# Vignana Bharathi Institute of Technology, Aushapur, Ghatkesar **B.** Tech Civil Engineering Course Structure and Syllabus – R22

#### **III YEAR I SEMESTER**

S. No.	Course	Course Title	L	Τ	Р	Credits
	Code					
1.	22CE3111	Structural Engineering -I (RCC)	3	1	0	4
2.	22CE3112	Geotechnical Engineering	3	0	0	3
3.	22MB3113	Business Economics & Financial Analysis	3	0	0	3
4.	22CE3114	Transportation Engineering	3	0	0	3
5.	22CE3115	Water Resources Engineering	3	0	0	3
6.	22CE3151	Transportation Engineering Laboratory	0	0	3	1.5
7.	22CE3152	Geotechnical Engineering Laboratory	0	0	3	1.5
8.	22HS3151	Advanced English Communication Skills	0	0	2	1
		Laboratory				
9.	22MC0005	Intellectual Property Rights	3	0	0	0
		Total Credits	18	1	8	20
III YEAR	<b>II SEMESTER</b>					

#### **III YEAR II SEMESTER**

S. No	Course	Course Title	L	Т	Р	Credits
	Code					
1.	22CE3211	Environmental Engineering	3	0	0	3
2.	22CE3212	Foundation Engineering	3	0	0	3
3.	22CE3213	Structural Engineering -II (Steel Structures)	3	0	0	3
4.		Professional Elective – I				
	22CE3271	Sustainable Construction Technology				
	22CE3272	Structural Analysis-II	3	0	0	3
	22CE3273	Air Pollution and Control				
5.		Professional Elective – II	3	0	0	3
	22CE3274	Prestressed Concrete				
	22CE3275	Disaster Management				
	22CE3276	Traffic Engineering				
6.		Open Elective - I	3	0	0	3
7.	22CE3251	Environmental Engineering Laboratory	0	0	2	1
8.	22CE3252	Computer Aided Analysis & Design Laboratory	0	0	2	1
9.	*22MC0002	Environmental Science	3	0	0	0
		Total Credits	21	0	4	20

\*Environmental Science in III Year II Sem Should be Registered by Lateral Entry Students Only.

# 22CE3111: STRUCTURAL ENGINEERING -I (RCC)

B.Tech. III Year I Sem	L	Т	Р	С
Pre-requisite: SOM, SA & CT	3	1	-	4

Course Objectives: The objectives of the course are to

- Acquire knowledge about various design philosophies theory and application of analysis and design of reinforced concrete structures.
- Evaluate the behaviour of RC member under flexure, Shear, torsion and bond.
- Understand various slabs design by using codal Provisions given in IS 456:2000.
- Understand the behaviour of RC member under compression loading, design suitable columnssections.
- Understand the types of footings, design different sections of footings.

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

- Design the singly reinforced, doubly reinforced and flanged sections under flexure.
- Design the singly reinforced, doubly reinforced and flanged sections under Shear, torsion andbond.
- Distinguish and Design the one-way, two-way slabs and Dog legged staircase.
- Design the axially loaded, uniaxial and biaxial bending columns.
- Classify the footings and Design the isolated square, rectangular and circular footings.

## UNIT –I

Design philosophies-Working Stress Method (WSM), Ultimate Load Method (ULM), and Limit State Method (LSM) – Material - Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS 456:2000 codal provisions.Limit state analysis and design of singly reinforced, doubly reinforced, Flanged sections- Tand L beamsections.

## UNIT – II

Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length along with I.S. code provisions. Limit state of serviceability for deflection and cracking.

Design of cantilever, simply supported and continuous beams with detailing.

# UNIT – III

Design of one-way slab, Two-ways slabs and continuous slab Using IS Coefficients, Design of doglegged staircase.

## $\mathbf{UNIT} - \mathbf{IV}$

Design of axially loaded Short rectangular and circular columns, Design of columns under uniaxialbending and bi-axial bending using SP-16 charts.

## UNIT - V

Different types of footings, design loads for foundation, Design of isolated-Square, rectangular and circular footings

# **TEXT BOOKS:**

- 1. Reinforced concrete design by S. Unnikrishna Pillai & Devdas Menon, Tata McGraw Hill,NewDelhi.
- 2. Reinforced Concrete Design: Principles and Practice N. Krishna Raju and R.N.Pranesh.New age International Publishers, New Delhi, 4th Edition, 2018.
- 3. Limit state designed of reinforced concrete P. C. Varghese, Prentice Hall of India, NewDelhi.

# **REFERENCES:**

- 1. Reinforced concrete design by N. Subrahmanian Oxford University Press.
- 2. B.C.Punmia, Ashok Kumar Jain and Arun Kumar —Reinforced concrete structures, Vol.1,Laxmi publications Pvt. Ltd., 3rd Edition,2011.
- 3. P. Purushotham Reinforced concrete structural elements-behaviour, Analysis and design, Tata Mc. Graw-Hill, 3rdEdition, 2014.
- 4. Design of Reinforced Concrete Structures by I. C. Syal and A. K. Goel, S. Chand & company.
- 5. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers
- 6. Design of concrete structures Arthus H. Nilson, David Darwin, and Chorles W. Dolar, TataMcGraw-Hill, 3rd Edition, 2005
- 7. M.L. Gambhir Fundamentals of Reinforced concrete design, Printice Hall of India PrivateLtd., New Delhi, 3rd Edition, 2006.

# CODE BOOKS

- 1. IS 456 : 2000 Plain and Reinforced Concrete-Code of Practice
- 2. SP-16 Design Aids for Reinforced Concrete

#### **B.Tech. III Year I**

#### **Pre-requisite: EG**

#### Objectives: To

- Understand the formation of soil and Index properties of soils.
- Determine the flow characteristics & effective stresses of soils.
- Determine the stresses and compaction characteristics in soil due to externally applied loads.
- Estimate the consolidation properties of soils.
- Estimate the shear strength property of soils.

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

- Characterize and classify the soils.
- Estimate seepage, effective stress, flow net characteristics of soil.
- Estimate stresses and compaction characteristics under various loading conditions.
- Analyze the compressibility characteristics of the soils.
- Analyze the shear strength of soil under various drainage conditions.

#### UNIT – I

**Introduction:** Soil formation and structure – moisture content, Three-phase system, volumetric relationships, Volume-mass-weight relationship – Specific Gravity - Field density by core cutter and sand replacement methods - Relative density.

**Index Properties of Soils:** Grain size analysis – consistency limits and indices – Unified and I.S. Classification of soils.

#### UNIT –II

**Permeability:** Soil water – capillary rise – flow of water through soils – Darcy's lawpermeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability of layered soils.

**Effective Stress & Seepage Through Soils:** Total, neutral and effective stress – principle of effective stress - quick sand condition – Seepage through soils – one dimensional flow, two - dimensional flow, Flow nets: Characteristics and Uses, uplift pressure, piping.

## UNIT –III

**Stress Distribution in Soils:** Boussinesq's and Westergaard's theories for point load, uniformly loaded, circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark's influence chart for irregular areas, contact pressure.

**Compaction**: Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties- laboratory methods – standard proctor test, modified proctor test - field methods - proctor needle test, Types of Field compaction Equipment – compaction quality control for road works- embankments, subgrade.

#### $\mathbf{UNIT} - \mathbf{IV}$

L T P C 3 - - 3 **Consolidation:** Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation -Spring analogy, stress history of clay; e-p and e-log(p) curves – normally consolidated soil, over consolidated soil and under consolidated soil – pre consolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

# UNIT - V

**Shear Strength of Soils:** Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands, effective and total shear strength parameters, Stress-Straincharacteristics of clays and sand; Stress paths - dilatancy – critical void ratio.

Introduction to foundations

# **TEXTBOOKS:**

- 1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International PvtLtd (2007).
- 2. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers andDistributors (2018).
- 3. Principals of Geotechnical Engineering by Braja M. Das, Cengage Learning Publishers, 8thedition (2015).

- 1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi (2007).
- 2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt. Ltd, (2002).
- 3. Soil Mechanics and Foundation by by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi, 16<sup>th</sup> Edition

#### L T P C 3 - - 3

#### **Course Objectives:**

- To understand the concepts of business economics, objectives, scope, role & Responsibilities of a manager of a business undertaking
- To analyze the market dynamics namely demand, elasticity of demand, demandforecasting and supply
- To gain the knowledge on the production theories and cost analysis while dealing with the production
- To explain the process & principles of accounting and to maintain Journal, Ledger, TrialBalance.
- To acquire the basics of how to analyze and interpret the financial statements through analysis.

Course Outcomes: At the end of this course, students will demonstrates the ability to

- Determine the objectives, role & responsibilities of a manager of a business undertaking.
- Understand the demand for a product of a company, to analyze various factors influencing demand elasticity and forecast & compute the future sales level of a product.
- Examine optimum production & cost functions with the help of mathematical equations, Assess the cost behaviour, costs useful for managerial decision making.
- Apply the principle of double entry to the maintenance of books of records and explain the significance and objectives of trial balance and final accounts.
- Analyze, interpret & comment on the financial statements of a business enterprise by using ratios analysis

#### UNIT – I

#### **Introduction to Business and Economics:**

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Sources of

Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and

Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

# UNIT – II

## **Demand and Supply Analysis:**

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

# UNIT- III

#### **Production, Cost, Market Structures & Pricing:**

**Production Analysis:** Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, and Monopolistic Competition.

**Pricing:** Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis.

#### UNIT - IV

**Financial Accounting**: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts (Simple Problems).

#### $\mathbf{UNIT} - \mathbf{V}$

**Financial Ratios Analysis :** Concept of Ratio Analysis, Importance and Types of Ratios, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios – Analysis and Interpretation (simple problems).

#### **Text Books:**

- 1. D. D. Chaturvedi, S. L. Gupta, "Business Economics Theory and Applications", International Book House Pvt. Ltd. 2013.
- 2. Dhanesh K Khatri, "Financial Accounting", Tata McGraw Hill, 2011.
- 3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, "Managerial Economics", 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

## **References:**

- 1. Paresh Shah, "Financial Accounting for Management" 2e, Oxford Press, 2015.
- 2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, "Financial Accounting", 5e, Vikas Publications, 2013.

# **Pre-requisite:** Surveying

# **Course Objectives:**

To learn

- A comprehensive insight of various geometrical elements, horizontal and vertical alignment of Highways.
- The various elements of highway geometric design
- The tests to be conducted on soil, aggregates, bitumen and modified binders for characterization of different materials needed for highway construction along with bitumen concrete mix design and advanced concretes for road application
- The various types of pavements, analysis and design of flexible & rigid pavement as per IRC code specifications and also overlay designs
- The various traffic engineering studies, design of traffic signal & road intersection and possible solutions to the traffic related issues

Course outcomes: After completion of the course, the student must be able to

- Describe the various elements of a highway.
- Develop Geometric Design for highways.
- Judge the suitability of the highway materials
- Design flexible and rigid pavements.
- Describe traffic characteristics and signal systems.

# UNIT-I

**Highway Alignment :** Classification of Urban and Rural roads, Requirements of Ideal Alignment, Factors Controlling Highway Alignment, Engineering Surveys for Alignment - Conventional Methods, Highway Cross Sectional Elements - Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards], Cross sections of different Class of Roads.

# UNIT-II

**Highway Geometric Design:** Design of Horizontal Alignments –Sight Distances – Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination of Sight Distance [Derivations and Problems in SSD and OSD], Super elevation, Design Speed, Radius of horizontal curve, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems] Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves, GeometricDesign of Hill Roads [IRC Standards Only

# UNIT-III

**Highway Materials and Construction Practice:** Desirable Properties and Testing of Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory) Soil - California Bearing Ratio Test, Field Density Test, Aggregate - Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices. Bitumen - Penetration, Ductility, Viscosity, Binder content and Softening point Tests. Construction

Practice – Subgrade, Granular Sub Base, Wet Mix Macadam, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications] Highway Drainage [IRC Recommendations]

# UNIT- IV

**Pavement Design**: Introduction to Pavement Design: Types of pavements and their typical crosssections: flexible, rigid and composite; Flexible Pavement analysis and design: Introduction to multilayered analysis, IRC 37-2012 method of flexible pavement design; Rigid pavement analysis and design: Factors controlling rigid pavement design, types of stresses in rigid pavements, critical load positions, load stresses and temperature stresses in interior, corner and edge locations of jointed plain cement concrete pavement slabs, IRC 58-2002 method of rigid pavement design; Overlay :Types of overlays on flexible and rigid pavements.

# UNIT-V

**Traffic Engineering:** Traffic Characteristics, Traffic Studies – Volume study, Speed studies-spot speed, speed and delay, OD studies, Traffic flow characteristics on flow, Capacity studies-PCU, Fundamental relationships Control devices- Traffic Signs and signals (Webster's method), Intersection, At Grade, Channelized, Rotary Intersection.

## **TEXTBOOKS:**

- 1. Khanna,S.K,Justo,AandVeeraragavan,A,'HighwayEngineering',NemChand&Bros.Revised TenthEdition, 2015
- 2. Kadiyali L.R. and Lal N B, Principles and Practices of Highway Engineering; Seventh Edition, First Reprint; Khanna Publishers, NewDelhi,2018
- 3. C Venkatramaih, Transportation Engineering Volume 1 Highway Engineering, 1<sup>st</sup> Edition, Universities Press, 2016

# **REFERENCES:**

- 1. Papacoastas, C. S. and Prevedouros, Transportation Engineering and Planning, Third Edition, Third Impression; Pearson Education, 2018.
- 2. Khisty C J and Lall B Kent; Transportation Engineering: An Introduction, Third Edition, 1st IndianAdaptation; Pearson India Education Service Pvt. Ltd, New Delhi2017.
- 3. Nicholas J Garber and Lester A Hoel, Traffic and Highway Engineering, 5<sup>th</sup> Edition,CengageLearning IndiaPrivateLimited, NewDelhi, 5thIndian Reprint,2015.
- 4. SubhashCSaxena,TextBookofHighwayandTrafficEngineering;FirstEdition;CBSPublisher sand Distributors. New Delhi, 2014

## Codal Provisions: DesignCodes:

- 1. IRC37-2018 Guidelines for the design of flexible pavements
- 2. IRC 58 2015 Guidelines for the design of plain jointed pavements for highways
- 3. IRC81-1997 Guidelines for Strengthening of flexible road pavements usingBenkelman beamdeflection technique

## 22CE3115: WATER RESOURCE ENGINEERING

B.Tech. III Year I	L	Т	Р	С
Sem Pre-requisite: FM&HM	3	-	-	3

Course Objectives: To introduce.

- Various abstractions and components of hydrological cycle
- Different Runoff estimation methods
- Occurrence and Movement of Ground water
- Duty and Delta requirements for irrigation
- The various theories involved in designing the canal and canal discharge

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

- Explain the various meteorological parameters.
- Estimate the runoff by using different hydrographs.
- Compute the yields of surface and sub-surface flow in soil.
- Implement the various methods on irrigation.
- Compute the discharge and flood frequency of a canal

#### UNIT - I

Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data - Adjustment of record - Rainfall Double Mass Curve. Runoff-Factors affecting Runoff - Runoff over a Catchment - Empirical and Rational Formulae.

Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation- Evapotranspiration- Penman and Blaney & Criddle Methods - Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

## UNIT - II

Distribution of Runoff - Hydrograph Analysis Flood Hydrography - Effective Rainfall - Base Flow - Base Flow Separation - Direct Runoff Hydrograph - Unit Hydrograph, definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

## UNIT - III

Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability,transmissivitty and storage coefficient, Darcy's law, radial flow to wells in confined and unconfined aquifers. Types of well's, Well Construction - Well Development.

## UNIT - IV

Necessity and Importance of Irrigation, advantages and ill effects of irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility

- Crop Rotation, preparation of land for Irrigation, standards of quality for Irrigation water.

Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Duty and delta, factors affecting duty- Design discharge for a watercourse. Depth and frequency of Irrigation, irrigation efficiencies-Water Logging.

# UNIT - V

Classification of canals, Design of Irrigation canals by Kennedy's and Lacey's theories, balancing depthof cutting, IS standard for a canal design canal lining.

Design Discharge over a catchment, Computation of design discharge rational formula, flood frequency analysis- Introductory Part Only. Stream Gauging - measurement and estimation of stream flow.

#### **TEXT BOOKS:**

- 1. Engineering hydrology by Jayram Reddy, Laxmi publications pvt. Ltd., New Delhi.
- 2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., NewDelhi.
- 3. Irrigation and Hydraulic structures by S. K. Grag.

- 1. Elementary hydrology by V. P. Singh, PHI publications.
- 2. Irrigation and Water Resources & Water Power by P. N. Modi, Standard Book House.
- 3. Water Resources Engineering I by Dr. G. Venkata Ramana, Acadamic Publishing Company.
- 4. Irrigation Water Management by D. K. Manjundar, Printice Hall of India.
- 5. Irrigation and Hydraulic structures by S. K. Grag.
- 6. Applied hydrology by Ven Te Chow, David R. Maidment larry W. Mays Tata Mc. Graw Hill.
- 7. Introduction to hydrology by Warren Viessvann, Jr, Garyl. Lewis, PHI.

# 22CE3151: TRANSPORTATION ENGINEERING LABORATORY

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#### **B.Tech. III Year I**

#### Sem Pre-requisite: CT

#### Course Objectives: To learn

- Laboratory tests and their procedures related to coarse aggregates and bitumen.
- The Evaluation of strength properties of aggregates.
- The test procedures for characterization of bituminous mixes
- The traffic volume studies
- The traffic speed studies

Course outcomes: After the completion of the course student should be able to

- Assess for Highway construction properties of highway materials.
- Examine the tests performed for Bitumen mixes.
- Proportion bitumen mixes
- Assess the traffic volume
- Assess the speed of vehicle

#### I. Test on Road Aggregates

- 1. Aggregate Crushing Value Test
- 2. Aggregate Impact Test.
- 3. Specific Gravity and Water Absorption.
- 4. Abrasion Test (Los Angeles)
- 5. Shape Test (Flakiness and elongation indices)
- 6. Sieve Analysis and gradation charts

## II. Test on Bitumen and Bituminous Mixes

- 1. Penetration Test.
- 2. Ductility Test.
- 3. Softening Point Test.
- 4. Viscosity Test
- 5. Flash and fire points and specific gravity
- 6. Marshall's Stability (sample preparation and testing for stability and flow values)

## **III.** Traffic Studies

- 1. Traffic Volume Studies,
- 2. Spot Speed Studies.

## **TEXT BOOKS:**

- 1. Highway Material Testing by Khanna S.K., Justo C.E.G, Nem Chand & Bros.
- 2. Road Material Testing and Pavement Evaluation by Dr. S. Krishna Rao and Dr. P. Sravana, ResearchIndia Publication, 2019
- 3. Highway Material Testing and Quality Control by Rao G. Venkatappa, Rao K. Ramachandra, PahariKausik, Rao and D.V. Bhavanna. I.K International Publisher.

## **IS CODES:**

- 1. IS 1201-1220 (1978) "Methods for Testing Tars and Bituminous Materials"
- 2. IRC SP 53 -2010 "Guidelines on use of Modified Bitumen"
- 3. MS-2 Manual for Marshalls Mix design 2002

# 22CE3152: GEOTECHNICAL ENGINEERING LABORATORY

# **B.Tech. III Year I**

# L T P C - - 3 1.5

## **Pre requisite:** EG Lab

# **Course Objectives:**

• To obtain index and engineering properties of locally available soils, and tounderstand the behavior of these soil under various loads.

## **Course Outcomes:**

• At the end of the course, the student will be able to Classify and evaluate the behavior of the soils subjected to various loads.

# LIST OF EXPERIMENTS

- 1. Atterberg Limits (Liquid Limit, Plastic Limit, and shrinkage limit)
  - a) Field density by core cutter method
  - b) Field density by sand replacement method
- 2. Grain size distribution
- 3. Specific gravity and Differential free swell index (DFSI) test
- 4. Permeability of soil by constant and variable head test methods
- 5. Standard Proctor's Compaction Test
- 6. Determination of Coefficient of consolidation
- 7. Unconfined compression test
- 8. Direct shear test
- 9. Vane shear test
- 10. Tri-axial compression test

# **Text Books:**

1. B. M. Das, "Soil Mechanics Laboratory Manual", Oxford University Press, 8th edn, 2012

2. SP 36 (Part - I): 1987-"Compendium of Indian Standards on Soil Engineering", Bureau of Indian Standards, New Delhi.

3. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International PvtLtd (2007).

- 1. Measurement of Engineering Properties of Soils by. E. Saibaba Reddy & K. RamaSastri, New Age International
- 2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers andDistributors, Delhi.
- 3. Geotechnical Engineering Laboratory Manual", prepared by faculty of Department of Civil Engineering.

#### 22HS3151: ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY

## B.Tech. III Year I Sem.

L T P C

## **Course Objectives**

This lab focuses on using Multi-media instruction as well as stimulating peer group activities for language development to meet the following targets:

- 1. To improve students fluency in spoken English.
- 2. To enable them to listen to English spoken at normal conversational speed.
- 3. To help students develop their vocabulary.
- 4. To read and comprehend texts in different contexts.
- 5. To communicate their ideas relevantly and coherently in writing.

## Course Outcomes: Students will be able to

- 1. Acquire vocabulary and Grammar and use them contextually.
- 2. Listen and speak effectively, and present themselves effectively.
- 3. Develop proficiency in academic reading and writing.
- 4. Communicate confidently in formal and informal contexts.
- 5. Increase their job opportunities.

## Syllabus

The following course activities will be conducted as part of the Advanced English Communication Skills (AECS) Lab:

## Unit I

Vocabulary and Grammar: Vocabulary Building – Word Formation: Prefixes and Suffixes - Synonyms, and Antonyms, One-word Substitutes, Idioms, Phrases, Collocations, and Compound Words.

**Grammar** – Articles, Prepositions, Tenses, Subject-Verb Agreement, Voice and Speech-Spotting Errors - Correction of Sentences,

## Unit II

**Advanced Reading Comprehension:** Argumentative Analysis of (with reference to) GRE, TOEFL, IELTS – Jumbled Sentences and Sentence Completion.

Unit III

**Writing Skills**– Structure and Different Types of Writings – Argumentative Writing – Letter Writing - Resume Writing - Technical Report Writing

Creating and Using LinkedIn Profile - Netiquette - Statement of Purpose (SOP) - Letter of Recommendation

## Unit IV

**Presentation Skills** -\_Oral Presentations (Group/Individual) and Written Presentations – PPTs/ Posters (Virtual/Offline) – Projects, Reports and Assignments - Introducing Oneself Virtually (Making a Video on Oneself and Analyzing it critically).

## Unit V

**Group Dynamics & Interviews:** Group Discussion - Dos and Don'ts - Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas – Debate: Concept and Process - Difference between Group Discussions and Debates- Rubrics of Evaluation - Interviews and Types of Interviews - Pre-interview Planning, Opening Strategies, Answering Strategies - Introducing Self - Oral Interviews (face-to-face) –Virtual Interviews - Mock Interviews - Handling Technical Glitches.

#### **Text books**

- Kumar, Sanjay and Pushp Lata. English for Effective Communication, Oxford University Press, 2015.
- Konal, Nira. English Language Laboratories- A Comprehensive Manual, PHI Learning Pvt. Ltd. 2011.

# References

• The Official Guide to the GRE General Test. Tamil Nadu: McGra Hills Education (India) 3<sup>rd</sup> Edition, 2017.



#### **B.** Tech III Year I Semester

#### L T P C 3 - - 0

# **Course Objectives:**

- To know the concept of intellectual property
- To study about trade marks
- To study about law of copyrights and law of patents.
- To impart the knowledge on trade secrets
- To know new developments in IPR laws at national and international level.

# Course Outcomes: At the end of this course, students will demonstrate the ability to

- . Distinguish and Explain various forms of IPRs
- . Identify criteria to fit one's own intellectual work in particular form of IPRs
- Apply statutory provisions to protect particular form of IPRs.
- .Explain about trade secrets
- Appraise new developments in IPR laws at national and international level

# UNIT – I:

**INTRODUCTION TO INTELLECTUAL PROPERTY:** Introduction, types of intellectual proper international organizations, agencies and treaties, importance of intellectual property rights.

# UNIT – II:

**TRADE MARKS:** Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

## UNIT – III:

**LAW OF COPYRIGHTS:** Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

LAW OF PATENTS: Foundation of patent law, patent searching process, ownership rights and tran

## UNIT – IV:

**TRADE SECRETS:** Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation. **Unfair competition:** Misappropriation right of publicity, false advertising.

## UNIT – V:

**NEW DEVELOPMENT OF INTELLECTUAL PROPERTY:** new developments in trade mark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copyright law, international patent law, and international development in trade secrets law.

## **TEXT BOOK:**

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

#### **REFERENCE BOOK:**

1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd

# **22CE3211:** ENVIRONMENTAL ENGINEERING

Course Objectives: To impart the knowledge on

- various water supply schemes and forecasting methods of population
- various water treatment units
- various distribution system sand wastewater characteristics
- treatment units and stages in wastewater treatment plant
- necessity of various treatment methods and disposal methods of wastewater

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

- Explain the water supply schemes and Forecasting methods
- Apply the design considerations for water treatment plant units
- Demonstrate the different sewer appurtenances and suitable disposal systems
- Operate the different stages involved in wastewater treatment.
- Apply the treatment and disposal methods of wastewater

#### UNIT- I

Introduction: water supply schemes, protected water supply, population forecast, design period, water demand, Types of demand, factors affecting, fluctuations, fire demand, sources of water, intakes, infiltration galleries, confined and unconfined aquifers, water quality parameters & testing, drinking water standards.

#### UNIT - II

Layout and general outline of water treatment units, sedimentation, uniform settling velocity, principles, design factors, surface loading, Jar test, optimum dosage of coagulant, coagulation, flocculation clarifier design, coagulants, feeding arrangements.

Filtration, theory, working of slow & rapid gravity filters, multimedia filters, design of filters, troubles in operation, comparison of filters, disinfection types of disinfection, theory of chlorination, chlorine demand, other disinfection treatment methods.

## UNIT-III

Distribution systems, types of layouts of distribution systems service reservoirs, Conservancy and water carriage systems, sewage and storm water estimation, time of concentration, Storm water overflows combined flow, characteristics of sewage, examination of sewage, B.O.D.,C.O.D. equations. Design of sewers, shapes and materials, sewer appurtenances, manholes, inverted siphon, catch basins, flushing tanks, ejectors, pumps and pump houses, house drainage, components requirements, sanitary fittings, traps, one pipe and two pipe systems of plumbing.

#### UNIT - IV

Layout and general outline of various units in a waste water treatment plant, primary treatment design of screens, grit chambers, skimming tanks, sedimentation tanks, principles and design of biological treatment, trickling filters, standard and high rate., ASP, ASP modification, aeration.

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# UNIT -V

Construction and design of oxidation ponds, oxidation ditches. sludge treatment Sludge digestion tanks, design of Digestion tank, factors affecting sludge digestion, Sludge disposal by drying, Elutriation of Sludge, septic tanks working principles and design, soak pits. Ultimate disposal of waste water- self- purification of rivers, sewage farming.

#### **TEXT BOOKS:**

- 1. Environmental Engineering, I and II by BC Punmia, Std.Publications.
- 2. Environmental Engineering, I and II by SK Garg, KhannaPublications.
- 3. Environmental Engineering, B.S.Biridie

- 1. Water and Waste Water Technology by Steel, Wiley
- 2. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2018.
- 3. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr. Wiley, 2007.
- 4. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall,NewJersey.
- 5. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson

# 22CE3212: FOUNDATION ENGINEERING

# **B.Tech. III Year II Sem**

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#### Pre-requisite: Soil Mechanics

#### **Course Objectives:**

- To Plan Soil exploration programme for Civil Engineering Projects
- To check the stability of slopes
- To determine the lateral earth pressures and design retaining walls
- To determine the Bearing capacity of Soil
- To design pile group foundation

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

- Understand the principles and methods of Geotechnical Exploration
- Decide the suitability of soils and check the stability of slopes
- Calculate lateral earth pressures and check the stability of retaining walls
- Analyse and design the shallow foundations
- Analyse and design the deep foundations

# UNIT – I

**Soil exploration**: Need – methods of soil exploration – boring and sampling methods penetration tests – plate load test– planning of soil exploration programme, Bore logs and preparation of soil investigation report.

## UNIT – II

**Slope stability**: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish slip circle method, method of slices, Bishop's Simplified method of slices–Taylor's Stability Number-stability of slopes of earth dams under different conditions.

## UNIT – III

**Earth pressure theories**: Active, Passive and at rest soil pressures - Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory.

**Retaining walls**: Types of retaining walls–stability of gravity and cantilever retaining walls against overturning, sliding and, bearing capacity, filter material for drainage.

## UNIT – IV

**Shallow foundations**- Types - choice of foundation – location and depth - safe bearing capacity – shear criteria – Terzaghi's, and IS code methods - settlement criteria – allowable bearing pressure based on SPT N value and plate load test – allowable settlements of structures.

# UNIT - V

**Pile foundation**: Types of piles – load carrying capacity of piles based on static pile formulae – dynamic pileformulae – Pile Capacity through SPT results - pile load tests - load carrying capacity of pile groups in sandsand clays – Settlement of pile groups – negative skin friction

**Well foundations:** Types – different shapes of wells – forces on wells - components of wells – sinking of wells– tilts and shifts.

# **TEXT BOOKS:**

- 1. K.R. Arora [2008], Soil Mechanics and Foundation Engineering, Standard Publishers.
- 2. P. Purusotham Raj [2013], Soil Mechanics and Foundation Engineering, Pearson Publishers.
- 3. Gopal Ranjan and A.S.R.Rao [2000], Basic and Applied Soil Mechanics, New Age International Publishers.

- 1. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
- 2. Geotechnical Engineering Principles and Practices by Cuduto, PHI International
- 3. Analysis and Design of Substructures Swami Saran, Oxford and IBH Publishing company Pvt Ltd (1998).
- 4. Geotechnical Engineering by S. K.Gulhati & Manoj Datta Tata Mc.Graw Hill Publishing company New Delhi. 2005.
- 5. Bowles, J.E., (1988) Foundation Analysis and Design 4th Edition, McGraw-Hill Publishing company, New York

# 22CE3213: STRUCTURAL ENGINEERING –II (STEEL STRUCTURES)

#### **B.Tech. III Year II**

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#### Pre-requisite: SOM & SA

#### **Course Objectives:**

- To impart the knowledge of mechanical properties, loads and load combinations, design philosophies and design of general and eccentric connections in steel structures.
- To comprehend design of tension members and compression members of steel structures.
- To perceive knowledge on design of flexural members of steel structures.
- To apprehend the knowledge on design of plate girders
- To aquire knowledge on design of roof trusses, purlins and gantry girders.

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

- Understand material behaviour, recognize various design philosophies in Steel structures and use limitstate concepts to design general and eccentric connections in steel structures.
- Use limit state method to design tension members, compression members with battened and lacedcolumn and base plates.
- Use limit state method to design beams in steel structures.
- Use limit state method to design the various components of welded plate girder including end andbearing stiffeners.
- Use limit state method to design the industrial structures and welded gantry girder.

#### UNIT- I

**Materials** – Types of structural steel –chemical and mechanical properties of steel, fire and fatigue behaviourof steel– Concepts of plasticity – yield strength - Loads and Stresses – Local buckling behavior of steel.

**Concepts of limit State Design** –Different Limit States – Load combinations for different Limit states -Design Strengths - deflection limits– serviceability – stability check.

**Design of Connections**– Different types of connections – Bolted connections – Design strength – efficiency of joint– prying action - Welded connections – Types of welded joints – Design requirements- Design of Beam-column connections - Eccentric connections - Type I and Type II connection – Framed connection– stiffened / seated connection.

#### UNIT - II

**Design of tension members** –Simple and built up members - Design strength – Design procedure forsplicing - lug angle.

**Design of compression members** – Buckling class – slenderness ratio – Design of simple compressionmembers - laced – battened columns – splice – column base – slab base.

# UNIT - III

Plastic Analysis- Plastic moment - Plastic section modulus - Plastic analysis of continuous beams

**Design of Flexural Members** – Laterally supported and unsupported Beams – Design of laterally supportedbeams - Bending and shear strength/buckling – I section with plates- Beam splice

## UNIT - IV

**Design of welded plate girders** – Elements – Economical depth – Design of main section – Connections between web and flange – Design of stiffeners - Bearing stiffener– Intermediate stiffeners – Design of web splice and flange splice.

## UNIT - V

**Steel Structural Systems**- Various steel structural systems -Types of roof trusses - Loads on trusses - Windloads - Purlin design –Truss design.

## **TEXT BOOKS:**

- 1. Design of Steel Structures, Subramanian N, Oxford University Press, New Delhi 2008.
- 2. Design of Steel Structures, Dayaratnam P, S. Chand & Co., New Delhi, 2003.

- 1. Limit state Design of steel structures, S.K. Duggal, Tata McGrawhill
- 2. Design of Steel Structures, Arya, A.S and Ajmani, A.L., Nemchand and brothers, Roorkee, 1992..
- Comprehensive Design of Steel Structures, Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain.Laxmi Publications Pvt. Ltd., New Delhi 2000. IS 800-2007, Code of practice for general construction in steel, Bureau of Indian Standards New Delhi

# 22CE3271: SUSTAINABLE CONSTRUCTION TECHNOLOGY (Professional Elective-I)

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## **B.Tech III Year II Semester Pre-requisite**: BMCP, CT

# Course Objectives: To

- Describe the housing strategies for the urban poor
- Identify the various technology and their applications in sustainable Housing
- Introduce low-cost housing infrastructure services
- Describe different sustainable alternative materials for construction
- Describe construction in disaster prone areas

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

- Decide the type of schemes for housing the urban poor
- Develop the suitable sustainable construction techniques in Housing.
- Apply knowledge of innovative cost-effective construction techniques
- Describe different sustainable alternative materials for construction of low-cost Infrastructure services
- Decide the type of construction in disaster prone areas for different engineering structures

**UNIT – I: Alternative Building Materials for Sustainable Construction:** Introduction- Substitute for scarce materials- Ferro-cement- Gypsum boards - Timber substitutions- Industrial wastes- Agricultural wastes- cement-soil blocks for masonry – stabilized mud construction.

Housing the Urban Poor: Introduction- Living conditions in slums- Approaches and strategies for housing urban poor.

**UNIT – II: Development and Adopting Sustainable Construction Technology:** Introduction- Adoption of innovative cost effective construction techniques- Adoption of pre-cast elements in partial prefabrication-Adopting of total prefabrication of mass housing in India- General remarks on pre cast rooting/flooring systems- Economical wall system- Single Brick thick loading bearing wall- 19cm thick load bearing masonry walls- Half brick thick load bearing wall- Fly ash-gypsum brick for masonry- Stone Block masonry- Adoption of pre-cast R.C. plank and join system for roof/floor in the building.

**UNIT – III: Low-Cost Infrastructure Services:** Introducing- Present status- Technological options- Low cost sanitation's- Domestic wall- Water supply- energy.

**UNIT – IV: Rural Housing:** Introduction- traditional practice of rural housing continuous- Mud Housing technology- Mud roofs- Characteristics of mud- Fire resistant treatment for thatched roof- Soil stabilization-Rural Housing programs.

**UNIT – V: Construction in Disaster Prone Areas:** Introduction to disasters and their effects on building and infrastructures- Damages to houses- Traditional Housing in disaster prone areas- Type of Damages of non-engineered and Engineered buildings- Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions

## **TEXT BOOKS:**

- 1. Modern Trends in Housing in Developing Countries by A.G.Madhava Rao, D.S.Ramachandra Murthy & G.Annamalai
- 2. Properties of Concrete by A.M.Neville, Pearson Publishing Limited, London

- 1. Building Materials for Low-Income Houses, International Councilfor Building Research Studies and Documentation.
- Handbook of Low-Cost Housing by A.K.Lal, New Age International Publishers.
  Light Weight Concrete by Academic kiado,Rudhai G.,Publishing Home of Hungarian Academy of Sciences, 1963.
- 4. Low-Cost Housing by G.C.Mathur

# 22CE3272: STRUCTURAL ANALYSIS-II (Professional Elective-I)

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# **B.Tech. III Year II**

## Pre-requisite: SOM & SA

#### **Objectives:**

- To understand the classical methods of analysis for statically indeterminate structures.
- To understand the analysis of continuous beam by kani's method.
- To differentiate the approximate and numerical methods of analysis for indeterminate structures.
- To differentiate the matrix methods of analysis.
- To analyze the frame using stiffness method.

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

- Solve statically indeterminate beams and portal frames using classical methods
- Analyze the continuous beams by kani's method
- Analyze the beams and frames by approximate and numerical methods of analysis.
- Analyze the beams by Matrix methods.
- Analyze the frames using Stiffness methods.

## UNIT-I

**Slope Deflection Method:** Analysis of single bay single story portal frames with and without side sway- Analysis of inclined frames – Shear force and bending moment diagrams, Elastic Curve.

**Moment Distribution Method:** Analysis of single bay single story portal frames with and without side sway-analysis of inclined frames- shear force and bending moment diagrams.

# UNIT-II

Kani'S Method: Analysis of continuous beams – including settlement of supports and single bay, single story portal frames without sway by Kani's method

## UNIT-III

**Approximate Methods of analysis:** Introduction – analysis of multi storey frames for lateral loads. Portal method, cantilever method – analysis of multi-story frames for gravity loads-substitute framemethod.

**Influence Lines for Indeterminate Beams:** Introduction -influence line diagram for shear force and bending moment for two span continuous beam with constant and different moments of inertia – influence line diagram for shear force and bending moment for propped cantilever beams.

## UNIT-IV

**Introduction to Matrix Methods of Analysis:** Introduction to Flexibility and stiffness matrix methods of analysis using system approach up to three degree of indeterminacy – Analysis of continuous beam including settlement of supports using flexibility and stiffness Methods.

# UNIT-V

Stiffness method of analysis of pin-jointed determinate plane frames using stiffness Methods – Analysis of single bay single story portal frames with and without side sway using stiffness method– shear force and bending moment diagrams – Elastic Curve.

# **TEXT BOOKS :**

- 1. Structural Analysis vol I &II by G.S Pandit S.P. Gupta Tata McGraw Hill Education Pvt.ltd.third Edition.
- 2. Advanced Structural Analysis by Ashok k.Jain ,Nem Chand brothers 2<sup>nd</sup> Edition.
- 3. Analysis of Structures Vol. I & 2 by Bhavikatti, Vikas publications

- 1. Basic Structural Analysis by C S Reddy, Tata Mc-Grawhill
- 2. Structural Analysis Vol -I &II by vazarani and rathwani , Khanna Publishers.
- 3. Theory of structures by Ramamuratam, jain book depot, New Delhi

#### 22CE3273: AIR POLLUTION AND CONTROL

# (Professional Elective-I)

## **B.Tech. III Year II Sem**

## **Course Objectives:**

- To impart the knowledge on sources and pollutants that are responsible for air pollution
- To understand the effects of air pollution on human and environments.
- To pursue knowledge of plume behaviour and meteorology conditions.
- To learn various control techniques to measure and reduce particulate matter
- To learn various control techniques to measure and reduce gaseouse missions various standards and management techniques to control air pollution.

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

- Identify various sources and pollutants that effect human and environment through air pollution
- Expalin various effects of air pollution on Humans, material and vegetation with the help ofcase studies.
- Classify various methods for control of air polution
- Suggest suitable method for removing particulate matter.
- Suggest suitable method for controlling gaseous emissions and to monitor air pollution.

#### UNIT -I

Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Lineand Areal Sources of air pollution-stationary and mobile sources.

## UNIT – II

Effects of Air pollutants on man, material and vegetation; Global effects of air pollution – Green Houseeffect, Heat Islands, Acid Rains, Ozone Holes etc.- Case studies on effects of Air pollution.

# UNIT - III

Thermo dynamics and Kinetics of Air-pollution – Applications in the removal of gases like SOx; NOx; CO; HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relativeHumidity; Influence of Meteorological phenomena on Air Quality wind rose diagrams.

## $\mathbf{UNIT} - \mathbf{IV}$

Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion. Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electro static precipitators.

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## UNIT-V

General Methods of Control of Nox and SOx emissions–In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management– Monitoring of SPM, SOx; NOx and CO Emission Standards.

## **TEXT BOOKS**:

- 1. Air pollution By M. N. Rao and H. V. N. Rao Tata McGraw HillCompany.
- 2. Air pollution by Wark and Warner.- Harper & Row, New York.

# **REFERENCE**:

1. Air pollution and control By K.V.S.G.Murali Krishna, Kaushal Publishers. Kakinada

#### 22CE3274: PRESTRESSED CONCRETE (Professional Elective-II)

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**Pre-requisite**: CT, RCC

Course Objectives: The objectives of the course are to make the students

- Understand the importance of PSC evolution of pre-stressing to overcome the shortcoming of RCC.
- Estimate the losses in PSC members.
- Analyse sections of PSC beams with different types tendons and design PSC beams.
- Understand transmission mechanism of pre-stressing force by bond.
- Understand the types of composite sections compute deflections of beams under loads.

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

- Distinguish between reinforced concrete structures and prestress concrete.
- Estimate losses of pre-stressing using IS 1343:2012.
- Analyse and Design pre-tensioned and post tensioned girders based on IS 1343:2012.
- Analyse and Design end block for Pretensioned member using is 1343:2012.
- Estimate total deflections of PSC members using IS 1343:2012.

#### UNIT -I

**Introduction:** Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.

## UNIT- II

**Methods and Systems of prestressing:** Pretensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System-Lee McCall system**Losses of Prestress:** Loss of prestress in pretensioned and posttensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

## UNIT -III

**Flexure:** Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of beams of rectangular and I sections- Kern line – Cable profile and cable layout.

**Shear:** General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear – Design of shear reinforcements- IS Code provisions.

## UNIT- IV

**Transfer of Prestress in Pretensioned Members:** Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members – stress distribution in End block – Analysis by Guyon, Magnel, – Anchorage zone reinforcement- IS Provisions

## UNIT -V

**Composite Beams:** Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

**Deflections:** Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long-time deflections- IS code requirements.

## **TEXT BOOKS:**

- 1. Prestressed concrete by Krishna Raju, Tata Mc Graw Hill Book Co. New Delhi., 6th ed. 2018
- 2. Design of prestress concrete structures by T.Y. Lin and Burn, John Wiley, New York.
- 3. Prestressed concrete by S. Ramamrutham Dhanpat Rai & Sons, Delhi.

- 1. Prestressed Concrete by N. Rajagopalan Narosa Publishing House
- 2. Prestressed Concrete byDr N.C SINHA Dr S.K ROY S Chand publications

# (Professional Elective-II)

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Pre-requisite: BMCP, EE, WRE	3	-	-	3

# **Course Objectives:**

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- To interpret the basic concepts of hazards, disasters and its vulnerability.
- To impart the knowledge of Disaster Management mechanism in preparedness and mitigation.
- To infer capacity building concepts and planning of disaster management.
- To interpret the strategies, policies and coping capacities in order to lessen the impact of hazards.
- To demonstrate the role of Government Agencies in disaster planning and policies.

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

- Identify various types of disaster and their vulnerability.
- Implement risk and crisis management concepts in prevention and mitigation of disaster.
- Execute capacity building concept for disaster counter measures.
- Discuss coping strategies that helps in improving safety measures or to lessen the impact ofhazards.
- Identify the role of government agencies in disaster planning and policies.

# UNIT – I

**Understanding Disaster:** Concept of Disaster, Environmental Disasters and Environmental Stress-Different approaches- Concept of Risk - Levels of Disasters - Disaster Phenomena and Events (Global, national and regional) **Hazards and Vulnerabilities:** Natural and man-made hazards; response time, frequency and forewarning levels of different hazards; hazard assessment; vulnerability assessment

# UNIT – II

**Disaster Management Mechanism**: Concepts of risk management and crisis managements - Disaster Management Cycle - Response and Recovery - Development, Prevention, Mitigation and Preparedness - Planning for Relief

# UNIT – III

**Capacity Building:** Capacity Building Concept - Structural and Nonstructural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management

## UNIT - IV

**Coping with Disaster & Coping Strategies:** Alternative adjustment processes - Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits - Mass media and disaster management

## UNIT - V

**Planning for disaster management:** Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India - Organizational structure for disaster management in India - Preparation of state and district disaster management plans, Legislative Support the state and national levels.

# **TEXT BOOKS:**

- 1. Manual on Disaster Management, National Disaster Management, Agency Govt of India.
- 2. Disaster Management by Mrinalini Pandey Wiley 2014.
- 3. Disaster Science and Management by T. Bhattacharya, McGraw Hill Education (India) Pvt Ltd Wiley

- 1. Earth and Atmospheric Disasters Management, N. Pandharinath, CK Rajan, BS Publications 2009.
- 2. National Disaster Management Plan, Ministry of Home affairs, Government of India(http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)

## **B.Tech III Year II Sem**

#### **Pre-requisite**: TE

#### Course Objectives: To learn

- The Traffic characteristics and relationships
- The methods of traffic surveys.
- The concepts of traffic capacity and level of service
- The Concept of Traffic and Environment
- Features of Traffic System Management

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

- Understand the human factors and vehicular factors in traffic engineering design
- Conduct different types of traffic surveys and analysis of collected data using statistical concepts.

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- Evaluate the highway capacity and level of service.
- Illustrate the measures to improve traffic and environment quality.
- Understand the basic knowledge on Traffic System Management

#### UNIT-I

**Traffic Planning and Characteristics:** Road user characteristics, PIEV theory, Vehicle Performance characteristics, Fundamentals of Traffic Flow-Some definitions, Relationship between the variables, Fundamental diagram of traffic flow, Linear relationship between speed and concentration, Urban Traffic problems in India, Measures to meet the traffic problems in urban areas.

#### **UNIT-II**

**Traffic Surveys:** Speed, journey time and delay surveys, Vehicles Volume Survey including nonmotorized transports, Methods and interpretation, Origin Destination Survey, Methods and presentation, Parking Survey, Accident analyses-Methods, interpretation and presentation, Statistical Methods in traffic Engineering: mean, Standard Deviation and Variance; Linear regression and Correlation with numerical problems.

#### UNIT-III

**Highway Capacity and Level of Service:** Basic definitions related to capacity; Level of service concept; Factors affecting capacity and level of service; Computation of capacity and level of service for two lane ruralhighways without access control, Multilane rural highways without access control.

#### UNIT-IV

**Traffic and Environment:** Detrimental effects of Traffic on Environment, Air pollution; Noise Pollution; Vibration, Visual intrusion and Degrading the Aesthetics, Severance and land consumption, Evaluation procedures, Environmental Areas, Situation in India.

# UNIT-V

**Traffic System Management (TSM):** Introduction, Travel Demand Management, Traffic Management-Scope, Restrictions on turning movements, one-way streets, Tidal flow operations, Exclusive Bus lanes, Closing Side Streets

#### **TEXT BOOKS:**

- 1. Kadiyali.L.R. "Traffic Engineering and Transport Planning", Khanna Publishers, Delhi, 2013
- 2. S K Khanna and CEG Justo and a Veeraragavan, "Highway Engineering", Nem Chand and Bros.
- 3. Traffic Engineering, Roger P. Roess, Elena S. Prassas and William R. McShane, Prentice Hall, 2010, Fourth Edition.

- 1. Principles of Traffic and Highway Engineering Garber & Hoel, Cengage Learning
- 2. Salter. R.I and Hounsell N.B, "Highway Traffic Analysis and design", Macmillan Press Ltd. 1996.
- 3. Fred L. Mannering, Scott S. Washburn and Walter P. Kilareski, Principles of Highway Engineeringand Traffic Analysis, Wiley India Pvt. Ltd., New Delhi, 2011
- 4. Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi,2010
- 5. SP:43-1994, IRC Specification, "Guidelines on Low-cost Traffic Management Techniques" for UrbanAreas, 1994
- 6. John E Tyworth, "Traffic Management Planning, Operations and control", Addison Wesly PublishingCompany, 1996
- 7. Hobbs.F.D. "Traffic Planning and Engineering", University of Brimingham, Peragamon Press Ltd,2005

#### 22CE3251: ENVIRONMENTAL ENGINEERING LABORATORY

**B.Tech. III Year II Sem** 

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**Pre-requisite:** EE

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Course Objectives: The objectives of the course are to Perform the experiments

- To determine water and waste water quality
- Understand the water & waste water sampling, their quality standards
- Estimate quality of water, wastewater

Course outcomes: After the completion of the course student should be able

- To Understand about the equipment used to conduct the test procedures
- To Perform the experiments in the lab
- To Examine and Estimate water, waste water and Environmental Quality
- Develop a report on the quality aspect of the environment

#### **Practical Work: List of Experiments**

- 1. Determination of pH
- 2. Determination of Electrical Conductivity
- 3. Determination of Total Solids (Organic and inorganic)
- 4. Determination of Acidity/Alkalinity
- 5. Determination of Turbidity
- 6. Determination of Hardness (Total, Calcium and Magnesium Hardness)
- 7. Determination of Chlorides
- 8. Determination of optimum coagulant Dosage
- 9. Determination of Dissolved Oxygen (Winkler Method)
- 10. Determination of COD
- 11. Determination of BOD/DO
- 12. Determination of Residual Chlorine
- 13. Total countNo.
- 14. Noise level measurement

#### **REFERENCES:**

- 1. Manual on Water Supply and Treatment. Ministry of Urban Development, NewDelhi
- 2. Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw HillInternational Editions, New York1985.
- 3. MetCalf and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGrawHill,NewDelhi.

## 22CE3252: COMPUTER AIDED ANALYSIS & DESIGN LABORATORY

#### **B.Tech. III Year II Sem**

# **Course Objectives:**

The objectives of the course are to

- Apply software for detailed analysis and design of structures.
- Utilize advanced software for fixed and continuous beam analysis and design.
- Proficient in plane frame analysis and design.
- Master space frame analysis and design under various loads.
- Conduct comprehensive residential building analysis for all relevant loads.

#### **Course outcomes:**

After the completion of the course student should be able to

- Model the geometry of real-world structure Represent the physical model of structuralelement/structure
- Perform analysis
- Interpret from the Post processing results
- Capable of conducting comprehensive analysis and design of residential buildings, considering all loads such as dead load (DL), live load (LL), wind load (WL), and earthquake load (EQL).
- Design the structural elements and a system as per IS Codes

# LIST OF EXPERIMENTS

- 1. Analysis & Design determinate structures using a software
- 2. Analysis & Design of fixed & continuous beams using a software
- 3. Analysis & Design of Plane Frames
- 4. Analysis & Design of space frames subjected to DL & LL
- 5. Analysis & Design of residential building subjected to all loads (DL,LL,WL,EQL)
- 6. Analysis & Design of Roof Trusses
- 7. Design and detailing of built up steel beam
- 8. Detailing of RCC slab (One way slab and two way slab)
- 9. Detailing of Steel built up compression membe

#### 22MC0002: ENVIRONMENTAL SCIENCE

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## **Course Objectives:**

**III B.Tech II Semester** 

- To study and Understand the importance of ecosystems.
- To impart knowledge on various natural resources.
- To know about biodiversity and biotic resources
- To impart knowledge on environmental pollution and control technologies

• To study and understand the environmental policies and regulations.

Course Outcomes: At the end of this course students will demonstrate the ability to

- Explain the importance of ecosystems.
- Discuss about various natural resources.
- Describe the importance biodiversity and biotic resources
- Discuss about environmental pollution and control technologies
- Explain the environmental policies and regulations.

#### 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 Problems 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.

## 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 Socioeconomical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

**Towards Sustainable Future:** Concept of Sustainable Development, 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, 4th Edition, New age international publishers.

5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.