III YEAR - I SEM

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19CY3112: CRYPTOGRAPHY & NETWORK SECURITY

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B. Tech III Year I Semester	**3**	**-**	**-**	**3**

Prerequisites:
- Should have knowledge of computer networks

Course Objectives:
- Understand the objectives of information security and the importance and application of each of confidentiality, integrity, authentication and availability and the basic categories of threats to computers and networks.
- Understand various modern cryptographic encryption algorithms
- Understand the design of hash functions, MACs and Digital Signatures and their significance
- Understand the various Transport layer protocols and Wireless network protocols
- Understand Email security and IP security protocols and case studies of cryptographic algorithms.

Course Outcomes:
- Able to differentiate the types of attacks and identify the mechanisms required to achieve security objectives and implement classical ciphers
- Able to apply fundamentals of mathematics and computer science to understand modern cryptographic algorithms like DES, AES, RSA etc and analyze them
- Able to Apply fundamentals of mathematics and computer science to understand and analyze the hashing algorithms, MACs, Digital Signatures, Key Management Protocols
- Able to understand and analyze the security requirements, various protocols at Transport layer, Network Layer, Session Layer and Application layer
- Able to apply the cryptographic algorithms and tools to solve problems related to data and network in different areas and evaluate them.

UNIT - I
Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security.
Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT - II
Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.
Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT - III
Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512)
Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure.

UNIT - IV
Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH).
Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security.

UNIT - V
E-Mail Security: Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, combines security associations, Internet Key Exchange.
Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOKS:
1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition.
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition.

REFERENCE BOOKS:
1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition.
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH.
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

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19CY3113: DATABASE MANAGEMENT SYSTEMS

B. Tech III Year I Semester

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Prerequisites: A course on "Data Structures".

Course Objectives:
- The objective of the course is to present an introduction to database management systems
- To provide an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.
- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Course Outcomes:
- Gain knowledge of fundamentals of DBMS.
- An ability to design a database and further reduce redundancy of relationships using various normal forms.
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques

UNIT - I
Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS
Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model

UNIT - II
Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra**,** Tuple relational Calculus, Domain relational calculus.

UNIT - III
SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.
Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT - IV
Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, serializability, Recoverability, Implementation of Isolation, testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple

Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata Mc Graw Hill* 3rd Edition
2. Database System Concepts, Silberschatz, Korth, *Mc Graw hill*, V edition.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education.*
3. Introduction to Database Systems, C. J. Date, *Pearson Education.*
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, *SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student* Edition.

19AM3111: DESIGN AND ANALYSIS OF ALGORITHMS

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B. Tech III Year I Semester

Prerequisites:
- A course on "Computer Programming and Data Structures"

Course Objectives:
- Introduces the notations for analysis of the performance of algorithms.
- Introduces the data structure disjoint sets.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate.
- Describes how to evaluate and compare different algorithms using worst-, average-, and best case analysis.
- Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Course Outcomes:
- Ability to analyze the performance of algorithms
- Ability to choose appropriate data structures and algorithm design methods for a specified application
- Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs
- Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm.

UNIT - I
Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.
Divide and conquer: General method, Applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT - II
Disjoint Sets: Disjoint set operations, union and find algorithms
Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

UNIT - III
Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT - IV
Greedy method: General method, Applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path Problem.

UNIT - V
Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.

TEXT BOOK:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

19CY3114: FORMAL LANGUAGES AND AUTOMATA THEORY

B. Tech III Year I Semester

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Course Objectives

- To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages.
- To introduce the fundamental concepts of formal languages, grammars and automata theory.
- Classify machines by their power to recognize languages and employ finite state machines to solve problems in computing.
- To understand deterministic and non-deterministic machines.
- To understand the differences between decidability and undecidability.

Course Outcomes

- Able to understand the concept of abstract machines and their power to recognize the languages.
- Able to employ finite state machines for modeling and solving computing problems.
- Able to design context free grammars for formal languages.
- Able to distinguish between decidability and undecidability.
- Able to gain proficiency with mathematical tools and formal methods.

UNIT - I
Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.
Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.

Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA, Moore and Melay machines

UNIT - II
Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.
Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma.

Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT - III
Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Tress, applications of Context-Free Grammars, Ambiguity in Grammars and Languages.

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

UNIT - IV

Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating €-Productions. Chomsky Normal form Griebech Normal form.

Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications

Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties of CFL's

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, the language of a Turing machine

UNIT - V
Types of Turing machine: Turing machines and halting

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines.

TEXT BOOKS:
1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd edition, PHI.

REFERENCE BOOKS:
1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

19CY3171: COMPILER DESIGN
(Professional Elective – I)

B. Tech III Year I Semester

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Prerequisites:
- A course on "Computer Organization and architecture".
- A course on "Computer Programming and Data Structures".

Course Objectives:
- Introduce the major concepts of language translation and compiler design.
- To impart the knowledge of practical skills necessary for constructing a compiler.
- Topics include phases of compiler, parsing, syntax directed translation, type checking use of symbol tables, code optimization techniques, intermediate code generation, code generation and data flow analysis.
- Compare top down with bottom-up parsers, and develop appropriate parser to produce parse tree representation of the input.
- To provide an overview to students regarding different considerations and phases of compilation.

Course Outcomes:
- Demonstrate the ability to design a compiler given a set of language features.
- Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
- Acquire skills in using lex tool & yacc tool for developing a scanner and parser.
- Design and implement LL and LR parsers
- Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity and also design algorithms to generate machine code.

UNIT - I
Introduction: The structure of a compiler, the science of building a compiler, programming language basics.
Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT - II
Syntax Analysis: Introduction, Context-Free Grammars, writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

UNIT - III
Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.
Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT - IV
Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.
Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

UNIT - V

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

TEXT BOOK:
1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.

REFERENCE BOOKS:
1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly.
2. Compiler Construction, Louden, Thomson.

19DS3172: ARTIFICIAL INTELLIGENCE
(Professional Elective – I)

B. Tech III Year I Semester

L	T	P	C
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Prerequisites:

- A course on "Computer Programming and Data Structures"
- A course on "Mathematical Foundations of Computer Science"
- Some background in linear algebra, data structures and algorithms, and probability will all be helpful.

Course Objectives: The objective of this course is to:
- Learn the distinction between optimal reasoning Vs. human like reasoning
- Understand the concepts of state space representation, exhaustive search, and heuristic search together with the time and space complexities.
- Learn different knowledge representation techniques.
- Understand the applications of AI, namely game playing, theorem proving, and machine learning.
- Know about the various applications of AI.

Course Outcomes: At the end of the course, student will be able to:
- Ability to formulate an efficient problem space for a problem expressed in natural language.
- Select a search algorithm for a problem and estimate its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique for a given problem.
- Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.
- Apply AI techniques to real-world problems to develop intelligent systems.

UNIT - I
Problem Solving by Search-I: Introduction to AI, Intelligent Agents
Problem Solving by Search –II: Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching wih Partial Observations, Online Search Agents and Unknown Environment .

UNIT - II
Problem Solving by Search-II and Propositional Logic
Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time Decisions.
Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.
Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT - III
Logic and Knowledge Representation
First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT - IV
Planning
Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.
Planning and Acting in the Real World: Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning.

UNIT - V
Uncertain knowledge and Learning
Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use,

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory.
Learning: Forms of Learning, Supervised Learning, Learning Decision Trees. Knowledge in Learning: Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming.

TEXT BOOK:
1. Artificial Intelligence A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS:
1. Artificial Intelligence, 3rd Edn, E. Rich and K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

19CY3172: DATA WAREHOUSING AND DATA MINING
(Professional Elective – I)

B. Tech III Year I Semester	L	T	P	C
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Pre-Requisites:
- A course on "Database Management Systems"
- Knowledge of probability and statistics

Course Objectives:
- Study data warehouse principles and it's working.
- Learn data mining concepts.
- Understand association rules mining.
- Discuss classification algorithms.
- Learn how data is grouped using clustering techniques.

Course Outcomes:
- Students should be able to understand why the data warehouse in addition to database systems.
- Ability to perform the pre-processing of data.
- Ability to apply mining techniques on pre-processed data.
- Ability to identify the association rules, classification and clusters in large data sets.
- Ability to solve real world problems in business and scientific information using data mining

UNIT- I
Data warehouse: Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modelling, Schema Design, Star and Snow-Flake Schema, Fact Consultation, Fact Table, Fully Addictive, Semi-Addictive, Non Additive Measures; Fact- Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

UNIT- II
Introduction to Data Mining: Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Pre-processing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binarization, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

UNIT- III
Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set.

UNIT- IV
Classification: Problem Definition, General Approaches to solving a classification problem, Evaluation of Classifiers, Classification techniques, Decision Trees-Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction; Naive-Bayes Classifier, Bayesian Belief Networks; K-Nearest neighbor, classification Algorithm and Characteristics.

UNIT- V
Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

TEXT BOOKS:

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers Elsevier 3rd Edition, 2011.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education

REFERENCE BOOKS:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Warehousing Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.
3. The Data Warehouse Life Cycle Toolkit – Ralph Kimball, Wiley Student Edition.
4. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press.

19CY3173: AD-HOC & SENSOR NETWWORKS
(Professional Elective – I)

	L	T	P	C
B. Tech III Year I Semester	3	-	-	3

Prerequisites
- A course on "Computer Networks"

Course Objectives:
- To understand the concepts of sensor networks
- To understand the MAC and transport protocols for ad hoc networks
- To understand the security of sensor networks
- To understand the nature of Ad-hoc and sensor networks.
- To understand the applications of adhoc and sensor networks

Course Outcomes:
- Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks
- Appreciate the importance of Adhoc and sensor networks for applications like environment monitoring, habitat monitoring, health care and data acquisition systems.
- Ability to solve the issues in real-time application development based on ASN.
- Ability to conduct further research in the domain of ASN
- Capable of model building, new protocol design and strategies simulation of the systems that include the above.

UNIT - I
Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.
Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms- **Proactive**: DSDV; **Reactive**: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms- **Location Services**-DREAM, Quorum-based; **Forwarding Strategies:** Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

UNIT - II
Data Transmission - Broadcast Storm Problem, **Rebroadcasting Schemes**-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. **Multicasting: Tree-based-** AMRIS, MAODV; **Mesh-based:** ODMRP, CAMP; **Hybrid:** AMRoute**,** MCEDAR.

UNIT - III
Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR**.** TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc.

Counselling Code : **VBIT**

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UNIT - IV
Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

UNIT - V
Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots.

TEXT BOOKS:

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN – 981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

REFERENCES:
1. Wireless sensor networks A network perspective, by Jun Zheng, Abbas Jamalipour, A John Wiley & Sons INC Publications.
2. Wireless Ad hoc and Sensor Networks Protocols, Performance, and Control *By Jagannathan Sarangapani,* Edition1st Edition, First Published2007, eBook Published31 January 2017, Pub. Location Boca Raton.

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19CY3174: CLOUD COMPUTING
(Professional Elective – I)

B. Tech III Year I Semester

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Pre-requisites: courses on Computer Networks, Operating Systems.

Course Objectives:
- This course provides an insight into cloud computing.
- Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.
- The fundamental ideas behind Cloud Computing
- The evolution of the paradigm, its applicability benefits, as well as current and future challenges
- The basic ideas and principles in data center design; cloud management techniques and cloud software deployment considerations

Course Outcomes:
- Explain the core concepts of the cloud computing paradigm
- Ability to understand various service delivery models of a cloud computing architecture.
- Ability to understand the ways in which the cloud can be programmed and deployed.
- Understanding cloud service providers.
- Analyze various cloud programming models and apply them to solve problems on the cloud.

UNIT - I
Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT - II
Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT - III
Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

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UNIT - IV
Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT V
Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjra soft, Aneka Platform

TEXT BOOK:
1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:
1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

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19CY3175: ETHICAL HACKING
(Professional Elective – II)

B. Tech III Year I Semester

L	T	P	C
3	-	-	3

Prerequisites: courses on Operating Systems, Computer Networks.

Course Objectives:
- The aim of the course is to introduce the methodologies and framework of ethical hacking for enhancing the security.
- Provides Insights on Impacts of Hacking
- Overview on Types of Hackers; Information Security Models; Information Security Program.
- Business Perspective, Planning a Controlled Attack.
- Framework of Steps (Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Deliverable and Integration)

Course Outcomes:
- Understand what is right and what is wrong in the world of hacking.
- Gain the knowledge of the use and availability of tools to support an ethical hack
- Gain the knowledge of interpreting the results of a controlled attack
- Understand the role of politics, inherent and imposed limitations and metrics for planning of a test
- Comprehend the dangers associated with penetration testing

UNIT- I
Introduction: Hacking Impacts, The Hacker
Framework: Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, and Integration.

Information Security Models: Computer Security, Network Security, Service Security, Application Security, Security Architecture

Information Security Program: The Process of Information Security, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking.

UNIT - II
The Business Perspective: Business Objectives, Security Policy, Previous Test Results, Business Challenges.
Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased Attacks, Teaming and Attack Structure, Engagement Planner, The Right Security Consultant, The Tester, Logistics, Intermediates, Law Enforcement.

UNIT - III
Preparing for a Hack: Technical Preparation, Managing the Engagement.
Reconnaissance: Social Engineering, Physical Security, Internet Reconnaissance.

UNIT - IV
Enumeration: Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase.
Exploitation: Intuitive Testing, Evasion, Threads and Groups, Operating Systems, Password Crackers, RootKits, applications, Wardialing, Network, Services and Areas of Concern.

UNIT - V
Deliverable: The Deliverable, The Document, Overall Structure, Aligning Findings, Presentation.
Integration: Integrating the Results, Integration Summary, Mitigation, Defense Planning, Incident Management, Security Policy, Conclusion.

TEXT BOOK:
1. James S. Tiller, "The Ethical Hack: A Framework for Business Value Penetration Testing", Auerbach Publications, CRC Press.

REFERENCE BOOKS:
1. EC-Council, "Ethical Hacking and Countermeasures Attack Phases", Cengage Learning.
2. Michael Simpson, Kent Backman, James Corley, "Hands-On Ethical Hacking and Network, Defense", Cengage Learning.

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19CY3176: DATA SCIENCE
(Professional Elective – II)

B. Tech III Year I Semester

L	T	P	C
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Course Objectives
- To learn concepts, techniques and tools they need to deal with various facts of data science practice, including data collection and integration
- To exploring data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication
- To understand the basic knowledge of algorithms and reasonable programming experience.
- Familiarity with basic linear algebra and basic probability and statistics
- To identify the importance of recommendation systems and data visualization techniques

Course Outcomes
- Understand basic terms what Statistical Inference means. Identify probability distributions commonly used as foundations for statistical modeling. Fit a model to data
- Discuss the significance of exploratory data analysis (EDA) in data science and to apply basic tools (plots, graphs, summary statistics) to carry out EDA
- Apply basic machine learning algorithms and to identify common approaches used for Feature Generation
- Analyze fundamental mathematical and algorithmic ingredients that constitute a Recommendation Engine.
- To Build their own recommendation system using existing components

UNIT - I:
Introduction: What is Data Science? - Big Data and Data Science hype – and getting past the hype - Why now? – Datafication - Current landscape of perspectives - Skill sets needed - Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model - Intro to R

UNIT - II:
Exploratory Data Analysis and the Data Science Process - Basic tools (plots, graphs and summary statistics) of EDA - Philosophy of EDA - The Data Science Process - Case Study: Real Direct (online real estate firm) - Three Basic Machine Learning Algorithms, Linear Regression - k-Nearest Neighbors (k-NN) - k-means

UNIT - III:
One More Machine Learning Algorithm and Usage in Applications - Motivating application: Filtering Spam - Why Linear Regression and k-NN are poor choices for Filtering Spam - Naive Bayes and why it works for Filtering Spam

Counselling Code : **VBIT**

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UNIT - IV:

Data Wrangling: APIs and other tools for scrapping the Web - Feature Generation and Feature Selection (Extracting Meaning From Data) - Motivating application: user (customer) retention - Feature Generation (brainstorming, role of domain expertise, and place for imagination) - Feature Selection algorithms – Filters; Wrappers; Decision Trees; Random Forests

UNIT - V:

Data Visualization - Basic principles, ideas and tools for data visualization 3 - Examples of inspiring (industry) projects - Exercise: create your own visualization of a complex dataset - Data Science and Ethical Issues - Discussions on privacy, security, ethics - A look back at Data Science - Next-generation data scientists.

TEXT BOOKS:
1. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014
2. Mining of Massive Datasets v2.1, Jure Leskovek, Anand Rajaraman and Jeffrey Ullman, Cambridge University Press, 2014
3. Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, 2013 (ISBN 0262018020)

REFERENCE BOOKS:
1. Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani and Jerome Friedman, 2nd Edition, 2009 (ISBN 0387952845)
2. Foundations of Data Science, Avrim Blum, John Hopcroft and Ravindran Kannan
3. Data Mining and Analysis: Fundamental Concepts and Algorithms, Mohammed J. Zaki and Wagner Miera Jr. Cambridge University Press, 2014
4. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber and Jian Pei, 3rd Edition, 2011 (ISBN 0123814790)

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19CY3177: DISTRIBUTED SYSTEMS
(Professional Elective – II)

B. Tech III Year I Semester

L	T	P	C
3	-	-	3

Pre-requisites
- A course on "Operating Systems".
- A course on "Computer Organization & Architecture".

Course Objectives:
- This course provides an insight into Distributed systems.
- Understanding on Peer to Peer Systems
- Understanding on Transactions and Concurrency control
- Understanding on Security
- Understanding on Distributed shared memory

Course Outcomes:
- Ability to understand Transactions and Concurrency control.
- Ability to understand Security issues.
- Understanding Distributed shared memory.
- Understanding peer to peer systems.
- Ability to design distributed systems for basic level applications.

UNIT - I
Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models -Introduction, Architectural and Fundamental models, Networking and Internetworking, Inter process Communication, Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study -Java RMI

UNIT - II
Operating System Support- Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, operating system architecture, Distributed File Systems-Introduction, File Service architecture.

UNIT - III
Peer to Peer Systems–Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies -Pastry, Tapestry, Application case studies -Squirrel, Ocean Store. Time and Global States-Introduction, Clocks, events and Process states, synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging. Coordination and Agreement. Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT - IV

Transactions and Concurrency Control-Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering. Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

UNIT - V

Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data. Distributed shared memory, Design and Implementation issues, and Consistency models.

TEXT BOOKS:

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems, S. Ghosh, Chapman & Hall/CRC, Taylor & Francis Group, 2010.

REFERENCE BOOKS:

1. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.

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19CY3178: CYBER LAWS
(Professional Elective – II)

B. Tech III Year I Semester

L	T	P	C
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Course Objectives:

- To understand the significance of cyber laws and different acts.
- Make Learner Conversant with The Social and Intellectual Property Issues Emerging from 'Cyberspace.
- Explore The Legal and Policy Developments in Various Countries to Regulate Cyberspace.
- Develop The Understanding of Relationship Between Commerce and Cyberspace.
- Give Learners in Depth Knowledge of Information Technology Act and Legal Frame Work Of Right To Privacy, Data Security And Data Protection.

Course Outcomes:

- Understand the need of cyber laws.
- Understand the important provisions of the act
- Understanding the significance of digital signatures.
- Analyze regulatory authorities in cyber law.
- Overview of cybercrime and procedure to report cybercrime.

UNIT - I

Introduction: History of Internet and World Wide Web, need for cyber law, Cybercrime on the rise, important terms related to cyber law.

Cyber law in India: Need for cyber law in India, History of cyber law in India, Information Technology Act, 2000, Overview of other laws amended by the IT Act, 2000, State Emblem of India (Prevention of Improper Use) Act 2005, National Policy on Information Technology 2012.

UNIT - II

Overview of The Information Technology Act, 2000: Applicability of the Act, Important provisions of the Act: Digital signature and Electronic signature, Digital Signature under the IT Act, 2000, EGovernance Attribution, Acknowledgement and Dispatch of Electronic Records, Certifying Authorities, Electronic Signature Certificates, Duties of Subscribers, Penalties and Offences, Intermediaries, Defusion of cybercrimes, Defusion of Cyber Criminal Legacy.

UNIT - III

Overview of Rules Issued Under the IT Act, 2000, Electronic Commerce, Electronic Contracts, Cyber Crimes, Cyber Frauds, Cyberpolicing.

UNIT - IV

Regulatory Authorities: Department of Electronics and Information Technology, Controller of Certifying Authorities (CCA), Cyber Appellate Tribuna, Indian Computer Emergency Response Team (ICERT), Cloud Computing, Case Laws.

UNIT - V

Introduction to Cybercrime and Procedure to Report Cybercrime: Procedure to Report Cyber Crime, Some Basic Rules for Safe Operations of the Computer and Internet, The Criminal Law (Amendment) Act, 2013: Legislative Remedies For Online Harassment And Cyber stalking In India.

TEXT BOOKS:
1. Pavan Duggal, Textbook On Cyber Law, second edition, Universal Law.
2. Pavan Duggal, Indian Cyberlaw On Cyber Crimes.

REFERENCE BOOKS:

1. Debby Russell and Sr. G.T. Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O' Reilly Media, 2006.

2. Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall, 2004.

3. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009.

4. Thomas R Peltier, Justin Peltier and John blackley, "Information Security Fundamentals", 2nd Edition, Prentice Hall, 1996.

5. Jonathan Rosenoer, "Cyber law: the Law of the Internet", Springer-verlag, 1997.

6. James Graham, "Cyber Security Essentials" Averbach Publication T & F Group.

7. PGF Cyberpolicing to Defuse Fake Government of Telangana (FGoT), Fake Government of India (FGoI) and Cybercriminal Legacy, Page.no 181-191, ISBN 978-981-16-3659-2.

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19CY3179: IoT SECURITY
(Professional Elective – II)

B. Tech III Year I Semester

L	T	P	C
3	-	-	3

Course Objectives:
- Understand the fundamentals, various attacks and importance of Security aspects in IoT.
- Understand the techniques, protocols and some idea on security towards Gaming models.
- Understand the operations of Bitcoin block chain, crypto-currency as application of block chain technology.
- Understand the essential components of IoT.
- Understand security and privacy challenges of IoT.

Course Outcomes:
- Incorporate the best practices learnt to identify the attacks and mitigate the same.
- Adopt the right security techniques and protocols during the design of IoT products.
- Assimilate and apply the skills learnt on ciphers and block chains when appropriate.
- Describe the essential components of IoT.
- Find appropriate security/privacy solutions for IoT.

UNIT - I
Fundamentals of IoT and Security and its need, Prevent Unauthorized Access to Sensor Data, Block ciphers, Introduction to Block chain, Introduction of IoT devices, IoT Security Requirements, M2M Security, Message integrity, Modeling faults and adversaries, Difference among IoT devices, computers, and embedded devices.

UNIT - II
IoT and cyber-physical systems RFID Security, Authenticated encryption Byzantine Generals problem sensors and actuators in IoT. IoT security (vulnerabilities, attacks, and countermeasures), Cyber Physical Object Security, Hash functions, Consensus algorithms and their scalability problems, Accelerometer, photoresistor, buttons.

UNIT - III
Security engineering for IoT development Hardware Security, Merkle trees and Elliptic curves digital signatures, verifiable random functions, Zero-knowledge systems motor, LED, vibrator. IoT security lifecycle, Front-end System Privacy Protection, Management, Secure IoT Databases, Public-key crypto (PKI), block chain, the challenges, and solutions, analog signal vs. digital signal.

UNIT - IV
Data Privacy Networking Function Security Trees signature algorithms proof of work, Proof of stake, Networking in IoT, Device/User Authentication in IoT IoT Networking Protocols, Crypto-currencies, alternatives to Bitcoin consensus, Bitcoin scripting language and their use Real-time communication.

UNIT - V
Introduction to Authentication Techniques Secure IoT Lower Layers, Bitcoin P2P network, Ethereum and Smart Contracts, Bandwidth efficiency, Data Trustworthiness in IoT Secure IoT Higher Layers, Distributed consensus, Smart Contract Languages and verification challenges data analytics in IoT - simple data analyzing methods.

TEXT BOOKS:
1. B. Russell and D. Van Duren, "Practical Internet of Things Security," Packt Publishing, 2016.
2. FeiHU, "Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations", CRC Press, 2016.
3. Narayanan et al., "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction," Princeton University Press, 2016.

REFERENCE BOOKS:
1. A. Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies," O'Reilly, 2014.
2. T. Alpcan and T. Basar, "Network Security: A Decision and Game-theoretic Approach," Cambridge University Press, 2011.
3. Security and the IoT ecosystem, KPMG International, 2015.
4. Internet of Things: IoT Governance, Privacy and Security Issues" by European Research Cluster.
5. Ollie Whitehouse, "Security of Things: An Implementers' Guide to Cyber-Security for Internet of Things Devices and Beyond", NCC Group, 2014
6. Josh Thompson, 'Block chain: The Block chain for Beginnings, Guide to Block chain Technology and Block chain Programming', Create Space Independent Publishing Platform, 2017.

19CY3152: CRYPTOGRAPHY AND NETWORK SECURITY LAB

B. Tech III Year I Semester	**L**	**T**	**P**	**C**
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Course Objectives:

- Explain the objectives of information security.
- To understand basics of Cryptography and Network Security.
- To be able to secure a message over insecure channel by various means
- Explain the importance and application of each of confidentiality, integrity, authentication and availability.
- Understand various cryptographic algorithms.

Course Outcomes:

- Understand basic cryptographic algorithms, message and web authentication and security issues.
- Get an overview of cryptographic algorithms
- Hands on experience on c/java programming languages.
- Identify information system requirements for both of them such as client and server.
- Understand the current legal issues towards information security.

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
   a) Ceaser cipher
   b) Substitution cipher c. Hill Cipher

4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.
8. Write a Java program to implement RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

TEXT BOOKS:
1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition.
2. Cryptography and Network Security: Atul Kahate, McGraw Hill, 3rd Edition.

REFERENCE BOOKS:
1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, McGraw Hill, 3rd Edition.
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH.
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

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19CY3153: DATABASE MANAGEMENT SYSTEMS LAB

B. Tech III Year I Semester

L	T	P	C
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Co-requisites:
- Co-requisite of course "Database Management Systems"

Course Objectives:
- Introduce ER data model, database design and normalization
- To facilitate students in Database design
- To emphasize the importance of normalization in databases.
- To familiarize issues of concurrency control and transaction management.
- Learn SQL basics for data definition and data manipulation

Course Outcomes:
- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers
- Hands on experience on Triggers and Cursors
- Hands on experience on DDL and DML commands.

List of Experiments:
1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS:
1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCES BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C.J. Date, *Pearson Education*
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, *SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student Edition.*

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19HS3151: ADVANCED ENGLISH COMMUNICATION SKILLS LAB

B. Tech III Year I Semester

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Introduction

A course on Advanced English Communication Skills (AECS) Lab is considered essential at the third year level of B.Tech and Pharmacy courses. At this stage, the students need to prepare themselves for their career which requires them to listen to, read, speak and write in English both for their professional and interpersonal communication. The main purpose of this course is to prepare the students of Engineering for their placements.

Course Objectives

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve students' fluency in spoken English
- To enable them to listen to English spoken at normal conversational speed and to help them develop their vocabulary
- To read and comprehend texts in different contexts and to communicate their ideas relevantly and coherently in writing
- To make students industry-ready
- To help students acquire behavioural skills for their personal, professional life and respond appropriately in different socio-cultural and professional contexts

Course Outcomes

Students will be able to:

- Acquire vocabulary and use it contextually
- Listen and speak effectively
- Develop proficiency in academic reading and writing
- Increase possibilities of job prospects
- Communicate confidently in formal and informal contexts

UNIT-I

Inter-personal Communication and Building Vocabulary –Starting a Conversation– Responding Appropriately and Relevantly –Using Appropriate Body Language –Role Play in Different Situations –Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.

UNIT-II

Reading Comprehension –General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, Skimming, Scanning, Inferring Meaning.

UNIT-III

Writing Skills –Structure and Presentation of Different Types of Writing –Letter Writing/Resume Writing/ e-correspondence/ Technical Report Writing.

UNIT-IV

Presentation Skills –Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/ emails/Assignments…etc.

UNIT-V

Group Discussion and Interview Skills –Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation-Concept and Process, Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference & Video-conference and Mock Interviews.

REFERENCES:
1. Kumar, Sanjay and Pushp Lata. English for Effective Communication, Oxford University Press, 2015.
2. Konar, Nira. English Language Laboratories –A Comprehensive Manual, PHI Learning Pvt. Ltd., 2011

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19CY3181: SUMMER INTERNSHIP

B. Tech III Year I Semester

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19MC0005: PROFESSIONAL ETHICS

B. Tech III Year I Semester

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Course Objectives
- To enable the students to imbibe and internalize the Values and Ethical Behavior in the personal and Professional lives.
- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of others.
- To create awareness on assessment of safety and risk

Course Outcomes
- The students will understand the importance of Values and Ethics in their personal lives and professional careers.
- The students will learn the rights and responsibilities as an employee, team member and a global citizen.
- Articulate what makes a particular course of action ethically defensible
- Identify the multiple ethical interests at stake in a real-world situation or practice
- Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

UNIT - I
Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT - II
Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT - III
Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers - The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT - IV
Work Place Rights & Responsibilities, Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research - The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing.
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UNIT - V
Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:
1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCES:
1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e, Cengage learning, 2015.
2. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

III YEAR - II SEM

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19CY3211: CYBER SECURITY

B. Tech III Year II Semester	**L**	**T**	**P**	**C**
	3	**1**	**-**	**4**

Prerequisites: Course on Computer Networks.

Course objectives:
- To understand various types of cyber-attacks and cyber-crimes
- To learn threats and risks within context of the cyber security
- To have an overview of the cyber laws & concepts of cyber forensics
- To study the defensive techniques against these attacks
- To understand the security challenges presented by mobile devices and information systems access in the cybercrime world.

Course Outcomes:
- Analyze and evaluate the cyber security needs of an organization.
- Understand Cyber Security Regulations and Roles of International Law and Learn, analyze and validate Forensics Data
- Understand web threats, security and privacy implications of an organization.
- Design and develop a security architecture for an organization.
- Understand fundamental concepts of data privacy attacks and policies.

UNIT - I
Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Cyberintelligence Vs. CyberCounterintelligence, Comprehensive Cyber Security Policy.

UNIT - II
Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

UNIT - III
Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, Security Intelligence, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations

UNIT - V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc

Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. **MiniCases:** The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B.B. Gupta, D.P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335,2018.

REFERENCE BOOKS:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group.
3. https://drive.google.com/file/d/1FNbtPdvbY3BFkF18suPYYf6u5iNRFc4-/view.

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19CY3212: CYBER CRIME INVESTIGATION & DIGITAL FORENSICS

B. Tech III Year II Semester

L	T	P	C
3	1	-	4

Prerequisites: course on Computer Networks, Cryptography and Network Security, Ethical hacking and cyber laws.

Course Objectives:
- To have an overview of cybercrime and its types.
- To study the basic concepts of cybercrime issues.
- To study investigation tools and techniques.
- To learn digital forensics tools and technology
- To understand cybercrime laws and acts, evidence handling procedures.

Course Outcomes:
- Analyze cybercrime issues and types.
- Understand the fundamentals of cybercrime and issues.
- Understand different investigation tools for cybercrime.
- Understand basics of Forensic Technology and Practices.
- Analyze different laws, ethics and evidence handling procedures.

UNIT - I
Introduction: Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: Social Engineering, Categories of Cyber Crime, Property Cyber Crime.

UNIT - II
Cyber Crime Issues: Unauthorized Access to Computers, Degree of cybercrime, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation, Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses.

UNIT - III
Investigation: Introduction to Cyber Crime Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Hands on Case Studies. Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

UNIT - IV
Digital Forensics: Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and

Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics.

UNIT - V
Laws and Acts: Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC, Electronic Communication Privacy ACT, IT ACT 2000 66C-Identity theft, Legal Policies.

TEXT BOOKS:
1. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.
2. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics ", Tata McGraw -Hill, New Delhi, 2006.

REFERENCE BOOKS:
1. Robert M Slade," Software Forensics", Tata McGraw - Hill, New Delhi, 2005.
2. Bernadette H Schell, Clemens Martin, "Cybercrime", ABC – CLIO Inc, California, 2004.
3. "Understanding Forensics in IT ", NIIT Ltd, 2005.
4. Cyber Intelligence Alternatives to Offset Online Sedition by in-Website Image Analysis Through WebCrawler Cyberforensics, P.no 187-200, ISBN 978-981-13-3599-0.

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19CY3213: SOFTWARE ENGINEERING

B. Tech III Year II Semester	**L**	**T**	**P**	**C**
	3	**1**	**-**	**4**

Prerequisites:
- Computer Programming
- Database Management Systems

Course Objectives
- To understand fundamental principles of Software engineering, and their application in the development of software products.
- To understand and create the software requirements specifications document.
- To understand and use unified modeling language for specifying, analysis and designing.
- To understand testing strategies for testing software applications
- To understand Software metrics and Risk Management strategies to identify potential problems before they occur.

Course Outcomes
- Able to apply the software engineering lifecycle phases communication, planning, analysis, design, construction, and deployment.
- Ability to translate end-user requirements into system and software requirements into Software Requirements Specification Document (SRS)
- Able to apply UML in object-oriented software modeling to develop computer software.
- Able to identify problems in software and will be able to develop a simple testing report.
- To understand Software Metrics, potential risk and how to manage them though RMMM plan.

UNIT - I
Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.
A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models.
Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

UNIT - II
Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

System models: Context models, behavioral models, data models, object models, structured methods.

UNIT - III
Design Engineering: Design process and design quality, design concepts, the design model.
Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT - IV
Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.
Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT - V
Metrics for Process and Products: Software measurement, metrics for software quality.
Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS:
1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS:
1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

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19CY3271: MOBILE APPLICATION SECURITY
(Professional Elective – III)

B. Tech III Year II Semester

L	T	P	C
3	-	-	3

Course Objectives:
- This course provides a thorough understanding of issues facing mobile devices, platforms and mobile development strategies.
- The course objective focus will be on wireless Application Protocol (WAP) and Mobile HTML security on PDAs/Smartphone.
- The course objective focus on Bluetooth's functionality and ubiquity on mobile devices provides some exciting opportunities for mobile application developers.
- This course objective provides knowledge on SMS security from an attacker's point of view.
- This course objective discusses the enterprise security features, support, and applications available on four major mobile platforms—BlackBerry OS, Windows Mobile, iPhone OS, and Google Android.

Course Outcomes:
- Understand the issues and technologies involved in designing a wireless and mobile system that is robust against various attacks.
- Gain knowledge and understand the security controls of multiple mobile operating systems
- Understand and analyze the issues and technologies involved in Bluetooth Technology.
- Analyze and understand the Security of Short Message Service
- Understand and analyze Enterprise security on the Mobile OS Device.

UNIT - I
Top Mobile Issues and Development Strategies: Top Issues Facing Mobile Devices, Physical Security, Secure Data Storage (on Disk), Strong Authentication with Poor Keyboards , Multiple-User Support with Security, Safe Browsing Environment , Secure Operating Systems, Application Isolation, Information Disclosure, Virus, Worms, Trojans, Spyware, and Malware , Difficult Patching/Update Process, Strict Use and Enforcement of SSL, Phishing , Cross-Site Request Forgery (CSRF), Location Privacy/Security, Insecure Device Drivers, Multi Factor Authentication, Tips for Secure Mobile Application Development.

UNIT - II
WAP and Mobile HTML Security WAP and Mobile HTML Basics, Authentication on WAP/Mobile HTML Sites, Encryption, Application Attacks on Mobile HTML Sites, Cross-Site Scripting, SQL Injection, Cross-Site Request Forgery, HTTP Redirects, Phishing, Session Fixation, Non-SSL Login, WAP and Mobile Browser Weaknesses, Lack of

HTTPOnly Flag Support, Lack of SECURE Flag Support, Handling Browser Cache, WAP Limitations.

UNIT - III

Bluetooth Security Overview of the Technology , History and Standards , Common Uses , Alternatives, Future, Bluetooth Technical Architecture , Radio Operation and Frequency, Bluetooth Network Topology , Device Identification , Modes of Operation , Bluetooth Stack ,Bluetooth Profiles, Bluetooth Security Features , Pairing , Traditional Security Services in Bluetooth, Security "Non-Features" , Threats to Bluetooth Devices and Networks, Bluetooth Vulnerabilities, Bluetooth Versions Prior to v1.2, Bluetooth Versions Prior to v2.1.

UNIT - IV

SMS Security Overview of Short Message Service, Overview of Multimedia Messaging Service, Wireless Application Protocol (WAP), Protocol Attacks, Abusing Legitimate Functionality, Attacking Protocol Implementations, Application Attacks, iPhone Safari, Windows Mobile MMS, Motorola RAZR JPG Overflow, Walkthroughs, Sending PDUs, Converting XML to WBXML.

UNIT - V

Enterprise Security on the Mobile OS Device Security Options, PIN, Remote, 346 Secure Local Storage, Apple iPhone and Keychain, Security Policy Enforcement, Encryption, Full Disk Encryption, E-mail Encryption, File Encryption, Application Sandboxing, Signing, and Permissions, Application Sandboxing, Application Signing, Permissions, Buffer Overflow Protection, Windows Mobile, iPhone, Android, BlackBerry, Security Feature Summary.

TEXT BOOK:
1. Alex Alexandrou, Cybercrime and Information Technology: The Computer Network Infrastructure and Computer Security, Cybersecurity Laws, Internet of Things (IoT), and Mobile Devices, CRC Press, 2021
2. Mobile Application Security, Himanshu Dwivedi, Chris Clark, David Thiel, TATA McGraw Hill.

REFERENCE BOOKS:
1. Mobile and Wireless Network Security and Privacy, Kami S. Makki, et al, Springer.
2. Android Security Attacks Defenses, Abhishek Dubey, CRC Press

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19CY3272: MACHINE LEARNING
(Professional Elective – III)

	L	T	P	C
B. Tech III Year II Semester	3	-	-	3

Prerequisites
- Data Structures
- Knowledge on statistical methods

Course Objectives
- Define machine learning and understand the basic theory underlying machine learning.
- Understand the basic concepts of learning and decision trees.
- Understand neural networks and Bayesian techniques for problems appear in machine learning
- Understand the instant based learning and reinforced learning
- Perform statistical analysis of machine learning techniques

Course Outcomes
- Choose the learning techniques and investigate concept learning
- Identify the characteristics of decision tree and solve problems associated with
- Apply effectively neural networks for appropriate applications
- Apply Bayesian techniques and derive effectively learning rules
- Evaluate hypothesis and investigate instant based learning and reinforced learning

UNIT - I
Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning. Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias.

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT - II
Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm. **Artificial Neural Networks-2-** Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural Networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning
.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT- IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, *Q*–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT - V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

TEXT BOOK:

1. Machine Learning – Tom M. Mitchell, - MGH.

REFERENCE BOOK:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis.

Counselling Code : **VBIT**

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19CY3273: DevOps
(Professional Elective – III)

	L	T	P	C
B. Tech III Year II Semester	3	-	-	3

Course Objectives: The main objectives of this course are to
- Describe the agile relationship between development and IT operations.
- Make the learner identify components of Devops environment
- Understand the skill sets and high-functioning teams involved in DevOps
- Understand related methods to reach a continuous delivery capability
- Implement automated system update and DevOps lifecycle

Course Outcomes: On successful completion of this course, students will be able to:
- Identify components of Devops environment
- Describe Software development models and architectures of DevOps
- Apply different project management, integration, testing and code deployment tool
- Investigate different DevOps Software development models
- Collaborate and adopt Devops in real-time projects

UNIT - I
Introduction: Introduction, Agile development model, DevOps, and ITIL. DevOps process and Continuous Delivery, Release management, Scrum, Kanban, delivery pipeline, bottlenecks, examples

UNIT - II
Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing.
DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices, and the data tier, DevOps, architecture, and resilience.

UNIT - III
Introduction to project management: The need for source code control, The history of source code management, Roles and code, source code management system and migrations, Shared authentication, Hosted Git servers, Different Git server implementations, Docker intermission, Gerrit, The pull request model, GitLab.

UNIT - IV
Integrating the system: Build systems, Jenkins build server, managing build dependencies, Jenkins plugins, and file system layout, The host server, Build slaves, Software on the host, Triggers, Job chaining and build pipelines, Build servers and infrastructure as code, Building by dependency order, Build phases, Alternative build servers, Collating quality measures.

UNIT - V

Testing Tools and automation: Various types of testing, Automation of testing Pros and cons, Selenium - Introduction, Selenium features, JavaScript testing, Testing backend integration points, Test-driven development, REPL-driven development

Deployment of the system: Deployment systems, Virtualization stacks, code execution at the client, Puppet master and agents, Ansible, Deployment tools: Chef, Salt Stack and Docker

TEXT BOOKS:

1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN10: 1788392574.
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952.

REFERENCE BOOK:

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley; ISBN-10.

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19DS3273: MOBILE APPLICATION DEVELOPMENT
(Professional Elective – III)

	L	T	P	C
B. Tech III Year II Semester	3	-	-	3

Prerequisites:
- Acquaintance with JAVA programming.
- A Course on DBMS.

Course Objectives: The Objective of this course is to:
- Demonstrate their understanding of the fundamentals of Android operating systems.
- Improves their skills of using Android software development tools.
- Demonstrate their ability to develop software with reasonable complexity on mobile platform.
- Demonstrate their ability to deploy software to mobile devices.
- Demonstrate their ability to debug programs running on mobile devices.

Course Outcomes: At the end of the course, the students will be able to:
- Student understands the working of Android OS Practically.
- Student will be able to develop Android user interfaces
- Understand the use of various Layouts and Widgets in Android Applications.
- Student will be able to develop, deploy and maintain the Android Applications.
- Able to develop embedded software for Mobile phones with SQLite.

UNIT - I
Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools
Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT - II
Android User Interface: Measurements – Device and pixel density independent measuring
UNIT - s Layouts – Linear, Relative, Grid and Table Layouts
User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers
Event Handling – Handling clicks or changes of various UI components

Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT - III

Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS. Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity. Notifications – Creating and Displaying notifications, Displaying Toasts.

UNIT - IV

Persistent Storage: Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

UNIT - V

Database – Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOKS:
1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013.

REFERENCE BOOK:
1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

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19CY3274:BLOCKCHAIN TECHNOLOGY
(Professional Elective – III)

	L	**T**	**P**	**C**
B. Tech III Year II Semester	**3**	**-**	**-**	**3**

Prerequisites:
- Knowledge in security and applied cryptography.
- Knowledge in distributed databases.

Course Objectives:
- Know the fundamentals of Blockchain technology
- Know about permission less and permissioned blockchain platforms
- Learn about cryptocurrencies
- Learn about the decentralized identity management
    - Learn about the various applications of blockchain technology

Course Outcomes:
- Describe blockchain structure and its foundations.
- Demonstrate the process of mining cryptocurrencies
- Ability to write smart contracts.
- Ability to decentralize the identity using blockchain
- Apply the blockchain technology in different areas like healthcare.

UNIT I:
Blockchain Technology: Introduction, distributed systems, growth of Blockchain Technology, Architecture, elements of blockchain, Types of blockchain. Cryptographic primitives. Cryptocurrencies: Bitcoin- an overview, transactions, mining. Ethereum- an overview, EVM.

UNIT II:
Consensus Protocols- The consensus problem, Permissionless Models, Permissioned Models, Proof of Work, Practical BFT, Proof Stake, Crash Fault Tolerence.

UNIT III:
Introduction to Solidity. Smart Contracts: History and definition, templates, Deploying smart contracts. Etherium Network, Etherium Virtual Machine, Etherium Development Environment. Hyperledger Fabric- an overview.

UNIT IV:
Decentralized Identity Management: Hyperledger Indy. Blockchain Interoperability: Hyperledger Aries. Blockchain Scalability and challenges, IoT with blockchain.

UNIT V:
Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations.

TEXT BOOKS:
1. Mastering Blockchain: A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies, Ethereum, and more, 3rd Edition, Imran Bashir, Packt Publishing, 2020.
2. Melanie Swan, Blockchain Blueprint for Economy, O'reilly.
3. Bitcoin and Cryptocurrency Technologies- A Comprehensive Introduction, Arvind Narayanan, Princeton University Press, 2016.

REFERENCES:
1. Mastering Bitcoin: Programming the Open Blockchain by Andreas M. Antonopoulos
2. Hyperledger Tutorials - https://www.hyperledger.org/use/tutorials
3. Ethereum Development Resources - https://ethereum.org/en/developers

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19CY3251: CYBER SECURITY LAB

B. Tech III Year II Semester

L	T	P	C
-	-	3	1.5

Prerequisites: A course on "Network Security and Cryptography".

Course Objective:
- To understand NMAP for network discovery and services.
- To lure cyber attackers and detect, deflect and study hacking attempts to gain unauthorized access to information systems. (Pentbox)
- To learn foot-printing to gather target information using Dmitry.
- To understand network communication using Wireshark.
- To understand firewall filtering rules.

Course Outcome:
- Get the skill to identify cyber threats/attacks.
- Get the knowledge to solve security issues in day to day life.
- Able to use Autopsy tools
- Perform Memory capture and analysis
- Demonstrate Network analysis using Network miner tools

List of Experiments
1. Perform an Experiment for port scanning with nmap
2. Set Up a honeypot and monitor the honeypot on the network
3. Install Jscript/Cryptool tool (or any other equivalent) and demonstrate Asymmetric, Symmetric crypto algorithm, Hash and Digital/PKI signatures.
4. Generate minimum 10 passwords of length 12 characters using open SSL command
5. Perform practical approach to implement Footprinting-Gathering target information using Dmitry-Dmagic, UAtester
6. Working with sniffers for monitoring network communication (Wireshark).
7. Using Snort, perform real time traffic analysis and packet logging.
8. Perform email analysis using the Autopsy tool.
9. Perform Registry analysis and get boot time logging using process monitor tool
10. Perform File type detection using Autopsy tool
11. Perform Memory capture and analysis using FTK imager tool
12. Perform Network analysis using the Network Miner tool
13. Firewall filtering techniques using IP tables on Linux.

TEXT BOOKS:
1. Real Digital Forensics for Handheld Devices, E. P. Dorothy, Auerback Publications, 2013.
2. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics, J. Sammons, Syngress Publishing, 2012

REFERENCE BOOKS:

1. Handbook of Digital Forensics and Investigation, E. Casey, Academic Press, 2010.
2. Malware Forensics Field Guide for Windows Systems: Digital Forensics Field Guides, C. H. Malin, E. Casey and J. M. Aquilina, Syngress, 2012.
3. The Best Damn Cybercrime and Digital Forensics Book Period, J. Wiles and A. Reyes, Syngress, 2007.

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19CY3252: CYBER CRIME INVESTIGATION & DIGITAL FORENSICS LAB

B. Tech III Year II Semester

L	T	P	C
-	-	3	1.5

Course Objectives:
- To provide students with a comprehensive overview of collecting, investigating, preserving, and presenting evidence of cybercrime left in digital storage devices, emails, browsers, mobile devices using different Forensics tools.
- To Understand file system basics and where hidden files may lie on the disk, as well as how to extract the data and preserve it for analysis.
- Understand some of the tools of e-discovery.
- To understand the network analysis, Registry analysis and analyze attacks using different forensics tools.
- To gather data from mobile devices with the goal of analysis using forensic tool.

Course Outcomes:
- Learn the importance of a systematic procedure for investigation of data found on digital storage media that might provide evidence of wrong-doing.
- To learn the file system storage mechanisms and retrieve files in hidden format.
- Learn the use of computer forensics tools used in data analysis.
- Learn how to find data that may be clear or hidden on a computer disk, find out the open ports for the attackers through network analysis, Registry analysis.
- Understand how to do data acquisition from mobile phones for investigation purpose

List of Experiments
1. **Perform email analysis** using the tools like Exchange EDB viewer, MBOX viewer and View user mailboxes and public folders, Filter the mailbox data based on various criteria, Search for particular items in user mailboxes and public folders
2. **Perform Browser history analysis** and get the downloaded content, history, saved logins, searches, websites visited etc using Foxton Forensics tool, Dumpzilla.
3. **Perform mobile analysis** in the form of retrieving call logs, SMS log, all contacts list using the forensics tool like SAFT
4. **Perform Registry analysis** and get boot time logging using process monitor tool
5. **Perform Disk imaging and cloning the** using the X-way Forensics tools
6. **Perform Data Analysis i.e** History about open file and folder, and view folder actions using Lastview activity tool
7. **Perform Network analysis** using the Network Miner tool.
8. **Perform information for incident response** using the crowd Response tool
9. **Perform File type detection using** Autopsy tool
10. **Perform Memory capture and analysis** using the Live RAM capture or any forensic tool.
11. Password cracking

1. Crack Linux password using the John the ripper tool
2. Crack the password using The Hydra tool by performing Brue force attack.
3. Crack Wi-Fi password using Aircrack-ng tool

12. Perform Encrypted disk detection by using Magnet encrypted disk detector tool

13. Perform log files analysis using any log monitoring tool.

14. Cyberpolicing case study: Fake GoI cybercrimes.

15. Retrieve Information Using Wayback machine:A Cyberforensic tool.

TEXT BOOKS:
1. Real Digital Forensics for Handheld Devices, E. P. Dorothy, Auerback Publications, 2013.
2. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics, J. Sammons, Syngress Publishing, 2012.

REFERENCE BOOKS:
1. Handbook of Digital Forensics and Investigation, E. Casey, Academic Press, 2010.
2. Malware Forensics Field Guide for Windows Systems: Digital Forensics Field Guides, C. H. Malin, E. Casey and J. M. Aquilina, Syngress, 2012.
3. The Best Damn Cybercrime and Digital Forensics Book Period, J. Wiles and A.Reyes, Syngress, 2007.
4. https://drive.google.com/file/d/1FNbtPdvbY3BFkF18suPYYf6u5iNRFc4-/view.

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19CY32P1: MOBILE APPLICATION SECURITY LAB
(Professional Elective – III Lab)

B. Tech III Year II Semester

L	T	P	C
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Course Objectives:
- This course provides a thorough understanding of issues facing mobile devices, platforms and mobile development strategies.
- The course objective focus will be on wireless Application Protocol (WAP) and Mobile HTML security on PDAs/smartphone.
- The course objective focus on Bluetooth's functionality and ubiquity on mobile devices provides some exciting opportunities for mobile application developers.
- This course objective provides knowledge on SMS security from an attacker's point of view.
- This course objective discusses the enterprise security features, support, and applications available on four major mobile platforms—BlackBerry OS, Windows Mobile, iPhone OS, and Google Android

Course Outcomes:
- Understand the issues and technologies involved in designing a wireless and mobile system that is robust against various attacks.
- Gain knowledge and understand the security controls of multiple mobile operating systems
- Understand and analyze the issues and technologies involved in Bluetooth Technology.
- Analyze and understand the Security of Short Message Service
- Understand and analyze Enterprise security on the Mobile OS Device.

List of Experiments:
1. Use the following tools to analyze an apk to detect for any existence of vulnerabilities
    a. QARK
    b. DEVKNOX
    c. OWASP
    d. DROZER
2. Implement Authentication: Single Sign-on
3. Implement Authentication: Two Factor Authentication
4. Demonstrate how to Detect and Remove Malware from Android Phone
5. Demonstrate Remote Lock or Wipe

TEXT BOOK:
1. Mobile Application Security, Himanshu Dwivedi, Chris Clark, David Thiel, TATA McGraw Hill.

REFERENCE BOOKS:
1. Mobile and Wireless Network Security and Privacy, Kami S.Makki,et al, Springer.
2. Android Security Attacks Defenses, Abhishek Dubey, CRC Press.

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19CY32P2: MACHINE LEARNING LAB
(Professional Elective – III Lab)

B. Tech III Year II Semester

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Course Objective: **The objective of this lab is to**
- Formulate machine learning problems corresponding to different applications.
- Apply machine learning algorithms to solve problems of moderate complexity.
- Apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.
- Discover patterns in the user data and then make predictions based on these and intricate patterns for answering business questions and solving business problems.
- Develop skills of using recent machine learning packages for solving practical problems.

Course Outcomes: After the completion of the course the student will be able to:
- Understand complexity of Machine Learning algorithms and their limitations;
- Understand the mathematical and statistical prospective of machine learning algorithms through python programming.
- Design and evaluate the unsupervised models through python in built functions.
- **Evaluate** the machine learning models pre-processed through various feature engineering algorithms by python programming.
- Design and apply various reinforcement algorithms to solve real time complex problems.

List of Experiments

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k-means clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5.   The following training examples map descriptions of individuals onto high, medium and low credit-worthiness. medium skiing design   single twenties no -> highRisk high   golf   trading   married forties yes -> lowRisk low   speedway transport   married thirties yes -> medRisk   medium football banking   single thirties yes -> lowRisk   high   flying media   married fifties yes -> highRisk low   football security   single twenties no -> medRisk medium golf   media single   thirties yes -> medRisk medium golf   transport married forties yes -> lowRisk high   skiing banking   single thirties yes -> highRisk low   golf unemployed married forties yes -> highRisk Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

6. Implement linear regression using python.

7. Implement Naïve Bayes theorem to classify the English text

8. Implement an algorithm to demonstrate the significance of genetic algorithm

9. Implement the finite words classification system using Back-propagation algorithm

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19CY32P3: DEVOPS LAB
(Professional Elective – III Lab)

B. Tech III Year II Semester

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Course Objectives:
- Describe the agile relationship between development and IT operations.
- Understand the skill sets and high-functioning teams involved in
- DevOps and related methods to reach a continuous delivery capability
- Implement automated system update and DevOps lifecycle
- To understand virtualization and performance

Course Outcomes:
- Identify components of Devops environment
- Apply different project management, integration, testing and code deployment tool
- Investigate different DevOps Software development, models
- Demonstrate continuous integration and development using Jenkins.
- Analyze data to detect anomalies

List of Experiments:
1. Write code for a simple user registration form for an event.
2. Explore Git and GitHub commands.
3. Practice Source code management on GitHub. Experiment with the source code written in exercise 1.
4. Jenkins installation and setup, explore the environment.
5. Demonstrate continuous integration and development using Jenkins.
6. Explore Docker commands for content management.
7. Develop a simple containerized application using Docker.
8. Integrate Kubernetes and Docker
9. Automate the process of running containerized application developed in exercise 7 using Kubernetes.
10. Install and Explore Selenium for automated testing.
11. Write a simple program in JavaScript and perform testing using Selenium.
12. Develop test cases for the above containerized application using selenium.

TEXT BOOKS:
1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN-10: 1788392574
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952

REFERENCE BOOKS / LEARNING RESOURCES:

1. Len Bass, Ingo Weber, Liming Zhu. DevOps: A Software Architect's Perspective. Addison Wesley
2. Edureka DevOps Full Course - https://youtu.be/S_0q75eD8Yc

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19DS32P3: MOBILE APPLICATION DEVELOPMENT LAB
(Professional Elective – III Lab)

B. Tech III Year II Semester

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Course Objectives:
- To learn how to develop Applications in android environment.
- To learn how to develop user interface applications.
- To learn how to develop URL related applications.
- Learn Storage Techniques and Animation in Android.
- Learn how to develop SQLite integration

Course Outcomes:
- Student understands the working of Android OS Practically.
- Student will be able to develop user interfaces.
- Student will be able to develop, deploy and maintain the Android Applications.
- Understand the use of various Layouts and Widgets in Android Applications.
- Develop Android applications related to mobile related server-less database like SQLITE

List of Experiments:

1. Create an Android application that shows Hello + name of the user and run it on an emulator. (b) Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button.

2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.

3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a "Back" button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back button. Use Fragment transactions and Rotation event listener.

4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.

5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.

6. Create an application that uses a text file to store user names and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with Login Failed message.

7. Create a user registration application that stores the user details in a database table.

8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.

9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.

10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc.

11. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.

12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.

13. Create an application that shows the given URL (from a text field) in a browser

TEXT BOOKS:
1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012.
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013.

REFERENCE BOOK:
1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013.

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19CY32P4: BLOCKCHAIN TECHNOLOGY LAB
(Professional Elective – III Lab)

B. Tech III Year II Semester

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Prerequisites:
- Knowledge in Basics of JavaScript /Java for Hyperledger Fabric.
- Basics of Solidity for ETH.

Course Objectives:
- To setup metamask
- To be familiar with Ganache
- To understand the Remix tool
- To setup Hyperledger Fabric
- To write smart contracts using the Solidity/Java/Javascript languages

Course Outcomes:
- Able to create a wallet using Metamsk
- Able to connect Ganache and Metamask
- Able to transfer Ethers from one account to another account
- Able to write and deploy smart contracts in Solidity language using Remix tool
- Able to work on Hyperledger Fabric

List of Experiments
1. Setup Metamask in the System and Create a wallet in the Metamask with Test Network.
2. Create multiple accounts in Metamask and perform the balance transfer between the accounts and describe the transaction specifications.
3. Setup the Ganache Tool in the system.
4. Create a custom RPC network in Metamask and connect it with Ganache tool and transfer the ether between ganache accounts.
5. Write a smart contract using a solidity program to perform the balance transfer from contract to other accounts.
6. Write a solidity program to perform the exception handlingSetup the Hyperledger Fabric Network with 2 Organizations 1 Peer Each in the system.
7. Create a channel called mychannel, carchannel in the deployed network.
8. Take the existing Fabcar smart contract and add a new function to query the car on the basis of person name and deploy the smart contract on the Hyperledger Fabric NetworkWrite an SDK program to query the person details from the deployed smart contract.

TEXT BOOK:

1. Blockchain Blueprint for Economy by Melanie Swan

REFERENCE BOOK:

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher.

19MC0002: ENVIRONMENTAL SCIENCE

B. Tech III Year II Semester

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Course Objectives

Develop ability to
- Identify the importance of ecosystem and its functions.
- Understand the natural resources and their usage in day to day life.
- Understand the concept of bio-diversity, its values and conservation.
- Be aware of the causes of different types of pollution and its control.
- Understand various environmental impacts, requirement of various policies and legislations towards environmental sustainability.

Course Outcomes
After the completion of the course, the student would be able to –

- Explain ecosystem and its functions namely, food chain, ecological pyramids etc.
- Acquire knowledge about different types of natural resources such as land, water, minerals, non-renewable energy and their excessive usage leading to detrimental effects on environment.
- Comprehend ecosystem diversity, its values and importance of hot spots to preserve the same.
- Explain different types of pollution, its control and impact on global environment.
- Recognize various environmental impacts and the importance of various acts and policies towards environmental sustainability.

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