABORATORY**

**B. Tech. I Year I Sem**

**L T P C**

**0 0 3 1.5**

**Course Objectives:** The objectives of this course for the student to

1. Capable of handling instruments related to the Hall effect and photo electric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
3. Understand the method of least square fitting
4. Study the behavior of B-H curve of ferromagnetic materials.
5. Study the behavior of passive components.

**Course Outcomes:** At the end of this course, the students will be able to

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Carried out data analysis
4. Understand the variation of magnetic field and behavior of hysteresis curve.
5. Learn the characteristics of passive components like L, C and R and their applications.

**LIST OF EXPERIMENTS:** Any 8 experiments are to be performed

1. Understanding the method of least squares– torsional pendulum as an example.
2. Determination of work function and Planck's constant using photoelectric effect.
3. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
4. Characteristics of series and parallel LCR circuits.
5. V-I characteristics of a p-n junction diode and Zener diode
6. Input and output characteristics of BJT(CE, CB & CC configurations)
7. a). V-I and L-I characteristics of light emitting diode (LED)b). V-I characteristics of a Laser diode
8. V-I Characteristics of solar cell
9. a). Determination of the beam divergence of the given LASER beam  
b). Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
10. Determination of Energy gap of a semiconductor.
11. Determination of time constant of RC Circuit.
12. Study B-H curve of a magnetic material.

**REFERENCEBOOK:**

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"-S Chand Publishers, 2017.



## 22CS1153: PROGRAMMING FOR PROBLEM SOLVING LAB

I B.Tech. I Semester

L T P C  
0 0 2 1

### Course Objectives:

1. To learn C-language Programs using the data types, input/ output statements and control statements.
2. Describe the importance of modular programming and arrays using C-Language Program.
3. Understand the concept and use of pointers for memory management techniques
4. Understand structure, union, and enumerated types.
5. Understand the basic characteristics of text, binary files and C implementation of file I/O using streams.

### Course Outcomes:

1. Ability to design and test programs to solve mathematical and scientific problems.
2. Ability to write structured programs using control structures and functions.
3. Able to Implement C programs using arrays & pointers.
4. Able to Use the type definition, enumerated types, define and use structures, unions in programs using C language.
5. Able to execute programs that read and write text, binary files using the formatting and character I/O functions.

### EXPERIMENTS

#### WEEK-1:

- a. Write a C program to find simple interest and compound interest.
- b. Write a C program to convert Celsius to Fahrenheit.
- c. Write a C Program to swap two numbers.
- d. Write a C program to perform all arithmetic operations (+, -, \*, /, %).
- e. Write a simple program that prints the results of all the operators available in C (Including pre/ post increment, bitwise and/or/not, etc.). Read required operand Values from standard input.

#### WEEK-2:

- a. Write a simple program that converts one given data type to another using auto Conversion and casting. Take the values from standard input.
- b. Write a C program to check whether the given number is even or odd using Conditional Operator.
- c. Write a C program to find the Largest of two numbers.
- d. Write a C program to print ascending order of three given integers.

#### WEEK-3:

- a. Write a C program to Check the given year is leap year or not.
- b. Write a C program to find the roots of quadratic equation.
- c. Write a C Program to implement arithmetic calculator using switch case.
- d. Write a program that declares Class awarded for a given percentage of marks,



where (use else if ladder and switch)  $<40\%$  = Failed,  $40\%$  to  $<60\%$  = Second class,  $60\%$  to  $<70\%$  = First class,  $\geq 70\%$  = Distinction. Read percentage from standard input.

**WEEK-4:**

- a. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:  
5 x 1 = 5  
5 x 2 = 10  
5 x 3 = 15
- b. Write a program that shows the binary equivalent of a given positive number between 0 and 255.
- c. Write a C program to find sum of individual digits of the given integer.
- d. Write a C program to find factorial of a given number.

**WEEK-5:**

- a. Write a program that finds if a given number is a prime number
- b. Write a C program to check whether the given number is palindrome or not.
- c. Write a C program to print Fibonacci series.
- d. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:  $1+x+x^2+x^3+\dots+x^n$ .

For example: if n is 3 and x is 5, then the program computes  $1+5+25+125$ .

**WEEK-6:**

- a. Write a C program to calculate the following, where x is a fractional value.  
 $1-x/2 +x^2/4-x^3/6$ .
- b. Write a C program to display the prime numbers from 1 to n (where n value is Given by user)
- c. Write a C program to construct a pyramid of numbers as follows:

```
1          *          1          1          *
1 2        * *        2 3        2 2        * *
1 2 3      * * *      4 5 6      3 3 3      * * *
                                     4 4 4 4      * *
                                                         *
```

- d. Write a C program to construct the Pascal triangle

**WEEK-7:**

- a. Write a C program to find largest, smallest numbers and average in a list of array elements.
- b. Write a C program to find mean, variance, standard deviation for a given list of elements.
- c. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.





**WEEK-8:**

- a. Write a C program to transpose a matrix.
- b. Write a C program to perform the Addition of Two Matrices.
- c. Write a C program to perform the Multiplication of Two Matrices.

**WEEK-9:**

Write programs using non recursive and recursive functions for the following

- a. Find GCD.
- b. Find the factorial of a given number.
- c. Generate the Fibonacci series.
- d. Find  $x^n$

**WEEK-10:**

- a. Write a C program to swap two integers using following methods.
  - i. call by value
  - ii. call by reference
- b. Write a program for reading elements using a pointer into an array and display the Values using array.
- c. Write a program for display values reverse order from an array using a pointer.
- d. Write a program through a pointer variable to sum of n elements from an array.

**WEEK-11:**

- a. Write a C program to insert a sub-string into a given main string from a given position.
- b. Write a C program to delete n characters from a given position in a given string.
- c. Write a C program to arrange given n strings in alphabetical order.
- d. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.

**WEEK-12:**

- a. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
- b. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba etc.)
- c. Write a C program that displays the position of a character ch in the string S or - 1 if S doesn't contain ch.
- d. Write a C program to count the lines, words and characters in a given text.

**WEEK-13:**

- a. Write a C program to find total and average marks for five subjects of three students using structures.
- b. Write a C program to demonstrate nested structures.
- c. Write a C program to display the contents of a file to standard output device.
- d. Write a C program which copies one file to another into another file.
- e. Write a C program to merge two files into a third file.  
(i.e., the contents of the first file followed by those of the second are put in the third file)



**WEEK-14:**

- a. Write a C program to reverse the contents of a file.
- b. Write a C program that does the following:  
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)  
Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek () function)  
The program should then read all 10 values and print them back.
- c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
- d. Write a C program that uses non recursive function to search for a Key value in a Given list of integers using linear search method.
- e. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.

**WEEK-15:**

- a. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
- b. Write a C program that sorts the given array of integers using selection sort in
- c. descending order Write a C program that sorts the given array of integers using insertion sort in ascending order

**TEXT BOOKS:**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Computer Programming in C, V. Rajaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMH Publishers.
4. C Programming, M.V.S.S.N.Prasad, ACME Learning Pvt. Ltd.
5. C and Data Structures, N.B.Venkateswarlu and E.V.Prasad,S.Chand Publishers
6. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publishers.



## 22HS1152: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

**B.Tech. I Year I Sem.**

**L T P C**

**0 0 2 1**

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

### **Course Objectives:**

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions and interviews.

### **Course Outcomes:** Students will be able to:

1. Make use of various online and web resources for independent language learning.
2. Understand the nuances of English language through audio-visual experience and group activities.
3. Neutralize their accent for intelligibility for enabling them to communicate with a global audience.
4. Speak with clarity and confidence which in turn improves their academic performance in the other courses.
5. Face and interact with various stakeholders leading to the enhancement of their employability skills.

### **Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:**

- a. Computer Assisted Language Learning (CALL) Lab**
- b. Interactive Communication Skills(ICS)Lab**

### **Listening Skills:**

#### **Objectives**

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend



thespeech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.*

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

### **Speaking Skills:**

Objectives

1. To involve students in speaking activities in various contexts
  2. To enable students express themselves fluently and appropriately in social and professional contexts
- Oral practice
  - Describing objects/situations/people
  - Role play–Individual/Group activities
  - Just A Mine(JAM)Sessions

The following course contents prescribed for the **English Language and Communication Skills**

#### **Lab.Exercise–I**

##### **CALL Lab:**

*Understand:* Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. *Practice:* Introduction to Phonetics–Speech Sounds–Vowels and Consonants– Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker- *Testing Exercises*

##### **ICS Lab:**

*Understand:* Spoken vs. Written language – Formal and Informal English.

*Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave

– Introducing Oneself and Others.

#### **Exercise**

##### **–ICALL**

##### **Lab:**

*Understand:* Structure of Syllables–Word Stress–Weak Forms and Strong Forms– Stress pattern in sentences – Intonation.

*Practice:* Basic Rules of Word Accent – Stress Shift-Weak Forms and Strong Forms – Stress pattern in sentences – Intonation - *Testing Exercises*

##### **ICS Lab:**

*Understand:* Features of Good Conversation–Strategies for Effective Communication.

*Practice:* Situational Dialogues–Role Play – Expressions in Various Situations–Making Requests and Seeking Permissions - Telephone Etiquette.



**Exercise-**

**III CALL**

**Lab:**

*Understand:* Errors in Pronunciation – Neutralising Mother Tongue Interference (MTI).

*Practice:* Common Indian Variants in Pronunciation–Differences between British and American Pronunciation -*Testing Exercises*

**ICS Lab:**

*Understand:* Descriptions – Narrations – Giving Directions and Guidelines–Blog Writing

*Practice:* Giving Instructions–Seeking Clarifications–Asking for and Giving Directions–Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

**Exercise–**

**IV CALL**

**Lab:**

*Understand:* Listening for General Details.

*Practice:* Listening Comprehension Tests-*Testing Exercises*

**ICS Lab:**

*Understand:* Public Speaking–Exposure to Structured Talks-Non-verbal Communication-Presentation Skills.

*Practice:* Making a Short Speech–Extempore – Making a Presentation.

**Exercise–**

**V CALL**

**Lab:**

*Understand:* Listening for Specific Details.

*Practice:* Listening Comprehension Tests – *Testing Exercises*

**ICS Lab:**

*Understand:* Group Discussion

*Practice:* Group Discussion

**Minimum Requirement of infrastructural facilities for ELCS Lab:**

**1. Computer Assisted Language Learning (CALL) Lab:**

**The Computer Assisted Language Learning Lab** has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

**System Requirement (Hard ware component):**

*Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:*

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones



## 2. Interactive Communication Skills(ICS)Lab:

**The Interactive Communication Skills Lab:** A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V. or LCD, a digital stereo – audio & video system and camcorder etc.

### Source of Material (Master Copy):

- *Exercises in Spoken English. Part 1, 2, 3.* CIEFL and Oxford University Press

**Note:** Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

### Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10<sup>th</sup> Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

### REFERENCE BOOKS:

1. (2022). *English Language Communication Skills–Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A work book*. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Work book*. Oxford University Press
4. Board of Editors. (2016). *ELCS Lab Manual: A Work book for CALL and ICS Lab Activities*. Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press.



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**22MC0001: INDUCTION PROGRAM**

R22-1 B.TECH-IT  
CSE



**22MC0002: ENVIRONMENTAL SCIENCE**

**I B.Tech. I Semester**

**L T P C**  
**3 0 0 0**

**Course Objectives:**

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

**Course Outcomes:**

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

**UNIT - I**

**ECOSYSTEMS:** Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

**UNIT - II**

**NATURAL RESOURCES: CLASSIFICATION OF RESOURCES:** Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

**UNIT - III**

**BIODIVERSITY AND BIOTIC RESOURCES:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

**UNIT - IV**

**ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES:** **Environmental Pollution:** Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution**





**control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

#### **UNIT - V**

**ENVIRONMENTAL POLICY, LEGISLATION & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

#### **TEXT BOOKS:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

#### **REFERENCE BOOKS:**

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4<sup>th</sup> Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.



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# **R22 B.Tech**

# **IT**

**2023-2024**

# **I Year – II Semester**

## **syllabus**



## 22BS1211- ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

I B.Tech. II Semester

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>4</b>

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives:** Develop ability to learn

1. Methods of solving the Ordinary Differential Equations of first order.
2. Methods of solving the higher order Ordinary Differential Equations.
3. Concept, properties of Laplace transforms & using the same to solve ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to vector integration.

**Course outcomes:** After successful completion of this course, student should be able to

1. Identify the type of first order Ordinary Differential Equation and solve them by appropriate method.
2. Apply the concept of higher order Ordinary Differential Equations to solve real world problems.
3. Solve ordinary differential equations by using Laplace transform techniques.
4. Calculate scalar potential for a vector and directional derivative of a scalar point function using vector differentiation.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

### UNIT-I: FIRST ORDER ODE

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

### UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second and higher order linear differential equations with constant coefficients: non-Homogeneous terms of the type  $e^{ax}$ ,  $\sin bx$ ,  $\cos bx$ , polynomials in  $x^k$ ,  $ve^{ax}$  and  $x V(x)$ , method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

Applications: Electric Circuits

### UNIT-III: LAPLACE TRANSFORMS

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, second shifting theorem (without proof), Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.



#### **UNIT-IV: VECTOR DIFFERENTIATION**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

#### **UNIT-V: VECTOR INTEGRATION**

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

#### **TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> Edition,
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5<sup>th</sup> Edition, 2016.

#### **REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9<sup>th</sup> Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.



## 22BS1212- ENGINEERING CHEMISTRY

**B.Tech. I Year II Sem.**

**L T P C**  
**3 1 0 4**

### **Course Objectives:**

1. To acquire knowledge about desalination of brackish water and treatment of municipal water
2. To include the fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
4. To understand the significance of green chemistry and green synthesis and to imbibe the green chemistry principles.
5. To acquire required knowledge about engineering materials like smart materials, lubricants, and biodiesel.

### **Course Outcomes:**

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
4. The student can use real examples to illustrate how the principles of *green chemistry* can be applied to chemical process in engineering
5. They can predict potential applications of engineering materials and practical utility in order to become good engineers and entrepreneurs.

### **UNIT - I: WATER AND ITS TREATMENT:**

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation, Determination of F<sup>-</sup> ion by ion- selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

### **UNIT – II BATTERY CHEMISTRY & CORROSION**

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.



### **UNIT - III: POLYMERIC MATERIALS:**

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene **Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP). **Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

### **UNIT - IV: GREEN CHEMISTRY AND ENGINEERING FOR SUSTAINABLE DEVELOPMENT**

Definition and history of Green chemistry, Concept and principles (Prevention, Atom Economy, Less Hazardous Chemical Syntheses, Designing Safer Chemicals, Safer Solvents and Auxiliaries, Design for Energy Efficiency, Use of Renewable Feedstock, Reduce, Derivatives, Catalysis, Design for Degradation, Real-time Analysis for Pollution Prevention, Inherently Safer Chemistry for Accident Prevention) of Green Chemistry with suitable examples.

### **UNIT - V: ENGINEERING MATERIALS:**

#### **Smart materials and their engineering applications**

Shape memory materials- Poly L- Lactic acid. Thermoresponse materials- Polyacryl amides, Poly vinyl amides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**Bio Diesel:** Sources and applications of Biodiesel

#### **TEXT BOOKS:**

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning, 2016
3. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.
4. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
5. Engineering Chemistry by K Sesha Maheswaramma and Mridula Chugh, Pearson Publications.

#### **REFERENCE BOOKS:**

- 1 Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
- 2 Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)



## 22ME1255: COMPUTER AIDED ENGINEERING GRAPHICS

**B.Tech. I Year II Sem.**

**L T P C**  
**1 0 4 3**

### **Course Objectives:**

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products
3. To draw sectional views and pictorial views for various types of solids.
4. To develop the lateral surfaces of basic engineering objects
5. To impart knowledge about standard principles of orthographic projection and isometric views of different objects.

### **Course Outcomes:** At the end of the course, the student will be able to

1. Apply computer aided drafting tools to create 2D and 3D objects
2. sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids
4. Read and interpret engineering drawings
5. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

### **UNIT-I:**

**Introduction to Engineering Graphics:** Principles of Engineering Graphics and their Significance, Scales–Plain & Diagonal, Conic Sections including the Rectangular Hyperbola –General method only. Cycloid, Epi cycloid and Hypo cycloid, Introduction to Computer aided drafting–views, commands and conics

### **UNIT-II:**

**Orthographic Projections:** Principles of Orthographic Projections–Conventions–Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections–points, lines and planes

### **UNIT-III:**

Projections of Regular Solids–Auxiliary Views–Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids–sectional views

### **UNIT-IV:**

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

### **UNIT-V:**

**Isometric Projections:** Principles of Isometric Projection–Isometric Scale–Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids –







## 22EE1214 - BASIC ELECTRICAL ENGINEERING

**B.Tech. I Year II Sem.**

**L T P C**  
**2 0 0 2**

**Prerequisites:** Mathematics

### **Course Objectives:**

1. To study and understand DC circuits.
2. To study and understand Single & Three phase AC circuits.
3. To study and understand the Single Phase Transformers.
4. To study and understand the different types of DC and AC machines.
5. To have the knowledge of various electrical installations and the concept of power factor improvement.

**Course Outcomes:** After completion of this course, students will be able to

1. Analyze DC circuits using various techniques
2. Analyze Single & Three phase AC circuits
3. Discuss the working principles and estimate the performance of Single Phase Transformers
4. Discuss the Construction and working principle of different types of DC and AC machines.
5. Classify various components of Low Voltage Electrical Installations and identify the importance of power factor improvement

**UNIT-I: D.C. CIRCUITS:** Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation (Series, Parallel, Series and Parallel circuits, Nodal Analysis and Mesh Analysis). Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.

**UNIT-II: A.C. CIRCUITS:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series circuits only), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

**UNIT-III: SINGLE PHASE TRANSFORMERS:** Working Principle and construction of Transformer, Types, Ideal and practical transformer, EMF Equation, equivalent circuit, losses in transformers, regulation and efficiency.

### **UNIT-IV: ELECTRICAL MACHINES**

**D. C. Generator:** Constructional details of D C Machine, Working Principle of D C Generator, EMF Equation, Types, Numerical Problems.

**D. C. Motor:** Working Principle of D C Motor, Types, Torque Equation, Numerical Problems Performance Characteristics of dc shunt motor.

**Three Phase Induction Motor:** Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics.

**Synchronous Generator:** Construction and working of synchronous generator.



**UNIT-V: ELECTRICAL INSTALLATIONS:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption, power factor improvement.

**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.
2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

**REFERENCE BOOKS:**

- 1 P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2<sup>nd</sup> Edition, 2019.
- 2 D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
- 3 M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1<sup>st</sup> Edition, 2012.
- 4 Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2<sup>nd</sup> Edition, McGraw Hill, 2021.
- 5 L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
- 6 E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
- 7 V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989



**22EC1215: ELECTRONIC DEVICES AND CIRCUITS**

**I B.Tech. II Semester**

**L T P C**  
**2 0 0 2**

**Course Objectives:**

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of devices.
3. To know the switching characteristics of devices.
4. To know the special purpose devices such as SCR, UJT.
5. To know the MOSFET and its characteristics

**Course Outcomes: Upon completion of the Course, the students will be able to:**

1. Acquire the knowledge of various electronic devices and their use on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.
4. Know the configurations of Transistors
5. Acquire the knowledge of various device characteristics.

**UNIT - I**

**Diodes:** Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

**UNIT - II**

**Diode Applications:** Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

**UNIT - III**

**Bipolar Junction Transistor (BJT):** Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

**UNIT - IV**

**Junction Field Effect Transistor (FET):** Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

**UNIT - V**

**Special Purpose Devices:** Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

**TEXT BOOKS:**

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11<sup>th</sup> Edition, 2009, Pearson.

**REFERENCE BOOKS:**

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5<sup>th</sup>Edition, Oxford.
2. ChinmoySaha, Arindam Halder, DebaatiGanguly - Basic Electronics-Principles and Applications, Cambridge, 2018.



**22CS1251: PYTHON PROGRAMMING LABORATORY**

**I B.Tech. II Semester**

**L T P C**

**0 1 2 2**

**Course Objectives:**

1. To learn python programming language using the data types, input/ output statements.
2. To install and run the Python interpreter
3. To learn control structures.
4. To Understand Lists, Dictionaries in python
5. To Handle Strings and Files inPython

**Course Outcomes:** After completion of the course, the student should be able to

1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python
3. Verify programs using modular approach, file I/O, Python standard library
4. Implement Digital Systems using Python
5. Capable to implement on hardwareboards

Note: The lab experiments will be like the following experiment examples

**Week -1:**

1. i) Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.  
ii) Start the Python interpreter and type `help()` to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3.
  - i) Write a program to calculate compound interest when principal, rate and numbers of periods are given.
  - ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points

**Week-2:**

1. Read name, address, email and phone number of a person through keyboard and print the details.
2. Write a program to demonstrate different number data types in Python.
3. Write a program to perform different Arithmetic Operations on numbers in Python.

**Week - 3:**

1. Print the below triangle using for loop. 5

```
4 4
3 3 3
2 2 2 2
1 1 1 1 1
```



2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop

#### **Week-4:**

1. Python program to print all prime numbers in a given interval (use break)
2. Write a python script to print the current date in the following format “Sun May 29 02:26:23 IST 2017”
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

#### **Week - 5:**

1. i) Write a program to convert a list and tuple into arrays.  
ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

#### **Week - 6:**

1. Write a function called is sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2. Write a function called has a duplicate that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
  - i). Write a function called remove duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
  - ii). The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add “I”, “a”, and the empty string.
  - iii). Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'  
ii) Remove the given word in all the places in a string?  
iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

#### **Week-7:**

1. Writes a recursive function that generates all binary strings of n-bit length
2. Write a program to define a lambda function(**rev\_upper**) to convert a string to its upper-case and reverse it.
3. Write a python program to find factorial of a number using Recursion.

#### **Week - 8:**

1. i) Write a python program that defines a matrix and prints  
ii) Write a python program to perform addition of two square matrices



- iii) Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

#### **Week - 9:**

1. Write a Python program to show how to use else clause with try and except clauses
2. Write a Python Module Program to implement Arithmetic operators, Bitwise operators, Logical operators in python as functions in one module.
3. Write a python program to specify scope and Lifetime of variables in python Functions.

#### **Week-10:**

1. a. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.  
b. Add an attribute named color to your Rectangle objects and modify draw rectangle so that it uses the color attribute as the fill color.  
c. Write a function called draw point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.  
d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

#### **Week- 11**

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences

#### **Week - 12:**

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR

#### **Week - 13:**

1. Write a program to implement Half Adder, Full Adder, and Parallel Adder
2. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.
3. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

#### **Week - 14:**

1. Write a script named **copyfile.py**. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
2. Write a GUI program to create a window for calculator and implement basic



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arithmetic operations in that window.

3. Write a python program to perform addition of two matrices using NUMPY package

**TEXT BOOKS:**

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

**REFERENCE BOOKS:**

1. Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1<sup>st</sup> Ed. 2021.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python, Kenneth A. Lambert, Cengage

R22-B.TECH-IT  
CSE



**22BS1252 - ENGINEERING CHEMISTRY LABORATORY**

**B.Tech. I Year II Sem.**

**L T P C**

**0 0 2 1**

**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils.
5. Students will be able to visualize the experiments virtually for better understanding

**Course Outcomes:** The experiments will make the student gain skills on:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Able to perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Students are able to prepare polymers like bakelite and nylon-6.
4. Estimations saponification value, surface tension and viscosity of lubricant oils.
5. Can perform the experiments making use of working models

**List of Experiments:**

- I. **Volumetric Analysis:** Estimation of Hardness of water by EDTA Complexometry method.
- II. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
- III. **Potentiometry:** Estimation of the amount of  $\text{Fe}^{+2}$  by Potentiometry.
- IV. **pH Metry:** Determination of an acid concentration using pH meter.
- V. Preparations:
  1. Preparation of Bakelite.
  2. Preparation Nylon – 6.
- VI. **Lubricants:**
  1. Estimation of acid value of given lubricant oil.
  2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
- VII. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
- VIII. Virtual lab experiments
  1. Construction of Fuel cell and its working.
  2. Smart materials for Biomedical applications
  3. Batteries for electrical vehicles.
  4. Functioning of solar cell and its applications.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).





**22EE1254- BASIC ELECTRICAL ENGINEERING LABORATORY**

**B.Tech. I Year II Sem.**

**L T P C**

**0 0 2 1**

**Prerequisites:** Basic Electrical Engineering

**Course Objectives:**

1. To measure the electrical parameters for different types of DC circuits using conventional and theorems approach.
2. To measure the electrical parameters for different types of AC circuits
3. To study the transient response of various R, L and C circuits using different excitations.
4. To determine the performance of Single Phase Transformers.
5. To determine the performance of different types of DC and AC machines.

**Course Outcomes: After completion of this course, students will be able to**

1. Verify the basic conventional approach and theorems for Electrical circuits through different experiments.
2. Calculate the electrical parameters for different types of AC circuits
3. Analyze the transient responses of R, L and C circuits for different input conditions.
4. Evaluate the performance calculations of Single Phase Transformers through various testing methods.
5. Evaluate the performance calculations of DC and AC machines through various testing methods.

**List of experiments/demonstrations:**

**PART- A (compulsory)**

1. Verification of KVL and KCL
2. Verification of Thevenin's theorem
3. Verification of Norton's theorem
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series
6. Circuits.
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
8. Performance Characteristics of a DC Shunt Motor
9. Torque-Speed Characteristics of a Three-phase Induction Motor.

**PART-B (any two experiments from the given list)**

1. Verification of Superposition theorem
2. Transient Response of Series RL and RC circuits for DC excitation
3. Load Test on Single Phase Transformer (Calculate Efficiency)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. No-Load Characteristics of a Three-phase Alternator

**TEXT BOOKS:**

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4<sup>th</sup> Edition, 2019.



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2. MS Naidu and S Kamakshaiah, “Basic Electrical Engineering”, Tata McGraw Hill, 2<sup>nd</sup> Edition, 2008.

#### **REFERENCE BOOKS:**

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, ”Basic Electrical Engineering”, S. Chand, 2<sup>nd</sup> Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1<sup>st</sup> Edition, 2012.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2<sup>nd</sup> Edition, McGraw Hill, 2021.
5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

R22-B.TECH-IT  
CSE



**22IT1255: IT WORKSHOP**

**I B.Tech. II Semester**

**L T P C**

**0 0 2 1**

**Course Objectives:** The IT Workshop for engineers is a training lab course spread over 60 hours.

1. The modules include training on PC Hardware, Internet & World Wide Web
2. To learn Hardware troubleshooting.
3. To understand the productivity tools including Word, Excel, PowerPoint and Publisher.
4. To learn the Safeguard computer systems from viruses/worms
5. To learn the LaTeX and Word.

**Course Outcomes:**

1. Perform Hardware troubleshooting
2. Understand Hardware components and inter dependencies
3. Safeguard computer systems from viruses/worms
4. Document/ Presentation preparation
5. Perform calculations using spreadsheets

**PC Hardware**

**Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Internet & World Wide Web**

**Task1: Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.



**Task 2: Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task 3: Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

**Task 4: Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms, PGF(ref.9) Case study of Wayback Machine web robot for Cyberforensics for Secure Digital India

### **LaTeX and WORD**

**Task 1 – Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 2: Using LaTeX and Word** to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Task 3: Creating project abstract** Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Task 4: Creating a Newsletter:** Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

### **EXCEL**

**Excel Orientation:** The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text



**Task 2 : Calculating GPA** - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

**Task 3:** Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

### **POWERPOINT**

**Task 1:** Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

**Task 2:** Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

**Task 3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides. Prepare and demonstrate (.ppt file) for the “Call to the Nation” quotations under "Faith and Strength", "Education and Society", "Powers of the Mind", "Man: The Maker of his Own Destiny", "India: Our Motherland" from the sources

<https://sites.google.com/view/chandraksekharaiyah/call-to-the-nation-book>

[https://www.ramakrishnavivekananda.info/vivekananda/complete\\_works.htm](https://www.ramakrishnavivekananda.info/vivekananda/complete_works.htm)

### **REFERENCE BOOKS:**

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*
3. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education*.
4. PC Hardware - A Handbook – Kate J. Chase *PHI* (Microsoft)
5. LaTeX Companion – Leslie Lamport, *PHI/Pearson*.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – *CISCO Press, Pearson Education*.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan  
– *CISCO Press, Pearson Education*.
8. "Swami Vivekananda - Call to the Nation", ISBN: 978-81-7505-018-1.  
<http://sites.google.com/view/pgovernanceforum>