COURSE STRUCTURE FOR
III - IV Years

&

DETAILED SYLLABI FOR
III - IV YEARS

B. Tech. (INFORMATION TECHNOLOGY)
A22 Regulation

(Applicable for the Batches admitted from 2022 & 2023)

DEPARTMENT OF INFORMATION TECHNOLOGY
SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY

(An Autonomous Institution approved by UGC and affiliated to JNTUH)
Yamnampet, Ghatkesar, Hyderabad - 501 301

2023

B.Tech (I.T.) III YEAR I SEM

Sl.No.	Course Category	Dept Course	Course	L	T	P/D	C	Max. Marks	
								CIE	SEE
1.	PE	CSE/IT	Professional Elective –I	3	0	0	3	40	60
2.	PC	9FC05	Data Warehousing and Data Mining	2	1	0	3	40	60
3.	PC	9EC03	Software Engineering	2	0	0	2	40	60
4.	PC	9EC04	Design and Analysis of Algorithms	2	1	0	3	40	60
5.	PC	9EC05	Computer Networks	3	0	0	3	40	60
6.	PC	9IC04	Intellectual Property Rights	3	0	0	-	Pass/Fail	
7.	PC	9EC63	Software Engineering Lab	0	0	3	1.5	40	60
8.	PC	9EC64	Computer Networks and Design and Analysis of Algorithms Lab	0	0	4	2	40	60
9.	PC	9FC65	Data Warehousing and Data Mining lab	0	0	3	1.5	40	60
10.	PS	9F585	Summer Industry Internship –I	0	0	0	1	40	60
			Total	**15**	**2**	**10**	**20**	**360**	**540**

B.Tech (I.T.) III YEAR II SEM

Sl.No.	Course Category	Dept Course	Course	L	T	P/D	C	Max. Marks	
								CIE	SEE
1.	OE		Open Elective –I	3	0	0	3	40	60
2.	PE	CSE/IT	Professional Elective –II	3	0	0	3	40	60
3.	PE	CSE/IT	Professional Elective -III	3	0	0	3	40	60
4.	PC	9EC06	Operating Systems	3	0	0	3	40	60
5.	PC	9LC03	Machine Learning	2	1	0	3	40	60
6.	PC	9FC06	Web Technologies	2	1	0	3	40	60
7.	PC	9EC65	Operating Systems and Machine Learning Lab	0	0	3	1.5	40	60
8.	PC	9FC66	Web Technologies Lab	0	0	3	1.5	40	60
9.	PC	9F686	Comprehensive Viva Voce	0	0	0	1	100	-
			Total	**16**	**2**	**6**	**22**	**420**	**480**

Note: Summer Industry Internship-II is to be carried out during the summer vacation between 6th and 7th semesters.

B.Tech (I.T.) IV YEAR I SEM

Sl.No.	Course Category	Dept Course	Course	L	T	P/D	C	Max. Marks	
								CIE	SEE
1.	OE		Open Elective –II	3	0	0	3	40	60
2.	PE	CSE/IT	Professional Elective -IV	3	0	0	3	40	60
3.	PE	CSE/IT	Professional Elective -V	3	0	0	3	40	60
4.	PC	9EC07	Automata Theory and Compiler Design	2	1	0	3	40	60
5.	PC	9EC08	Linux Programming	2	1	0	3	40	60
6.	PC	9EC09	Cryptography and Network Security	3	0	0	3	40	60
7.	PC	9EC66	Compiler Design and Information Security Lab	0	0	3	1.5	40	60
8.	PC	9EC67	Linux Programming Lab	0	0	3	1.5	40	60
9.	PS	9F787	Summer Industry Internship –II	0	0	0	1	40	60
			Total	**16**	**2**	**6**	**22**	**360**	**540**

B.Tech (I.T.) IV YEAR II SEM

Sl.No.	Course Category	Dept Course	Course	L	T	P/D	C	Max. Marks	
								CIE	SEE
1	OE		Open Elective –III	3	0	0	3	40	60
2	PC	9FC07	Cyber Security and Cyber laws	2	0	0	2	40	60
3	PS	9F888	Major Project	0	0	20	10	40	60
			Total	**5**	**0**	**20**	**15**	**120**	**180**

Professional Electives

Code	PE– I (3-1)	Code	PE – II (3-2)	Code	PE – III (3-2)	Code	PE – IV (4-1)	Code	PE – V (4-1)
9FC08	Information Retrieval Systems	9FC11	C# & .Net	9FC14	Mobile Application Development	9EC19	Full stack Development	9LC08	Augmented Reality and Virtual Reality
9FC09	Image Processing	9FC12	Computer Graphics	9EC16	Pattern Recognition	9LC18	Natural Language Processing	9EC22	Computer Vision
9EC10	Introduction to Data Science	9EC13	Artificial Intelligence and Deep Learning	9FC15	Big Data Analytics	9LC17	DevOps	9FC17	Cloud Computing
9EC11	Advanced Computer Architecture	9EC14	Distributed Databases	9IC45	Introduction to Internet of Things	9JC05	Block Chain Technologies	9JC04	Ethical Hacking
9FC10	Human Computer Interaction	9EC15	Semantic Web & Social Networks	9EC17	Advanced Operating Systems	9EC20	Mobile Computing	9LC21	Quantum Computing
9EC12	Software Requirements and Estimation	9FC13	Software Project Management	9EC18	Soft Computing	9FC16	Agile Software Development	9EC23	Advanced Algorithms

Open Electives

Open Elective Streams	Open Elective (OE)						
	Code	OE – I (3-1)	Code	OE – II (3-2)	Code	OE – III (4-2)
Entrepreneurship Stream	9ZC22	Basics of Entrepreneurship	9ZC23	Advanced Entrepreneurship	9ZC24	Product and Services
Finance Stream	9ZC05	Banking Operations and Insurance	9ZC15	Financial Markets and Services	9ZC19	Project and Risk Management
Innovation and Design Thinking Stream	9ZC08	Design Literacy and Design Thinking	9ZC09	Co- Creation and Product Design	9ZC10	Entrepreneurship and Business Design
Mechanical	9BC51	Introduction to Additive Manufacturing Processes	9BC52	Principles of Operations Research	9BC53	Principles of Automation and Robotics
Electrical	9AC44	Fundamentals of Measurements and Instrumentation	9AC45	Fundamentals of Renewable Energy Sources	9AC47	Power Electronic Devices and Converters
Electronics	9CC36	Fundamentals of Digital Circuits and Microprocessors	9CC37	Fundamentals of Communications	9CC38	Embedded Systems

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
DATA WAREHOUSING AND DATA MINING

Code: 9FC05

L	T	P	C
2	1	0	3

Prerequisite: Database Management Systems
Course Objectives:
1. To understand the principles of Data Mining and methods improve the quality of data.
2. To be familiar with the Data warehouse architecture.
3. To understand applications of Association Rule Mining and algorithms to find them.
4. To perform classification and prediction of data.
5. To understand applications and algorithms for Clustering and to introduce advanced topics in Data Mining.

Course Outcomes:
At the end of this course the student will be able to.
1. Understand the functionality of the various data mining functions.
2. Apply preprocessing techniques on various datasets.
3. Build a Data warehouse system and perform business analysis with OLAP tools.
4. Characterize the kinds of patterns that can be discovered by association rule mining.
5. Compare and contrast between different classification and clustering algorithms.

UNIT – I

Introduction: Fundamentals of data mining, KDD process, Architectures of Data Mining Systems ,Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task primitives, Integration of a Data mining System with a Database or a Data warehouse systems, Major issues in Data Mining.

UNIT – II

Data Preprocessing: Needs for Preprocessing the Data, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT – III

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

UNIT – IV

Mining Frequent, Associations and Correlations: Basic concepts, Frequent Itemset mining methods, Mining multilevel association rules from Transaction Databases, Mining Multidimensional association rules from Relational databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT – V

Classification and Prediction: Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Support Vector Machines (SVMs), k-nearest neighbor classifier, Other Classification Methods. Prediction, Classifier Accuracy.

UNIT – VI

Cluster Analysis Introduction: Types of Data in Cluster Analysis, Major Clustering methods, Partitioning Methods, Density-Based methods, Grid-Based methods, Model-Based Clustering methods, Outlier Analysis.
Advanced Concepts: Text Mining, Web Mining.

TEXT BOOKS:
1. Data mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Elsevier, 2006.
2. Data Mining Techniques – ARUN K PUJARI, University Press.

REFERENCE BOOKS:
1.   Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION
2.   Data Mining Techniques – ARUN K PUJARI, University Press.
3.   Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
4.   Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.
5.   The Data Warehouse Lifecycle Toolkit – RALPH KIMBALL WILEY STUDENT EDITION
6.   Introduction to Data Mining - First Edition, by Pang-Ning Tan, Michael Steinbach and Vipin Kumar, ISBN-13: 978-0321321367

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
SOFTWARE ENGINEERING

Code: 9EC03

L	T	P	C
2	0	0	2

Course Objectives

➢ To understand the importance of software engineering lifecycle models in the development of software
➢ To understand the various design principles in modeling a software
➢ To develop a software which adheres to the standard benchmarks
➢ To understand the object oriented principles and tools.
➢ To undergo the technical know in the process of software testing
➢ To understand the Process/product metrics, risk management, quality management.

Course Outcomes

1 Students can able to identify software processes and software engineering practices to select and justify approaches for a given project and its constraints and distinguish lifecycles for developing software products.
2. Students can able to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
3. Students understand the importance and principles of Unified Modeling Language, its building blocks and to relate UML paradigm for problem solving.
4. Students can define and design models for the requirements stated in the baseline document.
5. Students can able to understand and experience the testing process in improving the quality of the product by using software testing techniques/tools.

UNIT I

Introduction to Software Engineering: Software Development Life Cycle, 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 – Integrated (CMM-I)

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, RTM.

UNIT III

Process Models: The waterfall model, Incremental Process models, Evolutionary Process models, V model, Agile model, SCRUM
Introduction to Object_Oriented Design: Importance of Modeling, Principles of Modeling, Conceptual model of the UML, High-Level Design(HLD) and Low-Level Design(LLD), Coupling and Cohesion
Basic Structural Modeling: Class Diagrams, Forward and Reverse engineering.

UNIT IV

Basic Behavioral Modeling: Interaction diagrams, Use case Diagrams, Activity Diagrams, State chart diagrams.
Software Testing Introduction: What is Testing, Characteristics of Test Engineers, Software Testing Life Cycle, Levels of Testing, Test Cases: Format for Writing Test Case,
Test plan: Format to prepare Test plan.

UNIT V

Testing Strategies and Techniques: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, Gray box Testing, Boundary value Analysis, Equivalence Partition testing, Mutation Testing, Unit Testing, Integration Testing, Path testing, Regression Testing, Load testing, Stress Testing, Spike Testing, Accepting Testing, Alpha and Beta Testing.

Product and Process metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance, Software Measurement, Metrics for software quality.

UNIT VI

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. McGrawHill International Edition.
2.   Grady Booch, James Rumbaung, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.

REFERENCES
1. Software Engineering- Sommerville, 7th edition, Pearson education.
2. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
3. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
4. Systems Analysis and Design- Shely Cashman Rosenblatt,Thomson Publications.
5. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies
6. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
7. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.
8. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
9. Mark Priestley: Practical Object-Oriented Design with UML,TATA McGrawHill
10. Craig Larman Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Pearson Education
11. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-Dreamtech India Pvt. Ltd.

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
DESIGN AND ANALYSIS OF ALGORITHMS

Code: 9EC04

L	T	P	C
2	1	0	3

Prerequisite : Data structures

Course Objectives:

1. To provide a solid foundation in algorithm design and analysis, specifically, the student learning outcomes include: Basic knowledge of graph and matching algorithms.
2. Ability to understand and design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch and bound.

Course Outcomes:

After completion of the course, the student will be able to

1. Analyze worst-case running times of algorithms using asymptotic analysis.
2. Synthesize divide and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
3. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
4. Comprehend the concept of dynamic programming algorithms, their applications and analyze them.
5. AnalyzetheBacktrackingandBranchandBoundalgorithmsandalsoidentifythescenariosforits applicability. Comprehend the concept of P and NP Problems and its usage in the applications.

UNIT I

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, **Asymptotic Notation-** Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic Analysis, Connected and Bi-connected Components..
Applications: Designing optimal solution with respect to time for a problem.

UNIT II

Divide and conquer: General method, **Applications-**Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.
Applications: PNR number Search, sorting the google search results.

UNIT III

Greedy method: General method, **Applications-**Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.
Applications: Allocation of funds/resources based on the priority in the computer systems.

UNIT IV

Dynamic Programming: General method, **Applications-**Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem.
Applications: Routing Algorithms in the computer networking

UNIT V

Backtracking: General method, **Applications-**n-queen's problem, sum of subsets problem, graph coloring, Hamiltonian cycles, Maze generation Problem
Applications: Undo in MS-Word, Games

UNIT VI

Branch and Bound: General method, **Applications -** Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.
Introduction to NP-Hard and NP-Complete problems: Basic concepts of non deterministic algorithms, Definitions of NP-Hard and NP-Complete classes. Modular Arithmetic
Applications: Performance evaluation in the dynamic systems.

TEXT BOOKS:

1.   Fundamentals of Computer Algorithms, Ellis Horowitz,SatrajSahni and Rajasekharam,Galgotia publications pvt. Ltd.
2.   Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia,Johnwiley and sons.

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
COMPUTER NETWORKS

Code: 9EC05

L	T	P	C
3	0	0	3

Prerequisite : NIL

Course Objectives:

Understand primitives of computer networks Learn flow control, error control and access control mechanisms. Learn routing and congestion control algorithms, internet protocols. Understand Transport layer entities such as DNS and HTTP.

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

1. Identify the different types of network topologies and protocols useful for real time applications and transmission media.
2. Discuss design issues of data link layer and solve problems on Checksum and flow control.
3. Analyze MAC layer protocols and LAN technologies.
4. Obtain the skills of subnetting, routing mechanisms and congestion control.
5. Discuss the concepts, services and protocols of Transport and Application layers along with the network security

UNIT I Introduction:

Uses of Computer Networks, Types of networks: WAN, LAN, MAN, Network Topologies, Reference models: OSI, TCP/IP.
Physical Layer: Transmission media: magnetic media, twisted pair, coaxial cable, fiber optics, wireless transmission.

UNIT II:

Data link layer: Design issues in data link layer: framing, flow control, error control, Error Detection and Correction: Parity, CRC checksum, Hamming code, Flow Control: Sliding Window Protocols, Applications: Data link layer protocols HDLC, PPP.

UNIT III:

Medium Access sub layer: Channel allocation problem, MAC Protocols: ALOHA, CSMA, CSMA/CD, MAC addresses, IEEE 802.X, Standard Ethernet, Wireless LANS. Bridges, Types of Bridges.

UNIT IV:

Network Layer: Design issues in Network Layer, Virtual circuit and Datagram subnets-Routing algorithm: Shortest path routing, Flooding, distance vector routing, Link state routing, Hierarchical routing, Broad casting, Multi casting, Routing for mobile hosts.
Internetworking: Concatenated Virtual Circuits, Connectionless internetworking, Tunneling, Internetwork routing, Fragmentation

UNIT V:

Network layer in internet: IPv4, IP addresses, Sub netting, Super netting, NAT.Internet control protocols: ICMP, ARP, RARP, DHCP**.**
Congestion Control: Principles of Congestion, Congestion Prevention Policies.

Congestion Control in datagram Subnet: Choke packet, load shedding, jitter control.
Quality of Service: Leaky Bucket algorithm and token bucket algorithm.

UNIT VI:

Transport Layer: Transport Services, Connection establishment, Connection release and TCP and UDP protocols.
Application Layer: Domain name system, FTP, HTTP, SMTP, WWW.

TEXT BOOKS:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.
3. Data Communication and Networks-Bhushan Trivedi-OXFORD Publications.

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
INTELLECTUAL PROPERTY RIGHTS

Code: 9IC04

L	T	P	C
3	0	0	Pass/Fail

Course Objective:

This course is intended to impart awareness on intellectual property rights and various regulatory issues related to IPR

Course Outcomes:

At the end of this course the student will be able to
1. Demonstrate a breadth of knowledge in Intellectual property
2. Overview of Patents, Searching, filling and drafting of Patents
3. Overview of copyright & GI .
4. Overview of Trade Mark & Trade Secret,
5. Overview of Integrated Circuit and Industrial Design.
6. Knowledge about different national and international: Conventions and Treaties Governing the IPRs

UNIT I:

Introduction to IPR: Discovery, Invention, Creativity, Innovation, History & Significance of IPR, Overview of IPR -Patent, Copyright, Trade Mark, Trade Secret , GI, Industrial Design & Integrated Circuit, Non-patentable criteria

UNIT II:

Patents: Patents- Patentability Criteria, Types of Patents-Process, Product & Utility Models, Software Patenting and protection, Patent infringement- Case studies- Apple Vs Samsung, Enfish LLC Vs Microsoft, Overview of Patent search-Types of Searching, Public & Private Searching Databases, Basics of Patent Filing & Drafting, Indian Patents Law

UNIT III:

Copyrights and Geographical Indications: Types of Copyrights, Procedure for filing, copyright infringement, Copyright Law, Geographical Indications –Tirupati Laddu , Darjeeling Tea, Basmati rice

UNIT IV:

Trademark and Trade secrets: Trade Marks –Commercial importance, protection, registration, Case Studies- Sabena and Subena, Castrol Vs Pentagon, Trade Secrets- Case Studies-Kentucky Fried Chicken (KFC), Coca-Cola

UNIT V:

Protection of Industrial Designs & Integrated Circuits: Industrial Designs – Scope, protection, filing, infringement; Integrated Circuits & Layout design, Semiconductors, Unfair competition, Designs Act.

UNIT VI:

International Conventions & Treaties: Overview of WTO, GATT, TRIPS, WIPO, Berne Convention, Rome convention, Paris Convention, Patent Cooperation Treaty (PCT), Madrid Protocol, Budapest Treaty, Hague agreement

TEXT BOOKS:

1. Deborah E. Bouchoux, Intellectual Property for Paralegals – The law of Trademarks, Copyrights, Patents & Trade secrets, 3rd Edition, Cengage learning, 2012
2. N.S. Gopalakrishnan& T.G. Agitha, Principles of Intellectual Property, Eastern Book Company, Lucknow, 2009.

REFERENCE BOOKS:

1. M. M. S. Karki , Intellectual Property Rights: Basic Concepts, Atlantic Publishers, 2009
2. Neeraj Pandey &KhushdeepDharni, Intellectual Property Rights, Phi Learning Pvt. Ltd
3. AjitParulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd, 2006.
4. B. L. Wadehra. Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000.
5. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010.

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
SOFTWARE ENGINEERING LAB

Code: 9EC63

L	T	P	C
0	0	3	1.5

Course Objectives:
1. Learn understanding of diverse software requirements and craft a detailed Software Requirement Specification (SRS) document.
2. Learns various conceptual models relating to UML.
3. Helps the students to design the models in real market.
4. Develop the necessary code for the preparation of unit test cases.
5. Develop skills in software test automation using latest tools
6. Over all understanding of the software development life cycle process.

Course Outcomes:
1. Students have the capability to adeptly translate end-user requirements into a detailed software requirements specification document.
2. Students can able to generate a high-level design of the system from the software requirement and able to understand the importance and principles of Unified Modeling Language and design class, object and interactive diagrams and know their significance.
   a. The student should take up the case study of Unified Library application which is mentioned in the theory, and Model it in different views i.e. Use case view, logical view, component view, forward and Reverse Engineering, and Generation of documentation of the project.
   b. The student takes up the case studies mentioned below, and model it in different views i.e. Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.
3. Students can able to development unit test cases for the developed code
4. Students can able to experience testing automation tools and generate simple testing report

Case Studies:
1 Automatic Teller Machine
2 Library Management System
3 Railway Reservation System
4 Online Book Shopping System
5 Student Admission System
6. Amazon Application

   ➢ **Analysis**: Identify the requirements from the problem statement and prepare an SRS document for any of the Case studies mentioned above.
   ➢ **Design:** Perform the design for the case studies by using any design phase CASE Tools
   ➢ **Coding:** Develop Unit test cases for any case studies using JUNIT
   ➢ **Testing**: Develop test cases and convert the test cases to script using any of the case studies to perform functional testing using UFT 12.01 and Selenium WebDriver

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
COMPUTER NETWORKS AND DESIGN AND ANALYSIS OF ALGORITHMS LAB

Code: 9EC64

L	T	P	C
0	0	4	2

COMPUTER NETWORKS LAB

Prerequisite: Data Structures

Course Objectives:
 To provide an understanding of the design concepts of framing Error Detection & correction, Routing, Congestion concepts and Network tools.

Course Outcomes:
   ➢ At the end of this course the student will be able to
   ➢ Implement and analyze framing methods of the data link layer.
   ➢ Illustrate and implement error detection & correction techniques.
   ➢ Implement different Routing Algorithms.
   ➢ Understand basic Network Commands.
   ➢ Use of Wireshark and NS-2 tools and CISCO Packet Tracer

Computer Networks Lab Exercises:
1. Implement the data link layer framing methods such as
      a) Character / Byte stuffing
      b) Bit stuffing.
2. Implement on a data set of characters the three CRC polynomials
      a) CRC 12   b) CRC 16   c) CRC CCITT.
3. Implement Hamming code for error detection and error correction
4. Implement Dijkstra's algorithm to compute the shortest path through a graph.
5. Simulate Distance-Vector Routing using CISCO Packet Tracer.
6. Implement Congestion control using Leaky-Bucket Algorithm
7. Execute the basic Networking Commands

Arp	Hostname
ipconfig	ipconfig/all
Ipconfig/renew	Ipconfig/release
vii. Ipconfig/flushdns	viii. Pathping
ix. Ping	x. Route
xi. tracert	

8. Demonstration of NS-2.
9. Simulate Network Topologies using CISCO Packet tracer.

DESIGN AND ANALYSIS OF ALGORITHMS LAB

Prerequisite: Data Structures (C/C++) Lab
Course Objectives:
1. To write programs in java to solve problems using divide and conquer strategy.
2. To write programs in java to solve problems using backtracking strategy.
3. To write programs in java to solve problems using greedy and dynamic programming techniques.

Course Outcomes:
At the end of this course, the student will be able to
1. Implement Merge sort algorithm for sorting a list of integers in ascending order, Dijkstra's algorithm for the single source shortest path problem.
2. Implement Prim's algorithm to generate minimum cost spanning tree.
3. Solve the job sequencing with deadlines problem using greedy algorithm.
4. Design the solution for the 0/1 knapsack problem using implement Dynamic Programming and implement.
5. Using Dynamic programming approach solve the Optimal Binary search Tree problem.
6. Design and implement n-queens problem using backtracking approach.

List of Programs for Lab
1. Write a C program to implement Merge sort algorithm for sorting a list of integers in Ascending order.
2. Write a C program to implement Character sorting.
3. Write a C program to implement Dijkstra's algorithm for the single source shortest path problem.
4. Write a C program that implements Prim's algorithm to generate minimum cost spanning tree.
5. Write a C program to implement greedy algorithm for job sequencing with deadlines.
6. Write a C program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.
7. Write a C program to implement Dynamic programming algorithm for the Optimal Binary search Tree problem.
8. Write a C program to implement backtracking algorithm for n-queens problems.

Other Practice Programs:
1. Write a C program to implement Quick Sort algorithm for sorting a list of integers in ascending order.
2. Write a C program to implement the DFS algorithm for a Graph.
3. Write a C program to implement the BFS algorithm for a graph.
4. Write a C program that implements kruskal's algorithm to generate minimum cost spanning tree.
5. Write a C program to implement Floyd's algorithm for all pairs shortest path problem.
6. Write a C program to implement the backtracking algorithm for the Hamiltonian circuit's problem.
7. Write a C program to implement backtracking algorithm for the sum of subsets problem.

SREENIDHI INSTITUTE OF SCIENCE & TECHNOLOGY
INFORMATION TECHNOLOGY
DATA WAREHOUSING AND DATA MINING LAB

Code: 9FC65

L	T	P	C
0	0	3	1.5

Prerequisite: NIL

Course Objectives:

Learn how to build a data warehouse and query it. Learn to perform data mining tasks using a data mining toolkit. Understand the data sets and data preprocessing. Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression. Exercise the data mining techniques with varied input values for different parameters. To obtain Practical Experience Working with all real data sets. Emphasize hands-on experience working with all real data sets.

Course outcomes:

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

1. Work with the ETL and Mining tools.
2. Demonstrate the classification, clustering techniques on the data sets.
3. Comprehend the results obtained in the clustering, Association and Classification techniques applied on the data sets with varied input parameters.
4. Ability to apply mining techniques for realistic data.

Exercises

1. Perform filter transformation for the employee database.

2. Add the commission of 1000 Rs in the Salary field of Employee table using Expression Transformation.

3. Use Aggregator transformation to display the average salary of employees in each department.

4. Use Joiner transformation to display the Sailor_Name form Sailors table and Boat_Name from Boats table in a new table.

5. Perform steps to load top 2 salaries for each department without using Rank Transformation and SQL queries in Source Qualifier.

6. Implement the following Multidimensional Data Models
   i.Star Schema
   ii.Snowflake Schema
   iii.Fact Constellation.

7. Compare the GRI and Apriori usage (Prepare a sample data set in Spread Sheet).

8. Determine the Drugs importance w.r.t. Age, Cholestrol and BP using C 5.0.

9. Predict the accuracy of the test data set using Neural Net model using a Case Study of Botanical data set.

10. Compare the C 5.0 and Neural Net using the sample data.

11. Using the BASKETS1n dataset, select the data as given below.

   a) Customer age < 35 and count the customers who buy dairy and VEG products

   b) Find the AVG income of customers who buy at least 5 products

12. Using the BASKETS1n dataset, select the data as given below.

a) Derive the field whose home own is 'YES' and Age > 30 and sort data w.r.t. income in

Ascending order, and output only the item fields.

b) Find the mean value of salary w.r.t age={Young, Middle, Senior}.

13) Demonstrate the Weka machine learning toolkit and perform the following exercises
   * Determine the numbers of instances of each class are present in the data
   * Load the weather dataset and remove all instances where the attribute 'humidity' has the value 'high'?
   * Load the iris dataset and view the Visualizer panel.

SREENIDHI INSTITUTE OF SCIENCE & TECHNOLOGY
INFORMATION TECHNOLOGY
SUMMER INDUSTRY INTERNSHIP - I

Code: 9F585

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

Course Objectives:
 To enhance the knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

Course Outcomes:
 At the end of this course the student will be able to
1. Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
2. Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
3. Inculcate an enthusiasm to use the creative ideas to build the innovative projects and prototypes which are meeting the current needs of the market and society as a whole.
4. Improve their communicative skills and team skills.

A summer industry internship project shall be carried out by a group of students consisting of 1 or 2 to 3 in number during summer second year second semester at industries or institution. This work shall be carried out under the guidance of the faculty assigned as internal guide as well as external guide at industry where students are carrying out summer industry internship projects. Project shall consist of design, fabrication, software development or building of prototype or application app. This can be of interdisciplinary nature also.

There will be 100 marks in total with 40 marks of internal evaluation and 60 marks of external
The **internal evaluation** shall consist of:

Presentation	:	15 marks
Internal Evaluation	:	15 marks
Report	:	10 marks
		--------------
		40 marks

End examination   :   60 Marks.
External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the internal guide.

Presentation	:	10 marks
Demonstration/ Technology	:	40 marks
Report	:	10 marks
		--------------
		60 marks

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
OPERATING SYSTEMS

Code: 9EC06

L	T	P	C
3	0	0	3

Prerequisite: Computer Organization

COURSE OBJECTIVES:

Learn basics of operating Systems. Understand the process management, Inter process Communication and synchronization that take place in the operating system. Learn the principles of memory, I/O and file management in a secured environment.

COURSE OUTCOMES:

At the end of this course, the students will be able to

1. Understand the functional architecture of an Operating System with usage of system calls.
2. Analyze various process scheduling algorithms & pragmatics of scheduling algorithms used by various Operating Systems.
3. Solve issues related to process synchronization and Interprocess Communication(IPC) in the Operating System.
4. Comprehend the concepts of Deadlock and illustrate the concepts of Memory Management.
5. Explain the concepts of File System with regard to Directory and Disk Management Algorithms, ssummarize the aspects of I/O Systems, Protection and Security.

UNITI:

Introduction to Operating System: Definition, Functions of Operating Systems, **Types of Operating Systems:** Batch Operating System, Multiprogramming Operating System, Multiprocessing Operating System, Multitasking Operating System, Network Operating System, Real Time Operating System, Time-Sharing Operating System and Distributed Operating System.

Computer System Architecture: Four Components of a Computer System, **Operating System Services**, **System Calls**: Definition, Types of System Calls, **Operating System Structure:** Simple Structure, Layered Approach, **Threads:** Definition**,** Need of threads, types of threads.

UNIT II:

Process Management: Process concept: Definition of Process, Process State Diagram, PCB (Process Control Block), CPU Switch from process to process, Context Switching, Process Vs Thread.

Process Scheduling: Process Queues: Job Queue, Ready Queue, I/O/Device/Waiting Queue, Representation of Process Scheduling, **Types of Process Schedulers:** Long-term, Short-term and Medium-Term Scheduler.

CPU Scheduling: Preemptive Scheduling, Non-Preemptive Scheduling, Scheduling Criteria, **Scheduling Algorithms (Preemptive and Non-Preemptive with Arrival Time):** First Come First Serve (FCFS), Shortest-Job-First (SJF), Shortest Remaining Time First (SRTF), Priority

Scheduling, Round Robin (RR), Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling.

UNIT III:

Process Synchronization - The Critical Section Problem: Solution to Critical Section Problem (Software and Hardware), Synchronization Hardware, Classical Problems of Synchronization, Semaphores, Monitors.

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT IV:

Deadlocks: Definition, Necessary Conditions for Deadlock, **Methods For Handling Deadlocks**: Deadlock Prevention, Avoidance(Bankers Algorithm), Detection and Deadlock recovery.

Memory Management: Logical versus Physical Address Space, Swapping, Contiguous memory allocation, Paging and Segmentation techniques, Segmentation with paging, **Virtual Memory:** Demand Paging, **Page-Replacement Algorithms**: FIFO, LRU and Optimal, Thrashing.

UNIT V:

File System: Different types of files and their access methods, **Directory Structures:** Various file allocation methods - Contiguous, Linked with FAT and Indexed, **Disk Scheduling Algorithms**: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK.

UNIT VI:

I/O Systems: I/O Hardware: Polling, Interrupts and DMA, **Protection:** Goals of Protection, Principles of Protection, Access Matrix, Implementation of Access Matrix, Access Control List, Capability List, Program threats.

TEXT BOOKS:
1. Operating System Concepts by Silberchatz Galvin, 8th edition.
2. Modern Operating Systems by A. Tanenbaum, 1992, Prentice-Hall.
3. Operating Systems Internals and Design Principles by William Stallings,4th edition, 2001, Prentice-Hall
4.

REFERENCES
1. Operating System By Peterson , 1985, AW.
2. Operating System ByMilankovic, 1990, TMH.
3. Operating System Incorporating With Unix& Windows By Colin Ritche, 1974, TMH.
4. Operating Systems by Mandrik& Donovan, TMH
5. Operating Systems ByDeitel, 1990, AWL.
6. Operating Systems – Advanced Concepts By MukeshSinghal , N.G. Shivaratri, 2003, T.M.H.

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
MACHINE LEARNING

Code: 9LC03

L	T	P	C
2	1	0	3

Prerequisite: Introduction to Data Science

Course Objectives:
1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To have a thorough understanding of the Supervised and Unsupervised learning techniques
3. To study the various probability based learning techniques
4. To understand graphical models of machine learning algorithms

Course Outcomes:

At the end of this course, the student is able to
1. Understand the fundamental concepts of ML and Designing a Learning System.
2. Understand the basic concepts of MLP,RBF and SVM and their applications.
3. Understand the Probability models namely supervised, unsupervised,basic statistics analyze their analysis of algorithms along with their applications.
4. Understand various Dimensionality Reduction Techniques and Apply various Evolutionary Algorithms with models
5. Understand the Graphical models and their applications
6. Understanding Analytical Learning and Analyze KBANN Algorithm.

UNIT-I

INTRODUCTION: Learning– Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Linear Discriminants: Definitions of Perceptron, Linear separability, Linear Regression.
Design a Learning System– Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm. **(Textbook-1)**

UNIT-II

LINEAR MODELS:
Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Interpolations and Basis Functions – Support Vector Machines. **(Textbook-2)**

UNIT-III

TREE AND PROBABILISTIC MODELS:
Learning with Trees– Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms. **(Textbook-2)**

UNIT-IV

DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS:

Dimensionality Reduction– Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example. **(Textbook-1)**

UNIT-V

GRAPHICAL MODELS:

Markov Chain Monte Carlo Methods– Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods. **(Textbook-1)**

UNIT – VI

ANALYTICAL LEARNING:

Learning with perfect domain theory– Explanation based Learning – Inductive analytical approach to learning – KBANN algorithm. **(Textbook-2)**

TEXT BOOKS:
1. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.

REFERENCES:
1. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.
2. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014.
3. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
WEB TECHNOLOGIES

Code: 9FC06

L	T	P	C
2	1	0	3

Prerequisite: Computer Networks, Object-Oriented Programming concepts

Course Objectives:
1. To impart the basics knowledge of HTML5, CSS3 and Tailwind CSS
2. To develop proficiency in JavaScript programming.
3. To comprehend the fundamentals of MERN stack development
4. To design and implement RESTful APIs:
5. To build interactive and user-friendly web applications with ReactJS.

Course Outcomes:

Upon completing the course, a student will be able to
CO 1: **Web Technologies Foundations:** Students will master HTML5, including semantic elements, Web Storage API usage, and comprehension of HTTP status codes.
CO 2: **CSS and Responsive Design Proficiency:** Graduates will demonstrate expertise in CSS3, covering syntax, types, box model, Grid, Flexbox, Responsive Web Design, and practical knowledge of the Tailwind CSS framework.
CO 3: **JavaScript Mastery and Advanced Concepts:** Participants will achieve proficiency in JavaScript, understanding data types, functions, arrays, objects, along with advanced concepts like let, const, arrow functions, and Promises.
CO 4: **Full Stack Development Essentials:** Students will have acquired foundational knowledge in web servers, REST API principles, Express framework usage, MongoDB integration, and an introduction to the MERN stack.

Unit I

HTML 5: Semantic Elements, Web storage API, HTTP status codes.
CSS 3: Syntax structure, types, box model, Grid, Flexbox. Responsive Web Design using Media Queries, use of viewport, Transition, Animation.
CSS Framework: Tailwind css

Unit II

JavaScript: Introduction to JavaScript, data types, functions, Arrays, Objects, Regular expressions
Advanced JavaScript concepts: let, const, arrow functions, destructuring, spread, rest, Prototypal Inheritance,Closure, understanding callbacks, Promise, Async/await.

UNIT III

Introduction to MERN: What is MERN?, MERN components, Server-Less Hello World, Server setup.
Node JS: Introduction to Node.js, REPL, Node Modules: events, OS, HTTP, file i/o, environment variables, dotenv

Unit IV

Web Servers: client-server architecture**,** request-response objects, creating a basic HTTP server
Rest API: Introduction to RESTAPIs, HTTP verbs

Unit V

Express Framework: Introduction to Express, Installation of Express, Create first Express application, application, request, and response objects, configuring an Express application, Rendering views, sessions, forms, file upload. Connecting to an SQL database
MongoDB: Introduction to MongoDB, connecting to a MongoDB instance with Node, Reading from MongoDB, Writing to MongoDB.

Unit VI

Introduction to ReactJS: History of Front – end libraries, Motivation for using React, Key differentiators (Virtual DOM, one – way binding), React Components, JSX, props hooks, state, events, effects, fetching data from API using fetch, form validations, React Router, building and deploying react application.

TEXTBOOKS:

1. Beginning HTML, XHTML, CSS, and JavaScript, Jon Duckett, Wrox Publications, 2010
2. Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node,Vasan Subramanian, 2nd Edition, A Press.

REFERENCES:

1. E – resource: https://nodejs.org/en/docs/
2. E – resource : https://reactjs.org/
3. E – resource :https://tailwindcss.com/
4. E – resource :https://expressjs.com/
5. E – resource :https://web.dev/learn/css
6. E – resource :https://web.dev/learn/html

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
OPERATING SYSTEMS and MACHINE LEARNING LAB

Code: 9EC65

L	T	P	C
0	0	3	1.5

OPERATING SYSTEMS LAB

Prerequisite: NIL

COURSE OBJECTIVES:

To provide an understanding of the design aspects of operating system concepts through simulation

COURSE OUTCOMES:

At the end of this course, the students will be able to Implement scheduling algorithms, Interprocess Communication, Deadlocks, Memory management and File allocation techniques.

Exercises

1. Simulate the following CPU scheduling algorithms (Preemptive, With Arrival Time)
a) FCFS b) SJF c) Priority d) Round Robin

2. Write C programs to illustrate the following IPC mechanisms
a) Pipes b) FIFOs c) Message Queues d) Shared Memory

3. Implement Bankers Algorithm for Deadlock Avoidance.

4. Develop programs for Paging Technique of memory management.
5. Simulate all page replacement algorithms
a) FIFO b) LRU c) LFU

6. Simulate all file allocation strategies
a) Sequential/Contiguous b) Indexed c) Linked

MACHINE LEARNING LAB

Course Objective: The objective of this lab is to get an overview of the various machine learningtechniques and can able to demonstrate them using python.

Course Outcomes: After the completion of the course the student can able to:
  ➢ understand complexity of Machine Learning algorithms and their limitations;
  ➢ understand modern notions in data analysis-oriented computing;
  ➢ be capable of confidently applying common Machine Learning algorithms in practice andimplementing their own;
  ➢ Be capable of performing experiments in Machine Learning using real-world data.

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 VAR2predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k-meansclustering 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 lowcredit-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 thedataset?

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.

10. Implement Classification on a sample data set using SVM?

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
WEB TECHNOLOGIES LAB

Code: 9FC66

L	T	P	C
0	0	3	1.5

Course Objectives:
1. Apply HTML5 and CSS3 skills to create functional and visually appealing web pages.
2. Develop interactive web applications using JavaScript and DOM manipulation.
3. Build and deploy full-stack web applications using the MERN stack.
4. Design and implement RESTful APIs using Node.js and Express.js.
5. Create interactive and user-friendly web interfaces with ReactJS.

Course Outcomes:
Upon successful completion of this course, :
CO 1: Web Development Foundations: Students will master HTML5, applying semantic elements, utilizing the Web Storage API, and demonstrating proficiency in CSS3, encompassing syntax, types, box model, Grid, Flexbox, Responsive Web Design, and practical application of the Tailwind CSS framework.
CO 2: JavaScript Mastery and Advanced Concepts: Participants will achieve proficiency in JavaScript, understanding data types, functions, arrays, objects, and mastering advanced concepts like let, const, arrow functions, and Promises through practical coding scenarios.
CO 3: Server-Side Development Essentials: students will acquire foundational knowledge in web servers, REST API principles, and Express framework usage for rendering views, handling sessions, forms, file uploads, and connecting to an SQL database.
CO 4: Database Integration and MERN Stack Introduction: In the laboratory setting, students will gain hands-on experience connecting to MongoDB with Node, reading and writing data, while also receiving an introduction to the MERN stack, covering MERN components, serverless architecture, Node.js fundamentals, and basic server setup.

Note: **Students can select any 3 Problem Statements from each Cycle**

Cycle 1:
Problem Statement 1: Responsive Personal Portfolio Website (2 hours)
Create a responsive personal portfolio website using HTML5 and CSS3. The website should include sections for your profile, skills, experience, projects, and contact information. Use Tailwind CSS to style the website and ensure it is responsive across different screen sizes.

Problem Statement 2: E-commerce Product Page (3 hours)
Design and develop an e-commerce product page using HTML5, CSS3, and Tailwind CSS. The page should display product information, including images, descriptions, prices, and options for adding to cart. Use Tailwind CSS to create a visually appealing and consistent layout.

Problem Statement 3: Interactive Blog Post with Comments (3 hours)
Create an interactive blog post with comments using HTML5, CSS3, and JavaScript. The blog post should include a title, author, content, and a comment section. Use JavaScript to enable users to submit comments and display them on the page.

Problem Statement 4: Adaptive Landing Page for Different Devices (2 hours)
Develop an adaptive landing page that adjusts its layout and content based on the user's device. Use HTML5, CSS3, and JavaScript to detect the device type and display the appropriate content. Employ media queries and responsive design techniques to ensure the page looks great on all devices.

Cycle 2:
Problem Statement 1: Dynamically Generated Content with JavaScript (2 hours)
Create a web page that dynamically generates content using JavaScript. The page should include a button that, when clicked, generates a new random number and displays it on the page. Use JavaScript to manipulate the Document Object Model (DOM) to add and remove elements.

Problem Statement 2: Interactive Shopping Cart with JavaScript (3 hours)
Develop an interactive shopping cart using JavaScript. The cart should allow users to add and remove items, update quantities, and calculate the total price. Utilize JavaScript arrays and objects to store product information and manage cart operations.

Problem Statement 3: Regular Expression-Based Text Manipulation (3 hours)
Build a web application that performs text manipulation using regular expressions. The application should allow users to enter a text string and provide options for search, replace, and formatting. Implement regular expression patterns to identify and modify specific text elements.

Problem Statement 4: Asynchronous Data Fetching and Display with JavaScript Promises and Async/await (2 hours)
Create a web page that fetches data from an API asynchronously using JavaScript promises and Async/await. The page should display a loading indicator while the data is being fetched and then render the data in a list or table. Demonstrate the use of promises to handle asynchronous operations and improve code readability.

Cycle 3:
Problem Statement 1: Building a Simple REST API with MERN Stack (2 hours)
Create a simple REST API using the MERN stack (MongoDB, Express.js, React.js, and Node.js). The API should allow users to perform basic CRUD (Create, Read, Update, Delete) operations on a data collection, such as a list of tasks or products. Design the API endpoints, implement the server-side logic using Node.js and Express.js, and connect the API to a MongoDB database.

Problem Statement 2: Developing a Server-Side Application with Node.js and Express.js (3 hours)
Build a server-side application using Node.js and Express.js. The application should provide an endpoint to accept user input, perform some processing, and return a response. Implement error handling and logging mechanisms to ensure the application runs reliably. Explore using Node.js modules for common tasks, such as file I/O and data validation.

Problem Statement 3: Working with Environment Variables and Dotenv in Node.js Applications (2 hours)
Create a Node.js application that utilizes environment variables and dotenv to manage sensitive configuration data. Implement dotenv to load environment variables from a .env file and use them throughout the application. Demonstrate how to access and update environment variables securely.

Problem Statement 4: Implementing Event-Driven Programming with Node.js (3 hours)
Develop an event-driven Node.js application that utilizes the Node.js EventEmitter API. Create custom events to represent different occurrences, such as user actions or sensor readings. Register event listeners to handle these events and perform appropriate actions. Explore using modules like async/await to manage asynchronous event handling.

Cycle 4:

Problem Statement 1: Building a Simple Web Server with HTTP Request Handling (2 hours)

Create a basic HTTP server using Node.js and Express.js. The server should handle GET and POST requests, respond with appropriate HTTP status codes, and parse request payloads. Implement route handling to direct requests to specific functions for processing.

Problem Statement 2: Designing and Implementing a REST API for Resource Management (2 hours)

Design a REST API for managing a collection of resources, such as books or products. Define the API endpoints for each resource operation (Create, Read, Update, Delete) and map them to HTTP verbs (POST, GET, PUT, DELETE). Implement the API using Node.js and Express.js, including error handling and validation checks.

Cycle 5:

Problem Statement 1: Developing a Full-Stack Web Application with Express and MongoDB (2 hours)

Create a full-stack web application using Express.js and MongoDB. The application should allow users to create, read, update, and delete (CRUD) data stored in a MongoDB database. Implement the Express framework to handle routing, request processing, and templating. Utilize MongoDB to store and retrieve data using the Node.js MongoDB driver.

Problem Statement 2: Building a REST API with Express and MongoDB for User Management (3 hours)

Design and implement a REST API using Express.js and MongoDB for user management. The API should allow users to register, login, update their profiles, and manage their data. Implement authentication and authorization mechanisms to secure user access. Utilize MongoDB to store user information and session data.

Problem Statement 3: Creating a File Upload Application with Express and MongoDB (2 hours)

Develop a file upload application using Express.js and MongoDB. The application should allow users to upload files, store them in MongoDB, and retrieve them later. Implement file handling techniques to ensure secure and efficient file uploads and storage. Utilize MongoDB to store file metadata and references.

Problem Statement 4: Implementing Image Processing and Display with Express and MongoDB (3 hours)

Build an image processing and display application using Express.js and MongoDB. The application should allow users to upload images, apply image processing filters, and display the processed images. Utilize image processing libraries to manipulate images and store processed images in MongoDB. Implement image rendering techniques to display images on the web page.

Cycle 6:

Problem Statement 1: Building a Dynamic ReactJS Application with State Management (2 hours)

Create a dynamic ReactJS application that manages state using hooks. The application should display a list of items and allow users to add, remove, and update items. Implement state management techniques to keep the UI in sync with data changes. Utilize hooks like useState

and useEffect to handle state updates and side effects.

Problem Statement 2: Developing a Data-Driven ReactJS Application with API Fetching (3 hours)
Build a data-driven ReactJS application that fetches data from an API and renders it on the UI. The application should display a list of data items retrieved from the API and allow users to filter and search for items. Implement data fetching techniques using the fetch API or libraries like Axios. Utilize state management to store and update data from the API.

Problem Statement 3: Creating a User Interface with React Router for Navigation (2 hours)
Develop a user interface with React Router for navigation between different components and routes. The application should have multiple pages, such as a home page, a contact page, and an about page. Implement React Router components to handle routing and provide smooth transitions between pages. Utilize nested routes to organize complex navigation structures.

Problem Statement 4: Building and Deploying a ReactJS Application to a Hosting Platform (3 hours)
Build a complete ReactJS application and deploy it to a hosting platform like Netlify or Vercel. The application should have a functional UI, interact with APIs, and handle user input. Implement build tools like Webpack or Parcel to bundle and optimize the application. Configure the deployment environment and deploy the application to the chosen hosting platform.

REFERENCES:
1. E – resource: https://nodejs.org/en/docs/
2. E – resource : https://reactjs.org/
3. E – resource :https://tailwindcss.com/
4. E – resource :https://expressjs.com/
5. E – resource :https://web.dev/learn/css
6. E – resource :https://web.dev/learn/html

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
COMPREHENSIVE VIVA VOCE

Code: 9F686

L	T	P	C
0	0	0	1

Course Objectives:

Prepare students in basics and advanced relevant courses to revise and face technical interviews for enhancing employability.

Course Outcomes:

At the end of this course the student will be assessed the knowledge of the students in the Core and Elective subjects that they have studied till the completion of that academic year.

Comprehensive Viva Voce will be conducted in third year second semester for 100 marks.

Two Internal Exams (Oral) of 50 marks each will be considered for CIE. There will be no SEE for this course.
A student must secure 40% of the total marks to obtain a pass grade.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
AUTOMATA THEORY and COMPILER DESIGN

Code: 9EC07

L	T	P	C
2	1	0	3

Prerequisite : Set Theory

Course Objectives:
1. Learn principles of Finite state machine, finite automation models, and transition diagrams.
2. Understand regular languages and expressions for writing grammars.
3. Understand context free grammars useful in designing compilers.
4. Study the design and working of a complier.
5. Study the role of grammars in compiler design.
6. Learn a various parsing techniques for design of compilers.

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

1. Construct finite Automata for a given regular expressions, and derive strings with suitable examples. Conceptualize context free grammars and normal forms.

2. Design the push down automata and Turing Machine for complex languages.

3. Understand LEX tool and relate parsing techniques,

4. Demonstrate and solve problems on SLR, CLR, LALR, operator precedence parser, LR (0) grammar and use YACC tool.

5. Understand Semantic Analysis concepts to design compiler: and describe Intermediate code generation such as 3-address code form.

UNIT-I:

Introduction: Strings, Alphabet, Language, Operations, finite automaton model, acceptance of strings and languages, Chomsky hierarchy of languages. Deterministic finite automaton and non-deterministic finite automaton, NFA to DFA conversion, equivalence of DFA's

UNIT-II:

Regular Languages, Regular sets, regular expressions, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Closure properties of regular sets (proofs not required).
Context Free Grammars: Context free grammar, derivation trees, Right most and leftmost derivation, ambiguity in context free grammars, simplification of Context Free Grammars (removal of Ɛ-productions, UNIT productions and useless symbols). Chomsky normal form (CNF), Greibach normal form (GNF).

UNIT-III:

Push down automata: Definition, model, acceptance of CFL, introduction to Deterministic PDA and Non Deterministic PDA, design of PDA. **Turing Machine:** Turing Machine, definition, model, design of TM, recursively enumerable languages.

UNIT IV:

Overview of compiler – Environment, pass, phase, phases of compiler, LEX tool.
Top Down Parsing: Top down parsing technique, Recursive decent parsing with back tracking, Ambiguous grammar, Elimination of left recursion, Left factoring, LL (1) Parser.

UNIT V:

Bottom up parsing: shift reduce parser, LR(0), SLR, CLR, LALR, operator precedence parser, YACC tool.

UNIT VI:

Semantic Analysis: Syntax directed translation, S- Attributed, L Attributed definition, Symbol table format.
Intermediate Code Generation: 3-address code form, DAG.
Code Optimization: Local Optimization, loop optimization, peep-hole optimization.

TEXTBOOKS:
1. Introduction to Automata Theory Languages and Computation. Hopcroft H.E. and Ullman J. D. Pearson Education
2. Introduction to Theory of Computation? Sipser 2nd edition Thomson
3. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education

REFERENCES:
1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation ,John C Martin, TMH
3. Elements of Theory of Computation?, Lewis H.P. & Papadimition C.H. Pearson /PHI.
4. Theory of Computer Science Automata languages and computation -Mishra and Chandrashekaran, 2nd edition, PHI Course Requirements.
5. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
6. Compiler Construction, LOUDEN, Thomson

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
LINUX PROGRAMMING

Code: 9EC08

	L	T	P	C
	2	1	0	3

Prerequisite : Operating Systems

Course Objectives:

1. Induce working principles of Linux operating system, usage of File handling utilities, Security by file permissions, process utilities, Disk utilities, networking utilities.
2. Impart the shell responsibilities and meta-characters of it, control structures, shell interrupt processing, functions, debugging shell scripts.
3. Impart basics of file concepts kernel support for file, file structure and low-level I/O functions, system calls (file API's). Induce knowledge regarding Directory management and its API.
4. Demonstrate basics of process creation, execution and synchronization mechanisms. Give knowledge regarding a signal, need for having them, usage of various signals.
5. Narrate the need for Inter Process Communication. Explore the possible mechanisms to implement System V APIs. To demonstrate the usage of Message queues.
6. Incorporate implementation for semaphore API and shared memory API. To explain the need for using a basic Client-Server model.

Course Outcomes:

At the end of this course, the student will be able to

1. Command-Line Proficiency and Scripting Skills for different Shells.
2. Understanding File Systems and Process Management
3. Developing applications that leverage IPC mechanisms.
4. Design and Implementation Skills for Unix System V APIs

UNIT-I :

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, using system commands in awk.

(Applications: Determining what types of files are present in a system, debugging issues with file accessibility, finding a process troubling for a task and discarding from its existing, Write and extract necessary information from huge test files.)

UNIT – II:

Working with the Bourne again shell(bash): Introduction, shell responsibilities, pipes and input Redirection, output redirection, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

(Applications: Writing shell scripts for automating most of the regular jobs, taking backup on regular basis and restoring the same)

UNIT-III:

Files: File Concept, File System Structure, I nodes, File Attributes, File types, Library functions, the standard I/O and formatted I/O in C, stream errors, kernel support for files, System calls, file descriptors, low level file access – File structure related system calls (File APIs), file and record locking, file and directory management – Directory file APIs, Symbolic links & hard links.

(Applications: write some system programs to interact with file system, developing small system software's to work with files and devices, developing program's on directory management system)

UNIT-IV:

Process – Process concept, Kernel support for process, process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process, Process APIs. Signals– Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions.

(Applications: Applications to find number of typical processes are under different context and controlling them in synchronous manner. Develop user defined modules for handling a signal and controlling several issues with signals.)

UNIT-V:

Inter-process Communication: Introduction to IPC, Pipes, FIFOs, Introduction to three types of IPC-message queues, semaphores and shared memory. Message Queues Kernel support for messages, UNIX system V APIs for messages, client/server example.

(Applications: Developing applications complying with IPC mechanisms, developing an application that exchanges a set of messages among different processes. Write a client server application to go with any concurrent approach)

UNIT- VI:

Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores. Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory, semaphore and shared memory example.

(Applications: Develop critical section handling mechanisms to deal with any real problems. Building applications to share a piece of memory resource among processes concurrently)

TEXT BOOKS:

1.Unix System Programming using C++, T.Chan, PHI.
2.Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH, 2006.
3.Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition,rp-2008

REFERENCES:
1. Linux System Programming, Robert Love, O'Reilly, SPD.
2. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. Unix Network Programming, W.R. Stevens, PHI.
4. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
CRYPTOGRAPHY and NETWORK SECURITY

Code: 9EC09

L	T	P	C
3	0	0	3

Prerequisite : Nil

Course Objectives:
1. To learn the fundamental concepts of security attacks, security services.
2. To apply conventional cryptographic techniques in order to do encryption.
3. To apply Public key cryptography techniques in order to do encryption.
4. To learn IP security Architecture and its role in security framework.
5. To apply SSL and TLS for Web Security. To design and develop Intrusion Detection Systems and Firewall.

Course Outcomes:
At the end of this course, the student will be able to
1. Understand the fundamental concepts of Security Attacks and security standards with the model for network Security.
2. Review and analyze conventional and Public cryptographic techniques
3. Review and analyze Message Authentication, Secure Hash functions and outline the concepts of Kerberos and email privacy
4. Recognize architecture, key management and header formats of IPsec and Outline the various web security threats and protocols
5. Understand Intrusion Detection System and Design principles of Firewalls

UNIT – I:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs.

UNIT – II:

Conventional Encryption Principles, Conventional encryption algorithms: DES, TDES, AES, **RC4,** cipher block modes of operation, location of encryption devices, key distribution, Public key cryptography principles, public key cryptography algorithms: RSA, DIFFIE HELL MAN

UNIT – III:

Digital signatures, digital Certificates, Certificate Authority and key management, Approaches of Message Authentication, Secure Hash Functions: SHA1 and HMAC
Kerberos, X.509 Directory Authentication Service. Email privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT – IV

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT – V

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Intruders, Viruses and related threats.

UNIT – VI:

Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

TEXT BOOKS:

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education, 4th Edition.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permeh, wileyDreamtech

REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
4. Principles of Information Security, Whitman, Thomson.
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
COMPILER DESIGN and INFORMATION SECURITY LAB

Code: 9EC66

L	T	P	C
0	0	3	1.5

COMPILER DESIGN LAB

Prerequisite: Nil

Course Objectives:
This laboratory course is intended to make the students experiment on the basic techniques of compiler construction and tools that can used to perform syntax-directed translation of a high-level programming language into an executable code.

Course Outcomes:
At the end of this course the student will be able to
 1. Implementation of DFA for a given Languages/ Regular Expression.
 2. Usage LEX of tool to implement lexical analyzer in compiler design and implementation of Top-Down Parser.
 3. Usage of   YACC tools for implementing bottom up parser.

Exercises:

1) Implement DFA accepting the language containing even binary numbers.

2) Implement DFA that accept all the strings of a's and b's 3rd symbol from is RHS always a .

3) Implement DFA accepting the language of strings not ending with 00 over the input (0,1)

4) Implement the DFA that accepts all the string of a's and b's where number of a 's is divisible by 3 and number of b's is divisible by2.

5) write lex program to implement lexical analyzer functionality.

6) Write a lex program to count the number of words and number of lines in a given file or program.

7) Write a 'C' program to implement lexical analyzer using c program.

8) write recursive descent parser for the grammar E->E+T E->T T->T*F T->F
     F->(E)/id.

9) write recursive descent parser for the grammar S->(L)   S->a L->L,S L->S

10) Write a C program to calculate first function for the grammar
      E->E+T E->T T->T*F T->F
       F->(E)/id

11) Write a YACC program to implement top down parser for the given grammar.

12) Write a YACC program to evaluate algebraic expression.

INFORMATION SECURITY LAB

Prerequisite : Nil

Course Objectives:
1. Learn the fundamental of information security principles and services offered to secure the data.
2. Apply conventional cryptographic techniques in order to do encryption.
3. Apply Public key cryptography techniques in order to do encryption.

Course Outcomes:
At the end of this course, the student will be able to
Understanding of Symmetric Encryption Algorithms, Asymmetric Encryption Algorithms, Hash and Key Exchange, Digital Signature and Digital Envelope, Demonstration of NS3 Tool

List of Programs

1. Implement Substitution Cipher.

2. Implement Transposition Cipher.

3. Implement DES

   (a) Generate Cipher text for the given Plaintext.

   (b) Retrieve the Plaintext from the given Cipher text.

4. Implement Diffie Hellman Algorithm and generate Secret Key.

5. Implement RSA algorithm

   (a) Generate Public key and Private key pair

   (b) Generate Cipher text for the Plaintext

   (c) Obtain the Plaintext from the Cipher text

6. Implement Hash Algorithm.

7. Generate Digital Signature

8. Implement Digital Envelope.

9. Installation of NS3.

10. Demonstration of NS3.

11. Executing simple projects in NS3.

12. Implement a program to transfer file between Client-Server using Socket.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
LINUX PROGRAMMING LAB

Code: 9EC67

L	T	P	C
0	0	3	1.5

Prerequisite: NIL
Course Objectives:
1. To make use of File handling utilities, Security by file permissions, process utilities, Disk utilities, networking utilities.
2. To understand meta-characters of BASH, acquire the knowledge regarding control structures, shell interrupt processing, functions, debugging shell scripts.
3. To impart usage of kernel support for files using C, understand file structure and low-level I/O functions, system calls (file API's). Induce knowledge regarding Directory management and its API.
4. To analyze syntaxes for process creation, execution and synchronization mechanisms. Give knowledge regarding a signal, need for having them, usage of various signals.
5. To understand the possible mechanisms to implement System V APIs and analyze the usage of Message queues APIs.
6. To incorporate implementation for semaphore API and shared memory API. To explain the need for using a basic Client-Server model.

Course Outcomes:
1. Understanding the basic commands of Linux operating system and can write shell scripts.
2. Proficiency in using system calls for Linux APIs for file I/O in Shell Scripting.
3. Monitoring and diagnosing process-related Utilities.
4. Developing applications complying with IPC mechanisms.

List of Experiments
1. Basic Linux Commands File handling utilities, Security by file permissions, Process utilities, Disk utilities, sed, awk, grep.

2. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.

3. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.

4. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

5. C programming examples using Linux Operating systems.

        a) wc   b) cat   c) cp

6. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

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7.   Write the following Shell scripts:

    a) To accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.

    b) To list all of the directory files in a directory.

    c) To find factorial of a given integer.

8.   a) Write an awk script to count the number of lines in a file that do not contain vowels.

    b) Write an awk script to find the number of characters, words and lines in a file.

9.   Implement in C the following UNIX commands using System calls a) rename b) link

10. Write a C program to emulate the UNIX ls – l command.

11. Write a C program on zombie process

12. Write a C program that illustrates the following. a) Creating a message queue. b) Writing to a message queue. c) Reading from a message queue.

13. Write a C program that illustrates file locking using semaphores.

14. Write a C program to implement record locking.

15.   Write a C program to implement data communication between two processes using PIPE.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
SUMMER INDUSTRY INTERNSHIP-II

Code: 9F787

L	T	P	C
0	0	0	1

Course Objectives:
 To enhance the knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

Course Outcomes:
 At the end of this course the student will be able to
1. Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
2. Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
3. Inculcate an enthusiasm to use the creative ideas to build the innovative projects and prototypes which are meeting the current needs of the market and society as a whole.
4. Improve their communicative skills and team skills.

A summer industry internship project shall be carried out by a group of students consisting of 1 or 2 to 3 in number during summer second year second semester at industries or institution. This work shall be carried out under the guidance of the faculty assigned as internal guide as well as external guide at industry where students are carrying out summer industry internship projects. Project shall consist of design, fabrication, software development or building of prototype or application app. This can be of interdisciplinary nature also.

There will be 100 marks in total with 40 marks of internal evaluation and 60 marks of external
The **internal evaluation** shall consist of:

Presentation	:	15 marks
Internal Evaluation	:	15 marks
Report	:	10 marks
		--------------
		40 marks

End examination   :   60 Marks.
External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the internal guide.

Presentation	:	10 marks
Demonstration/ Technology	:	40 marks
Report	:	10 marks
		--------------
		60 marks

Syllabus for B.Tech (IT) IV YEAR II SEM
INFORMATION TECHNOLOGY
CYBER SECURITY AND CYBER LAWS

Code: 9FC07

L	T	P	C
2	0	0	2

Prerequisite: Nil

Course Objectives:
1. To learn fundamentals of cryptography and its application to network security.
2. To understand network security threats, security services, and countermeasures.
3. To learn computer security, Internet, E-commerce and E-governance with reference to Free
4. Market Economy
5. To learn International Efforts relating to Cyberspace laws and Cyber crimes
6. To learn Law relating to electronic records and intellectual property rights in India
7. To understand ethical laws of computer for different countries.
8. To learn Penalties, Compensation and Offences under the Cyberspace and Internet in India
9. To learn Miscellaneous provisions of IT Act and Conclusions

Course Outcomes:

At the end of this course the student will be able to
1. Familiarize the cryptographic procedures and Understand its primitives
2. Outline Security policy in Legislation and Comprehend E-Commerce frame work, models and its associated threats
3. Justify the role of electronic signatures in E-Commerce and summarize the various laws relating to it.
4. Categorize international cyber laws and cyber crimes.
5. Explore Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000 and Outline theoffences under the Cyberspace law and the Internet in India

UNIT-I

Introduction to cyber Security, cryptography, Types of Attacks, Secrete Key Cryptography

Introduction: Cyber attacks, Defense Strategies and Techniques Mathematical background for Cryptography: Modulo arithmetic, The greatest common divisor, Useful Algebraic Structures, Chinese Remainder Theorem Basics of Cryptography: Secret versus Public key Cryptography, Types of attacks, Elementary substitution Ciphers, Elementary Transposition Ciphers, Other Cipher Properties Secrete Key Cryptography: Product Ciphers, DES Construction, Modes of Operation, MAC and other Applications, Attacks, Linear Crypt analysis.

UNIT-II

Introduction to Computer Security, Internet, E-commerce and E-governance with reference to Free Market Economy

Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity, Conceptual Framework of E-commerce: governance, the role of Electronic Signatures in E-commerce with Reference to Free Market Economy in India.

UNIT-III

Law relating to electronic records and intellectual property rights in India
Legal aspects of Electronic records / Digital signatures, Cyber laws, the roles and regulations of Certifying Authorities in India, Protection of Intellectual Property Rights in Cyberspace in India.

UNIT-IV

International Efforts relating to Cyberspace laws and Cyber crimes
International efforts related to Cyber laws, Council of Europe (COE) convention on Cyber Crimes.

UNIT-V

Penalties, Compensation
Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000 and judicial review.

UNIT-VI

Offences under the Cyberspace, Internet in India and Miscellaneous provisions of IT Act and Conclusions
Some important offences under the Cyberspace law and the Internet in India, Other offences under the INFORMATION TECHNOLOGY Act in India, The role of Electronic Evidence and miscellaneous provisions of the IT Act.

TEXT BOOK:

1. Network security and Cryptography by Bernard Menezes CENGAGE Learning Publications, 2010.
2. Cyber Laws and IT Protection, Harish Chander, PHI, 2012.

REFERENCE BOOKS:

1. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2ndEdition, O' Reilly Media, 2006.
2. Wenbo Mao, "Modern Cryptography – Theory and Practice", Pearson Education, New Delhi, 2006.
3. Cyberspace and Cybersecurity, George Kostopoulos, Auerbach Publications, 2012.
4. Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, Second Edition, Albert Marcella, Jr., Doug Menendez, Auerbach Publications, 2007

Syllabus for B.Tech (IT) IV YEAR II SEM
INFORMATION TECHNOLOGY
MAJOR PROJECT

Code: 9F888

L	T	P	C
0	0	20	10

COURSE OBJECTIVES:
To enhance the knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Estimate the human and physical resources required, and make plan for the development of Project
2. Break down the Project into tasks and determine handover procedures
3. Identify links and dependencies, and schedule to achieve deliverables
4. Allocate roles with clear lines of responsibility and accountability with team spirit.
5. Design and develop the software or prototype using modern software tools wherever applicable to meet societal needs
6. Present the Project done and submit the report

A project shall be carried out by a group of students consisting of 1 or 2 to 3 in number in fourth year second semester. This work shall be carried out under the guidance of the faculty assigned as internal guide and shall involve design, fabrication, software development or any other significant activity. This can be of interdisciplinary nature also.

Out of total 100 marks for project work (in the final year second semester), 40 marks shall be for Continues Internal Evaluation and 60 marks for the Semester External Evaluation at the end of the Semester.

Semester End External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The committee consists of an external examiner, HOD, a Senior Faculty Member and Internal Guide.

Division of Marks for Continues Internal Evaluation – 40 marks

S.No	Description	Marks
1	Abstract Seminar at the end of 3 weeks	5
2	Design Seminar at the end of 8 weeks	5
3	Implementation / Demonstration of Seminar at the end of 12 weeks	10
4	Evaluation of Project by Internal Guide	10
5	Project Report	10
	Total	**40**

S.No	Description	Marks
1	Final Project Report	**10**
2	Presentation	**20**
3	Demonstration / Defense of Project	**30**
	Total	**60**

Division of Marks for Semester End External Evaluation – 60 Marks

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
Professional Elective-I (III - I)
INFORMATION RETRIEVAL SYSTEMS

Code: 9FC08

L	T	P	C
3	0	0	3

Prerequisites: Data Structures

Course Objectives:
- To learn the important concepts and algorithms in IRS
- To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Course Outcomes:
- Ability to apply IR principles to locate relevant information large collections of data
- Ability to design different document clustering algorithms
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

UNIT – I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT – II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction
Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

UNIT - III

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

UNIT - IV

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

UNIT V

Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems. Integrating Structured Data and Text Historical progression, Information retrieval as a relational application, Semi structured search using a relational schema.

UNIT VI

Multimedia Information Retrieval – Models and Languages – Data Modeling, Query Languages, Indexing and Searching.
Distributed Information Retrieval: A Theoretical model of distributed retrieval, web search

TEXT BOOK:

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCE BOOKS:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
IMAGE PROCESSING (Professional Elective - I)

Code: 9FC09

L	T	P	C
3	0	0	3

Prerequisite : Computer Graphics

Course Objectives:

Make decisions from image data, online inspection and face recognition

Course Outcomes:

At the end of this course the student will be able to
1. Analyze general terminology of image processing.
2. Examine various types of images, intensity transformations and spatial filtering.
3. Develop Fourier transform for image processing in frequency domain.
4. Evaluate the methodologies for image segmentation, restoration etc.

5. Implement image process and analysis algorithms.
6. Apply image processing algorithms in practical applications.

UNIT – I

Introduction: Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system.. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels.

UNIT – II

Image enhancement in the spatial domain: Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods.

UNIT – III

Image restoration: A model of the image degradation/restoration process, noise models, restoration in the presence of noise–only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function.

UNIT– IV

Color Image Processing: Color fundamentals, color models, pseudo color image processing, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation.

UNIT – V

Image Compression and Morphology: Fundamentals, image compression models, error-free compression, lossy predictive coding, image compression standards, Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, hit or miss transformation.

UNIT – VI

Image Segmentation and Recognition: Detection of discontinuous, edge linking and boundary detection, thresholding, region–based segmentation, Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers.

Text Books:

1. Digital Image Processing, Rafeal C.Gonzalez, Richard E.Woods, Third Edition, Pearson Education/PHI.

REFERENCE BOOKS:

1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
3. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
4. Digital Image Processing, William K. Prat, Wily Third Edition
5. Digital Image Processing and Analysis, B. Chanda, D. Datta Majumder, Prentice Hall of India, 2003

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
INTRODUCTION TO DATA SCIENCE
(Professional Elective- I)

Code: 9EC10

L	T	P	C
3	0	0	3

Prerequisite: Python Programming, Probability and Statistics

COURSE OBJECTIVES:
1. Learn concepts, techniques, and tools they need to deal with various facets of data science practice, including data collection and integration
2. Exploring data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication
3. Understand the basic knowledge of algorithms and reasonable programming experience and some familiarity with basic linear algebra and basic probability and statistics
4. Identify the importance of recommendation systems and data visualization techniques

COURSE OUTCOMES:
After completion of the course, the student should be able to
1. Develop in depth understanding of the key technologies in data science and business analytics: visualization techniques and statistics.
2. Practice problem analysis and decision-making.
3. Gain practical, hands-on experience on Advanced statistics through coursework and applied research experiences.
4. Students will apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

Unit I:

Data science: Basic terminology - Example – Sigma Technologies -
Types of Data: Structured versus unstructured data - Quantitative versus qualitative data - The four levels of data – Nominal – Ordinal – Interval – Ratio

Unit II:

Basic Mathematics - Basic symbols and terminology - Vectors and matrices - Arithmetic symbols - Summation - Proportional - Dot product - Graphs - Logarithms/exponents - Set theory - Linear algebra - Matrix multiplication
Basic Statistics: Obtaining data - Observational - Experimental - Sampling data - Probability sampling - Random sampling - Unequal probability sampling - Measuring statistics - Measures of center - Measures of variation - Measures of relative standing - The Empirical rule

Unit III:

Advanced Statistics: Point estimates - Sampling distributions - Confidence intervals - Hypothesis tests - Conducting a hypothesis test - One sample t-tests - Example of a one sample t-tests - Assumptions of the one sample t-tests - Type I and type II errors - Hypothesis test for categorical variables - Chi-square goodness of fit test - Chi-square test for association/independence

Unit IV:

The Basics of NumPy Arrays - The Basics of NumPy Arrays - Aggregations: Min, Max, and Everything in Between - Computation on Arrays: Broadcasting - Fancy Indexing
Data Manipulation with Pandas - Introducing Pandas Objects - Data Indexing and Selection - Handling Missing Data - Combining Datasets: Concat and Append - Aggregation and Grouping

Unit V:

Visualization with Matplotlib - Importing matplotlib - Simple Line Plots - Simple Scatter Plots - Histograms, Binnings, and Density – case study: Effect of Holidays on US Births

Unit VI:

Basic Machine Learning: Introduction to machine learning, types of machine learning: Supervised and unsupervised
Types of Supervised learning: Classification and regression, Classifiers – Decision tree and k-Nearest Neighbors (k-NN),
Types of unsupervised: Clustering k-means, Association Rule mining

TEXT BOOKS:

1. Principles of Data Science, Sinan Ozdemir, Packt, (2016)
2. Python Data Science handbook, Essential Tools for Working with Data, Jake Vanderplas, O'Reilly, (2017)

REFERENCE BOOKS:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson
2. Laura Igual and Santi Seguí, Introduction to Data Science, Springer

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
ADVANCED COMPUTER ARCHITECTURE
(Professional Elective - I)

Code: 9EC11

L	T	P	C
3	0	0	3

Prerequisites: Computer Organization

Course Objectives

1. To impart the concepts and principles of parallel and advanced computer architectures.
2. To develop the design techniques of Scalable and multithreaded Architectures.
3. To Apply the concepts and techniques of parallel and advanced computer architectures todesign modern computer systems

Course Outcomes: Gain knowledge of

1. Computational models and Computer Architectures.
2. Concepts of parallel computer models.
3. Scalable Architectures, Pipelining, Superscalar processors, multiprocessors

UNIT – I:

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architectural development tracks, Program and network properties, Conditions of parallelism, Program partitioning and Scheduling, Program flow Mechanisms, System interconnect Architectures.

UNIT – II:

Principals of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.

UNIT – III:

Bus Cache and Shared memory, Backplane bus systems, Cache Memory organizations, Shared-Memory Organizations, Sequential and weak consistency models, Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, superscalar pipeline design.

UNIT – IV:

Parallel and Scalable Architectures, Multiprocessors and Multicomputers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputers.

UNIT – V:

Message-passing Mechanisms, Multivetor and SIMD computers, Vector Processing Principals, Multivector Multiprocessors, Compound Vector processing, SIMD computer Organizations, The connection machine CM-5

UNIT – VI:

Scalable, Multithreaded and Dataflow Architectures, Latency-hiding techniques, Principals of Multithreading, Fine-Grain Multicomputers, Scalable and multithreaded Architectures, Dataflow and hybrid Architectures.

TEXT BOOK:

1. Advanced Computer Architecture Second Edition, Kai Hwang, Tata McGraw Hill Publishers.

REFERENCE BOOKS:

1. Computer Architecture, Fourth edition, J. L. Hennessy and D.A. Patterson. ELSEVIER.

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
HUMAN COMPUTER INTERACTION
(Professional Elective - I)

Code: 9FC10

L	T	P	C
3	0	0	3

Course Objectives: To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional "keyboard and mouse" computing; become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans; be able to apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks and recognize the limits of human performance as they apply to computer operation; appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user; be familiar with a variety of both conventional and non-traditional user interface paradigms, the latter including virtual and augmented reality, mobile and wearable computing, and ubiquitous computing; and understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems. Finally, working in small groups on a product design from start to finish will provide you with invaluable team-work experience.

Course Outcomes:
  ➢ Ability to apply HCI and principles to interaction design.
  ➢ Ability to design certain tools for blind or PH people.

UNIT-I:

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design.

UNIT-II:

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics-Principles of user interface.

UNIT-III:

Design process – Human interaction with computers, importance of human characteristics human consideration in Design, Human interaction speeds, understanding business functions.

UNIT-IV:

Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT-V:

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls.
Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT-VI:
Software tools – Specification methods, interface – Building Tools.
Interaction Devices – Keyboard and function keys – pointing devices-speech recognition digitization and generation – image and video displays – Printers.

TEXTBOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream a Tech.
2. Designing the userinterface.3rd Edition Ben Shneidermann, Pearson Education Asia.

REFERENCES:

1.Human – Computer Interaction.ALANDIX,JANETFINCAY,GREGORYD,ABOWD, RUSSELLBEALG,PEARSON.
2.InteractionDesignPRECE,ROGERS,SHARPS.WileyDreamtech,
3.UserInterfaceDesign,SorenLauesen,PearsonEducation

Syllabus for B.Tech (IT) III YEAR I SEM
INFORMATION TECHNOLOGY
SOFTWARE REQUIREMENTS and ESTIMATION
(Professional Elective – I)

Code: 9EC12

L	T	P	C
3	0	0	3

Prerequisite: Software Project Management

Course Objectives:
1. Demonstrate the knowledge of the distinction between critical and non- critical systems and should author a software requirements document.
2. Understand the proper contents of a software requirements document and distributed system architectures and application architectures.

Course Outcomes:
At the end of this course the student will be able to
1. Explain need, practices and Risk issues in Software requirements.
2. Describe Software Requirements Engineering elements such as review, quality and priorities.
3. Explain software Modeling and Requirements Management.
4. Apply Estimation methods for size using Mark II FPA, Full Function Points, LOC Estimation.
5. Apply Cost and Schedule estimation factors during software development.
6. Apply tools for Requirements Management and Estimation.

UNIT- I:

Software Requirements: What and Why Essential Software requirement, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management

UNIT –II:

Software Requirements Engineering Requirements elicitation, elicitation techniques, requirements analysis, documentation, review, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality.

UNIT – III:

Software Requirements Modeling, Analysis Models, Use Case Modeling, Dataflow diagram, state transition diagram, class diagrams.

Software Requirements Management Requirements management Principles and practices, Requirements attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain.

UNIT IV:

Software Estimation Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation Size **Estimation** Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, and Conversion between size measures.

UNIT – V:

Effort, Schedule and Cost Estimation What is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Cost Estimation.

UNIT – VI:

Tools for Requirements Management and Estimation Requirements Management Tools: Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite pro, Caliber – RM, implementing requirements management automation.

Software Estimation Tools: Desirable features in software estimation tools, IFPUG, USC's COCOMO II, and SLIM (Software Life Cycle Management) Tools.

TEXT BOOK:
1. Software Requirements and Estimation by Rajesh Naik and Swapna Kishore, Tata Mc Graw Hill.

REFERENCE BOOKS:

1. Software Requirements by Karl E. Weigers, Microsoft Press.
2. Managing Software Requirements, Dean Leffingwell & Don Widrig, Pearson Education, 2003.
3. Mastering the requirements process, second edition, Suzanne Robertson & James Robertson, Pearson Education, 2006.
4. Estimating Software Costs, Second edition, Capers Jones, TMH, 2007.
5. Practical Software Estimation, M.A. Parthasarathy, Pearson Education, 2007.
6. Measuring the software process, William A. Florac& Anita D. Carleton, Pearson Education, 1999.

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
C# AND .NET FRAMEWORK
(Professional Elective-II)

Code: 9FC11

L	T	P	C
3	0	0	3

Prerequisite: Object Oriented Programming through Java

COURSE OBJECTIVES:
Understand .NET Interoperation services. Learn Client side programming and Server side architectures and programming technologies, .NET Remoting. Understand the significance of Web services and web service security, the importance of RESTful, SOAP, DISCO, and UDDI and Web Services.

COURSE OUTCOMES:
At the end of this course, studentswill able to
1. Introducing .Net Architecture and learn basic programming in C# and the object oriented programming concepts.
2. Explain advance features and enhance skills in writing windows applications, ADO.NET and ASP.NET.
3. Discuss various class libraries for different applications and data manipulation functions.
4. Understand the advanced concepts in data connectivity, WPF, WCF and WWF with C# and .NET 4.5.
5. Develop distributed applications using .NET Framework.
6. Create mobile applications using .NET compact Framework.

UNIT I:

INTRODUCTION TO C#
Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.

UNIT II:

OBJECT ORIENTED ASPECTS OF C#
Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

UNIT III:

APPLICATION DEVELOPMENT ON .NET
Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, Dataset, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration.

UNITIV:

WEB BASED APPLICATION DEVELOPMENT ON .NET
Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web. config, web services.

UNIT V:

SQL Connection: Passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.

UNIT VI:

CLR AND .NET FRAMEWORK
Assemblies, Versoning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, remoting, security.

TEXT BOOKS:

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.

REFERENCES BOOKS:

1. Andrew Troelsen , "Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.
2. Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition, O"Reilly, 2010.

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
COMPUTER GRAPHICS
(Professional Elective – II)

Code: 9FC12

L	T	P	C
3	0	0	3

Course Objectives:
1. Various Input and Out Put devices and various Out Put Primitive Algorithms
2. Filled Area Primitive Algorithms and 2-D geometrical transformations
3. 2-D Viewing and clipping Algorithms
4. 3-D Object Representation and 3-D geometrical Transformations
5. 3-D Viewing and visible surface detection methods
6. Computer Animation languages

Course Outcomes:
At the end of this course, the student will be able to
1. Understandfundamental terms in Computer Graphics, various visible surface determination algorithms and midpoint and line segment analysis.
2. Explore 2D graphics and algorithms including: line drawing, polygon filling, clipping, and transformations.
3. Apply functions 2D viewing and apply clipping algorithms.
4. Understand the concepts and techniques used in 3D computer graphics, including viewing transformations, hierarchical modeling, color, lighting and texture mapping.
5. Apply single and multiple 3-D viewing techniques like viewing coordinates etc and also back-face detection, depth-buffer, and scan-line methods.
6. Analyze the animation production pipeline and Produce a short animation.

Unit-I

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices. Output primitives : Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms, Applications.

Unit-II

Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms
2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

Unit- III

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland – Hodgeman polygon clipping algorithm

UNIT-IV

3-D Object Representation: Polygon surfaces, quadric surfaces, spline representation, Bezier curve and B-Spline curves, polygon rendering methods. 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

UNIT-V

3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

UNIT-VI

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications. (p.nos 604- 16 of text book -1, chapter 21 of text book-2).

TEXT BOOKS:

1. "Computer Graphics C version", Donald Hearn and M.Pauline Baker, Pearson Education.
2. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

REFERENCE BOOKS:

1. "Computer Graphics", second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.
2. "Computer Graphics Second edition", Zhigandxiang, Roy Plastock, Schaum's outlines, Tata Mc- Graw hill edition.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
4. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
5. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
6. Computer Graphics, Steven Harrington, TMH

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
ARTIFICIAL INTELLIGENCE ANDDEEP LEARNING
(Professional Elective – II)

Code: 9EC13

L	T	P	C
3	0	0	3

Prerequisite: Machine Learning

COURSE OBJECTIVES:

1. To understand the different types of AI agents
2. Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)
3. To understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving
4. Know how to build simple knowledge-based systems
5. Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information
6. Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems
7. Ability to carry out independent (or in a small group) research and communicate it effectively in a seminar setting.
8. Ability to apply concepts of convolutional networks in day to day applications.

Course Outcomes:

After completion of this course, student will be able to
1. Identify different types of agents and their relationships with the environment.
2. Demonstrate the application of agents handling applications dealing with conflict resolution
3. Represent knowledge in logical level and also be able to convert it to a form suitable for implementation.
4. Derive inferences applying rules of First Order Logic
5. Formulate an approach for applications involving complete and incomplete Planning And Choose the appropriate learning strategy needed for solving a given problem.

UNIT I

Introduction: AI problems, Intelligent agents: Agents and Environments, Rationality, Nature of environments, Structure of agents, Problem solving agents, Problem formulation – Planning Application – Classical Planning problem

UNIT II

Searching and Game Theory: Searching for solutions, Searching with partial information (Heuristic search), Greedy best first search, A* search Constraint Satisfaction problem -Game Playing: Adversarial search : Games, Minimax algorithm, Optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions. **Case studies:** Tic-tac-toe game

UNIT III

Knowledge Representation and Reasoning : Logical Agents, Knowledge Based Agents, Wumpus world, Propositional logic, Resolution patterns in propositional Logic, First order logic, Inference in first order logic, propositional vs. First order inference, Unification and Lifting, Forward chaining, Backward chaining, Resolution

UNIT IV

Uncertain Knowledge and Reasoning : Bayes Rule, Concepts of Time and Uncertainty, Utility Functions, Value of Information, Value iteration, Policy iteration, Partially Observable MDP

UNIT – V

BASICS OF DEEP LEARNING
Deep learning architectures: Convolutional Neural Networks : Neurons in Human Vision-The Shortcomings of Feature Selection - Full Description of the Convolutional Layer - Max Pooling-Full Architectural Description of Convolution Networks - Closing the Loop on MNIST with Convolutional Networks- -Building a Convolutional Network for CIFAR-10 - Visualizing Learning in Convolutional Networks- Leveraging Convolutional Filters to Replicate Artistic Styles-Learning Convolutional Filters for Other Problem Domains-Training algorithms.

UNIT VI

DEEP REINFORCEMENT LEARNING:
Deep Reinforcement Learning Masters Atari Games -   Reinforcement Learning-Markov Decision Processes (MDP)-Explore Versus Exploit - Pole-Cart with Policy Gradients-Q-Learning and Deep Q-Networks-Improving and Moving Beyond DQN.

TEXT BOOKS
1 S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, Third Edition, 2009.
2. Artificial Intelligence, 3rd Edition, Patrick Henry Winston, Pearson Education, 1992.
3. Nikhil Buduma, Nicholas Locascio, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms", O'Reilly Media, 2017.
4. Ian Goodfellow, YoshuaBengio, Aaron Courville, "Deep Learning (Adaptive Computation and Machine Learning series", MIT Press, 2017.

REFERENCES:
1. M. Tim Jones, ―Artificial Intelligence: A Systems Approach(Computer Science), Jones and   Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, ―The Quest for Artificial Intelligence, Cambridge University Press, 2009.

3. William F. Clocksin and Christopher S. Mellish, Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003.
4. Gerhard Weiss, ―Multi Agent Systems, Second Edition, MIT Press, 2013.

5. David L. Poole and Alan K. Mackworth, ―Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.
6. Bratko, ―Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
DISTRIBUTED DATABASES
(Professional Elective – II)

Code: 9EC14

L   T   P   C
3   0   0   3

Prerequisites:
1. A course on "Database Management Systems"

Course Objectives:
1. To expose the need for distributed database technology to confront with the deficiencies of the centralized database systems.
2. To introduce the basic principles and implementation techniques of distributed database systems.
3. To equip students with principles and knowledge of parallel and object-oriented databases.
4. To learn distributed DBMS architecture and design, query processing and optimization, distributed transaction management and reliability, parallel and object database management systems.

Course Outcomes:
➢ Understand theoretical and practical aspects of distributed database systems.
➢ Study and identify various issues related to the development of distributed database system.
➢ Understand the design aspects of object-oriented database system and related development.

UNIT – I

Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.
Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.
Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT – II

Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data.
Distributed query Optimization: Query optimization, centralized query optimization, distributed query optimization algorithms.

UNIT – III

Transaction Management: Definition, properties of transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

UNIT – IV

Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.

UNIT – V

Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.
Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design,

UNIT – VI

Distributed object Database Management Systems: Architectural issues, object management, distributed object storage, object query Processing.
Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

TEXT BOOKS:

1. M. Tamer OZSU and PatuckValduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

REFERENCE BOOK:

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
SEMANTIC WEB & SOCIAL NETWORKS
(Professional Elective – II)

Code: 9EC15

L	T	P	C
3	0	0	3

Prerequisite: Nil

Course Objectives:

Understand Web Intelligence and Ontology. Learn basics of Semantic web, its representation issues and Social Network Analysis.

Course Outcomes:

At the end of this course the student will be able to
1. Appraise the role of the Web, its need and Intelligence.
2. Outline the concepts of Machine Intelligence Ontology, Inference engines, Software Agents, Berners-Lee www and Semantic Road Map.
3. Conceptualize Knowledge Representation for the Semantic Web with Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML and XML Schema.
4. Apply Ontology Engineering using Ontology Development Tools/ Methods, Ontology Libraries, Ontology Mapping, Logic and Inference Engines.
5. Illustrate Semantic Web Applications, Services and Technology.
6. Apply Social Network Analysis, Semantic web networks analysis and describe Building of Semantic Web Applications with social network features.

UNIT I

Web Intelligence: Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web

UNIT II

Machine Intelligence: Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT III

Knowledge Representation for the Semantic Web: Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML, XML/XML Schema.

UNIT IV

Ontology Engineering: Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT V

Semantic Web Applications, Services and Technology: Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT VI

Social Network Analysis and Semantic web: Development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

TEXT BOOKS:

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

REFERENCES:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, RudiStuder,PaulWarren,JohnWiley&Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers (Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD.
5. A Semantic Web Primer, G. Antoniou and V. Harmelen, PHI.

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
SOFTWARE PROJECT MANAGEMENT
(Professional Elective – II)

Code: 9FC13   **L   T   P   C**
                                             3   0   0   3

Course Objectives:
Software Project Management course aims to give the students an understanding of the building blocks of software projects and induces the essence of project management. The spectrum of topics covered in this subject including software lifecycle, software economics, artifacts, processes, workflows, architecture, planning etc help strengthen the fundamentals of the student enabling them to have a deeper understanding of software project management.

Course Outcomes:
At the end of this course the student will be able to
1. Explain primitives of Project Planning and evolution of software economics.
2. Describe software economics; reduce Software product size, improvement in software processes, improving team effectiveness, improving automation, Achieving quality.
3. Explain Life cycle phases and Artifacts of the process.
4. Describe Model based software architectures and Work Flows.
5. Apply Checkpoints for a process such as Major mile stones, Minor Milestones and apply work breakdown structures for a iterative process within cost and schedule. Describe Project Organizations and Responsibilities.
6. Describe Automation and Project Control and Process instrumentation and explain Future Software Project Management such as Modern Project Profiles and Next generation project management.

UNIT I:

Concept of Management: Management Definition, Role and Responsibilities of Management, Management in Software Industry
Types of Software Organizations: Start-up companies, Independent Software Companies, Multi-National Software Companies.
Conventional Software Management: The waterfall model, conventional software Management performance.
Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

UNIT II:

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.
The old way and the new way: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT III:
Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.
Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT IV:

Model based software architectures: A Management perspective and technical perspective.
Work Flows of the process: Software process workflows, Iteration workflows.

UNIT V:

Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments. **Iterative Process Planning:** Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.
Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

UNIT VI:

Process Automation: Automation Building blocks, The Project Environment.
Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations,
Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions.
Case study: The command center processing and display system – Replacement (CCPDS-R)

TEXTBOOKS:

1.   Software Project Management, Walker Royce: Pearson Education, 2005.

REFERENCE BOOKS:
  1.   Management Concepts and Practices, Tim Hannagan, FT Prentice Hall, 5th Edition
  2.   Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
  3.   Software Project Management, Joel Henry, Pearson Education.
       Software Project Management in practice, Pankaj Jalote, Pearson Education.2005

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
MOBILE APPLICATION DEVELOPMENT
(Professional Elective – III)

Code: 9FC14

L	T	P	C
3	0	0	3

Prerequisite : Java Programming

Course Objectives:
- To demonstrate their understanding of the fundamentals of Android operating systems
- To demonstrate their skills of using Android software development tools
- To demonstrate their ability to develop software with reasonable complexity on mobile platform
- To demonstrate their ability to deploy software to mobile devices
- To demonstrate their ability to debug programs running on mobile devices

Course Outcomes:
CO1: Ability to understand the technical challenges posed by current mobile devices and wireless communications.
CO2: Understand to learn the Android Application lifecycle .
CO3: Select and evaluate suitable software tools and APIs for the Development of a particular mobile application and understand their strengths, scope and limitations.
CO4: Slove the need to keep up with rapid changes and new developments
CO5: Ability to identify the SQLite database and files.
CO6: Design and development small interactive programs for mobile devices.

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

UNIT – II

Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes
Android User Interface: Measurements – Device and pixel density independent measuring units. **Layouts –** Linear, Relative, Grid and Table Layouts.

UNIT – III

User Interface (UI)Components – Editable and non editable Text Views, 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 – IV

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 – V

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

UNIT – VI

Advanced Topics: Alarms – Creating and using alarms.
Using Internet Resources – Connecting to internet resource, using download manager
Location Based Services – Finding Current Location and showing location on the Map, updating location

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:

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

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
PATTERN RECOGNITION
(Professional Elective – III)

Code: 9EC16

L	T	P	C
3	0	0	3

Prerequisites

1. Students are expected to have knowledge basic linear algebra, basic probability theory and basic programming techniques;
2. A course on "Computational Mathematics"
3. A course on "Computer Oriented Statistical Methods"

Course Objectives:

1. This course introduces fundamental concepts, theories, and algorithms for pattern recognition and machine learning.
2. Topics include: Pattern Representation, Nearest Neighbor Based Classifier, Bayes Classifier, Hidden Markov Models, Decision Trees, Support Vector Machines, Clustering, and an application of hand-written digit recognition.

Course Outcomes

1. Understand the theory, benefits, inadequacies and possible applications of various machine learning and pattern recognition algorithms
2. Identify and employ suitable machine learning techniques in classification, pattern recognition, clustering and decision problems.

UNIT - I:

Introduction: What is Pattern Recognition, Data Sets for Pattern Recognition, Different Paradigms for Pattern Recognition. Representation: Data Structures for Pattern Representation, Representation of Clusters, Proximity Measures, Size of Patterns, Abstractions of the Data Set, Feature Extraction, Feature Selection, Evaluation of Classifier, Evaluation of Clustering.

UNIT - II:

Nearest Neighbor Based Classifier: Nearest Neighbor Algorithm, Variants of the NN Algorithm use of the Nearest Neighbor Algorithm for Transaction Databases, Efficient Algorithms, Data Reduction, Prototype Selection. Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naïve Bayes Classifier, Bayesian Belief Network.

UNIT - III:

Hidden Markov Models: Markov Models for Classification, Hidden Morkov Models, Classification using HMMs. Decision Trees: Introduction, Decision Tree for Pattern Classification, Construction of Decision Trees, Splitting at the Nodes, Overfitting and Pruning, Examples of Decision Tree Induction.

UNIT - IV:

Support Vector Machines: Introduction, Learning the Linear Discriminant Functions, Neural Networks, SVM for Classification. Combination of Classifiers: Introduction, Methods for Constructing Ensembles of Classifiers, Methods for Combining Classifiers.

UNIT - V:

Clustering: Why is Clustering Important, Hierarchical Algorithms, Partitional Clustering, Clustering Large Data Sets.

UNIT – VI:

An Application-Hand Written Digit Recognition: Description of the Digit Data, Preprocessing of Data, Classification Algorithms, Selection of Representative Patterns, Results.

TEXT BOOK:

1. Pattern Recognition: An Algorithmic Approach: Murty, M. Narasimha, Devi, V. Susheela, Spinger Pub, 1st Ed.

REFERENCE BOOKS:

1. Machine Learning - Mc Graw Hill, Tom M. Mitchell.
2. Fundamentals Of Speech Recognition: Lawrence Rabiner and Biing- Hwang Juang. Prentice-Hall Pub.

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
BIG DATA ANALYTICS
(Professional Elective – III)

Code: 9FC15

L	T	P	C
3	0	0	3

Prerequisites: Machine Learning

Course Objectives:

1. **To explore the fundamental concepts of big data analytics.**
2. To understand storage and parallel processing of Big Data using Hadoop
3. To introduce programming tools like HIVE, SQOOP, HBASE in Hadoop ecosystem.
4. To understand the applications using Apache Spark RDD Concepts.
5. To know high level API like Data Frames and Spark SQL
6. To teach the fundamental techniques and principles in achieving big data analytics with stream processing.

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

1. Comprehend the fundamentals of big data analytics and understand how Hadoop solves the big data problem in real life.

2. Interpret the challenges with big data and elaborate the knowledge about the technological developments in big data environment and difference between NOSQL and SQL databases.

3. Discuss the Hadoop distributed file system (HDFS) framework and anatomy of Hadoop map-reduce.

4. Design the algorithms to process big data using Apache Spark Low Level API.

5. Apply Hadoop Data Analysis to social Media Analytics and Opinion Mining on Tweets.

UNIT– I:

Introduction to Big Data: Big Data Analytics, Characteristics of Big Data – The Four Vs, importance of Big Data, Different Use cases, Data-Structured, Semi-Structured, Un-Structured

Introduction to Hadoop and its use in solving big data problems. Comparison Hadoop with RDBMS, Brief history of Hadoop, Apache Hadoop EcoSystem, Components of Hadoop, The Hadoop Distributed File System (HDFS):, Architecture and design of HDFS in detail, Working with HDFS (Commands)

UNIT-II

Anatomy of Hadoop map-reduce (Input Splits, map phase, shuffle, sort, combiner, reduce phase) (theory)

Hive: Introduction to Hive, data types and file formats, HiveQL data definition(Creating Databases and Tables),HiveQL for Data loading, HiveQL data manipulation, Logical joins, Window functions, Optimization, Table partitioning, Bucketing, Indexing, Join Strategies.

UNIT-III

SQOOP : Introduction to SQOOP, SQOOP imports : From Database to HDFS/Hive,
SQOOP exports: From HDFS/Hive to Database, Incremental imports
NoSQL &HBase: Overview, HBasearchitecture, CRUD operations

UNIT-IV

SPARK Basics: History of Spark, Spark Architecture, Spark Shell, working with RDDs in Spark:RDD Basics, Creating RDDs in Spark. RDD Operations. Passing Functions to Spark, Transformations and Actions in Spark, Spark RDD Persistence
Working with Key/Value Pairs : Pair RDDs, Transformations on Pair RDDs, Actions Available on Pair RDDs

UNIT-V

Structured API :DataFrames,SQL : Overview of Structured Spark Types, Schemas, Columns and Expressions, DataFrame Transformations, Working with different types of data, Aggregations- Aggregation Functions, Grouping, User-Defined Aggregation Functions, ‚Joins-Inner Joins, Outer Joins, Processing CSV Files, JSON Files, Text Files and Parquet Files, Spark SQL

UNIT-VI

Spark streaming: Stream Processing Fundamentals, Structured Streaming Basics - Core Concepts, Structured Streaming in Action, Transformations   on   Streams,   Input   and Output(Kafka)
Case study: Twitter Stream processing application

Text Books:
1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley,2012
2. SPARK: The Definitive Guide, Bill Chambers &MateiZaharia, O'Reilley, 2018 Edition

REFERENCES:
1. "Hadoop Operations", O'Reilley, Eric Sammer,2012
2. "ProgrammingHive",O'Reilley,E.Capriolo,D.Wampler,andJ.Rutherglen, 2012
3. "HBase: The Definitive Guide", O'Reilley, Lars George,2011
4. Big Data, Big Analytics: Emerging, Michael Minnelli, Michelle Chambers, and AmbigaDhiraj

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
INTRODUCTION TO INTERNET OF THINGS
(Professional Elective – III)

Code: 9IC45

L	T	P	C
3	0	0	3

Prerequisite: Data Communications and Networks

Course Outcomes:
At the end of this course, the students will be able to
- • Getting familiar with terminology, technology and applications of IOT
- • Understand and explain IoT system management using M2M (machine to machine) with necessary protocols
- • Design and develop Python Scripting Language programs preferred for many IoT applications
- • Use Raspberry PI as a hardware platform for designing the IoT sensor interfacing
- • Implement web based services for IoT
- • Understand and analyze the case studies illustrating IoT Design

UNIT I:

Introduction to Internet of Things Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies like Wireless Sensor Networks, Cloud Computing, Big data analytics, and Communication protocols, Embedded Systems, IoT Levels and Templates.

UNIT II:

IoT and M2M Software defined networks, network function virtualization, difference between SDN and NFV for IoT; Basics of IoT System Management with NETCOZF-YANG (Block Diagrams).

UNIT III:

Developing IoT, IoT Design Methodology – The 10 steps design methodology; Logical design using Python: Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, date/time operations, Python packages of interest for IoT.

UNIT IV:

IoT Physical Devices and End points Raspberry PI – Introduction to Raspberry PI and its Interfaces (serial, SPI, I2C) Programming – Python programming with Raspberry PI – Controlling Input / output (Interfacing with LED and LDR).

UNIT V:
IoT Physical Servers and Cloud Offerings Cloud concepts (IaaS, PaaS, Saas), Introduction to Cloud Storage models and communication APIs – WAMP, Xively; Python web application framework with Django, Designing a RESTful web API

UNIT VI:

Case Studies Illustrating IoT Design Home Automation – Smart Lighting, Home intrusion detection, Cities – Smart parking, Environment – Weather monitoring system, Weather reporting bot, Air pollution monitoring, Forest fire detection, Agriculture – Smart irrigation, Productivity applications – IoT printer.

TEXT BOOKS:
- Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
- Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
ADVANCED OPERATING SYSTEMS
(Professional Elective – III)

Code: 9EC17

L	T	P	C
3	0	0	3

Course Objectives

1. To study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems)

2. To identify hardware and software features that supports these systems.

Course Outcomes

1. Understand the design approaches of advanced operating systems
2. Analyze the design issues of distributed operating systems.
3. Evaluate design issues of multi-processor operating systems.
4. Identify the requirements Distributed File System and Distributed Shared Memory.
5. Formulate the solutions to schedule the real time applications.

UNIT – I

Architectures of Distributed Systems: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives. Theoretical Foundations: Inherent Limitations of a Distributed System, Lamport's Logical Clocks, Vector Clocks, Causal Ordering of Messages, Termination Detection.

UNIT – II

Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms, Non-Token – Based Algorithms: Lamport's Algorithm, The Ricart-AgrawalaAlgorithm, Maekawa's Algorithm, Token-Based Algorithms: Suzuki-Kasami's Broadcast Algorithm, Singhal's Heurisric Algorithm, Raymond's Heuristic Algorithm.

UNIT – III

Distributed Deadlock Detection: Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Distributed Deadlock Detection: Control Organizations for Distributed Deadlock Detection, Centralized- Deadlock – Detection Algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms

UNIT – IV

Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures Multi Processor Operating Systems: Introduction, Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling.

UNIT – V

Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues, Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing

UNIT – VI

Distributed Scheduling: Task Migration, Issues in task Migration Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

TEXT BOOK:
1. Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, Tata McGraw-Hill Edition 2001

REFERENCES:
1. Distributed Systems: Andrew S. Tanenbaum, Maarten Van Steen, Pearson Prentice Hall, Edition – 2, 2007

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
SOFT COMPUTING
(Professional Elective – III)

Code: 9EC18

L T P C
3 0 0 3

Course Objectives:

1. Familiarize with soft computing concepts
2. Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
3. Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
4. Learn the concepts of Genetic algorithm and its applications
5. Acquire the knowledge of Rough Sets.

Course Outcomes: On completion of this course, the students will be able to:

1. Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
2. Understand fuzzy logic and reasoning to handle and solve engineering problems
3. Apply the Classification and clustering techniques on various applications.
4. Understand the advanced neural networks and its applications
5. Perform various operations of genetic algorithms, Rough Sets.
6. Comprehend various techniques to build model for various applications

UNIT – I

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT-II

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT-III

Fuzzy Decision Making, Particle Swarm Optimization

UNIT-IV

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties.

Unit-V

Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT-VI

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

TEXT BOOK:
1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

REFERENCE BOOKS:
1. S. N. Sivanandam& S. N. Deepa, "Principles of Soft Computing", 2nd edition, Wiley India, 2008.

2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning", Pearson Education.

3. J. S. R. Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education, 2004.

4. G.J. Klir& B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.

5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.

6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill International editions,1995

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
FULL STACK DEVELOPMENT
(Professional Elective – IV)

Code: 9EC19

L	T	P	C
3	0	0	3

Prerequisite: Web Technologies

Course Objectives:

Upon successful completion of this course, students will be equipped to:
1. Harness the power of Git for seamless version control, branching strategies, and collaborative workflows.
2. Craft interactive web applications utilizing JavaScript, jQuery, and JSON data structures.
3. Build RESTful APIs and data-driven microservices using Spring Boot's robust framework.
4. Master containerization and orchestration with Docker and Kubernetes for efficient deployment and management.

Course Outcomes:

Upon successful completion of this course, students will be able to:
1. Master version control systems using Git and its advanced features for collaborative software development.
2. Develop dynamic web applications using JavaScript, jQuery, and JSON data formats.
3. Build and deploy Spring Boot applications for RESTful APIs, data access, and user authentication.
4. Containerize and orchestrate microservices using Docker and Kubernetes for scalable and secure applications.

UNIT - I:

Version Control Systems: In-depth exploration of Git and its features, Advanced Git branching and merging strategies, Git collaboration and workflow management.

UNIT - II:

Frontend Development: Javascript basics, OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc. JSON data format.

UNIT III:

Spring Boot Fundamentals: Introduction to Spring Boot, Spring Boot application structure and components, Dependency management with Spring Boot, Creating and running Spring Boot applications, Implementing REST APIs with Spring Boot, Data access with Spring Boot, User authentication and security in Spring Boot

UNIT IV:

Containerization with Docker : Introduction to Docker and containerization, Docker image creation and management, Docker container execution and management, Docker networking and volume management, Orchestrating containerized applications with Docker Compose, Docker security and best practices.

UNIT V:

Kubernetes for Orchestration: Introduction to Kubernetes and container orchestration, Kubernetes cluster architecture and components, Kubernetes deployments, pods, and services, Kubernetes labels, selectors, and annotations, Managing Kubernetes applications with kubectl, Kubernetes monitoring, logging, and alerting, Kubernetes security and best practices.

UNIT VI:

Microservices Architecture: Principles and concepts, Design patterns, Development with Spring Boot, Docker, and Kubernetes, Testing and deployment, Monitoring and observability.

TEXT BOOKS:

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas
2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating DynamicWebsites by Robin Nixon
3. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BY AZAT MARDAN

REFERENCES:
1. "Pro Git" by Scott Chacon and Ben Straub
2. "Spring Boot in Action" by Craig Walls
3. "Docker: Up and Running" by Nigel Poulton
4. "Kubernetes in Action" by Marko Luksa
5. "Microservices: From Design to Deployment" by Sam Newman

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
NATURAL LANGUAGE PROCESSING
(Professional Elective – IV)

Code: 9LC18

L	T	P	C
3	0	0	3

Prerequisites: Data Structures, Finite Automata and Probability Theory

Course Objectives:
1. Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.
2. Understand and carryout proper experimental methodology for training and evaluating empirical NLP systems.

Course Outcomes:
On successful completion of this course, students will be able to:
1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carryout proper experimental methodology for training and evaluating empirical NLP systems.
3. Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Able to design, implement, and analyze NLP algorithms.
5. Able to design different language modeling Techniques.

UNIT-I:

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models.
Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches.

UNI-II:

Syntax Analysis: Parsing Natural Language, Tree banks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT-III:

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT-IV:

Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT-V:

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure.

UNI-VI:

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling.

TEXT BOOKS:

1. Multilingual Natural Language Processing Applications: From Theory to Practice–Daniel M.Bikel and ImedZitouni,Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S.Tiwary.

REFERENCES:

1. Speech and Natural Language Processing-Daniel Jurafsky&James H Martin, Pearson Publications.
2. Charniak, E.: Statistical Language Learning. The MIT Press.
3. Jelinek, F.: Statistical Methods for Speech Recognition. The MIT Press.
4. Lutz and Ascher - "Learning Python", O'Reilly

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
DEVOPS
(Professional Elective – IV)

Code: 9LC17

L	T	P	C
3	0	0	3

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

Course Outcomes:
On successful completion of this course, students will be able to:
1. Identify components of Devops environment.
2. Describe Software development models and architectures of DevOps.
3. Apply different project management, integration, testing and code deployment tool.
4. Investigate different DevOps Software development models.
5. Assess various Devops practices.
6. 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

UNIT – VI

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). ISBN-10: 1788392574.
2. Deepak Gaikwad, Viral Thakkar. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952.

REFERENCES:

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

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
BLOCK CHAIN TECHNOLOGIES
(Professional Elective – IV)

Code: 9JC05

L	T	P	C
3	0	0	3

Prerequisite: Information Security

Course Objectives:
To understand how block chain systems (mainly Bit coin and Ethereum) work. To securely interact with them, design, build, and deploy smartcontractsanddistributedapplications.Integrateideasfromblockchaintechnologyinto theirownprojects.

Course Outcomes: At the end of this course the student will be able to
1. Summarize the conceptual working of blockchain using Cryptographic principles.
2. Explore the Payment Verification protocol, its lifecycle and the different consensus algorithms.
3. Classify the different types of crypto currency alongside their features.
4. Outline the legal issues of consideration in the development of blockchain.

UNIT I:

Basics: Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. **Cryptography:** Hash function, Digital Signature - ECDSA, Memory Hard Algorithm,Zero Knowledge Proof.

UNITII:

Blockchain: Introduction,Advantageoverconventionaldistributeddatabase,Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, GasLimit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application ,Soft &Hard Fork, Private and Public blockchain.

UNIT III:

Distributed Consensus: Nakamo to consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

UNITIV:

Crypto currency: History, Distributed Ledger, Bitcoin protocols- Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin

UNIT V:

Crypto currency Regulation: Stakeholders, Roots of Bitcoin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of

Things, Medical Record Management System, Domain Name Service and future of Block chain.

UNITVI-:

(Trends and Topics)-Zero Knowledge proofs and protocols in Block chain-Succinct non interactive argument for Knowledge (SNARK)- pairing on Elliptic curves-Z cash.

TEXT BOOK:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder,Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton UniversityPress (July19, 2016).

REFERENCES:

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies 2. Satoshi Nakamoto,Bitcoin: A Peer-to-Peer Electronic Cash System 3. DR. Gavin Wood, "ETHEREUM: A SecureDecentralizedTransactionLedger,"Yellow paper.2014. 4. Nicola Atzei,MassimoBartoletti,andTizianaCimoli, A surveyof attacks on Ethereum smart contracts

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
MOBILE COMPUTING
(Professional Elective – IV)

Code: 9EC20

L	T	P	C
3	0	0	3

Course Objectives:
Learn concepts of mobile communication and various media access control methods. Understand IP mobile primitives and concepts of network and transport layer with regard to mobile communication. Learn WAP protocols, Bluetooth and the Necessary Tools for Android.

Course Outcomes:
At the end of this course, the student will be able to
1. Identify vast application areas for mobile / wireless communications and Understand GSM Architecture, Services.
2. Examine Hidden and exposed terminals, Near and far terminals and Differentiate medium access control methods for wireless communication SDMA, FDMA, TDMA and CDMA.
3. Illustrate mobile IP primitives in Network layer and Demonstrate IP packet delivery, DHCP.
4. Distinguish Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP in Transport layer
5. Understand applications of MANETs routing algorithms, data hoarding, client server computing along with the data delivery mechanisms.
6. Understand protocols and tools such as WAP, Bluetooth and Identify emerging mobile operating systems.

UNIT – I

Introduction to Mobile Communications and Computing: Mobile Computing (MC): Introduction to MC, novel applications, limitations, introduction to mobile architecture - UMTS, GSM.
Architecture GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

UNIT – II

(Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT – III

Mobile Network Layer: Mobile IP (Goals, assumptions, entities and   terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

UNIT – IV

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

UNIT - V

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing algorithms.
Database: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, data delivery mechanisms

UNIT – VI

Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management), introduction to mobile operating systems- Android: Android versions, Typographical Conventions, the Necessary Tools for Android.

Textbooks:

1. Jochen Schiller, "Mobile Communications", *Addison-Wesley*.(Chapters 1, 2, 3, 4, 7, 8 and 9). Second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", *Wiley*, 2002, ISBN 0471419028. (Chapters 6, 11, 15, 17, 18, 19, 26 and 27)
3. Android Programming: The Big Nerd Ranch Guide by Bill Phillips, Chris Stewart, Brian Hardy and Kristin Marsicano, second edition.

References:

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004,
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", *Springer*, second edition, 2003.
4. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley *DreamTech*, 2003
5. A. Tanenbaum "Computer Networks", 4th edition.
6. Android Programming (Big Nerd Ranch Guide), by Phillips,Stewart, Hardy and Marsicano
7. Android Programming – Pushing the limits by Hellman

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
AGILE SOFTWARE DEVELOPMENT
(Professional Elective – IV)

Code: 9FC16

L	T	P	C
3	0	0	3

Prerequisite: Software Engineering and OOAD

Course Objectives:
- Organize Agile Software Development, Extreme Programming and Software Development Rhythms.
- Describe their unique features relative to traditional software practices
- Examine their applications in the real world and addresses their impacts on developing software.

Course Outcomes:

1. Summarize the various agile methodologies: extreme programming, scrum, and feature driven programming.
2. Apply the XP practices, pair programming and agile modeling for real time projects.
3. Apply XP to a small project.
4. Examine the process of Feature-Driven Development and Regaining Control.
5. Relate Agile Modeling and RUP and Choose Tools to help with Agile Development.

UNIT – I

Introduction: Agile Methods, Agile Manifesto, and Agile Modeling Introduction, What Is Agile, The Agile Manifesto, Agile Methods, XP: Extreme Programming, DSDM, SCRUM, Feature-Driven Development, Modeling Misconceptions, Agile Modeling, Tools of Misconceptions, Updating Agile Models

UNIT - II

Extreme Programming: Introduction, Core XP Values, The Twelve XP Practices, About Extreme Programming, Planning XP Projects, Test First Coding, Making Pair Programming Work

UNIT - III

Agile Modeling and XP: Introduction, The Fit, Common Practices, Modeling Specific Practices, XP Objections to Agile Modeling, Agile Modeling and Planning XP Projects, XP Implementation Phase

UNIT - IV

Feature-Driven Development: Introduction, Incremental Software Development, Regaining Control: The Motivation behind FDD, Planning an Iterative Project, Architecture Centric, FDD and XP

UNIT – V

Agile Methods with RUP and PRINCE2 and Tools and Obstacles: Agile Modeling and RUP, FDD and RUP, Agile Methods and PRINCE2, Tools to Help with Agile Development, Eclipse: An Agile IDE.

UNIT-VI

Obstacles to Agile Software Development, Management Intransigence, The Failed Project Syndrome, Contractual Difficulties, Familiarity with Agility

Text Books:

1. Agile software construction,1/e,John hunt, springer, 2005
2. Agile and Iterative Development: a manager's guide, Addison-Wesley Craig Larman, Pearson Education - 2004.
Reference Books:
1. The Art of Agile Development, Pearson, Robert C. Martin, Juli, James Shore, Chromatic, 2013, O'Reilly Media.
2. Agile Testing, Elisabeth Hendrickson, Quality Tree Software Inc 2008.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
AUGMENTED REALITY and VIRTUAL REALITY
(Professional Elective – V)

Code: 9LC08

L	T	P	C
3	0	0	3

Pre-Requisites: Data Structures

COURSE OBJECTIVE:

This course provides students with an opportunity to explore the research issues in Augmented Reality and Virtual Reality (AR &VR). It also makes the students know the basic concepts and framework of virtual reality.

COURSE OUTCOMES: After completion of course, students will be able to

1. Understand the fundamentals of Virtual Reality.
2. Analyze multiple Models of Input and Output Interface in Virtual Reality like Gloves, Video-based Input, 3D Menus & 3DScanner etc.
3. Illustrate the fundamentals or advanced topics of Computer Graphics.
4. Analyze the Interactive Techniques on VR in respect of Body Track, Hand Gesture, 3D Manus, and Object Grasp.
5. Understand the development tools of VR.
6. Explore the Conceptual idea on Augmented Reality and relate the illustrations.

Unit I:

Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality.

Unit II:

Multiple Models of Input and Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual /Auditory Haptic Devices.

Unit III:

Visual Computation in Virtual Reality: Fundamentals of Computer Graphics. Software and Hardware Technology on Stereoscopic Display. Advanced Techniques in CG: Management of Large Scale Environments & Real Time Rendering.

Unit IV:

Interactive Techniques in Virtual Reality: Body Track, Hand Gesture, 3D Manus, And Object Grasp.

Unit V:

Development Tools and Frameworks in Virtual Reality: Frameworks of Software Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools etc. Application of VR in Digital Entertainment: VR Technology in Film & TV Production. VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR.

Unit VI:

Augmented and Mixed Reality, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

TEXTBOOK:

1) Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.

2) Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

REFERENCE BOOKS:

1) Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications, Foundations of Effective Design, Morgan Kaufmann, 2009**.**

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
COMPUTER VISION
(Professional Elective – V)

Code: 9EC22

L	T	P	C
3	0	0	3

Course Objectives:

In this course students will learn basic principles of image formation, image processing algorithms and different algorithms for 3D reconstruction and recognition from single or multiple images (video). This course emphasizes the core vision tasks of scene understanding and recognition. Applications to 3D modeling, video analysis, video surveillance, object recognition and vision based control will be discussed.

Course Outcomes:

After learning the course the students should be able to:

1. Understand the basic fundamentals of computer vision and diversity of computer vision applications
2. Explore the various camera models, multi view geometry, structures and generate 3D model from images
3. Analyze and apply image preprocessing, continuous and discrete representation methods and feature extraction techniques
4. Apply regularization theory, optical communication ,stereo vision, and motion estimation techniques to detect moving objects in a video
5. Illustrate different image shape representations and understand Fourier and wavelet descriptors and segmentation methods
6. Understand various object recognition methods, Hough transforms and illustrate shape matching

UNIT I:

Introduction : Computer Vision and Computer Graphics , What is Computer Vision - Low-level, Mid-level, High-level , Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia.

UNIT II:

Image Formation Models : Monocular imaging system , Radiosity: The 'Physics' of Image Formation, Radiance, Irradiance, BRDF, color etc, Orthographic & Perspective Projection,• Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading , Photometric Stereo, Depth from Defocus , Construction of 3D model from images

UNIT III:

Image Processing and Feature Extraction: Image preprocessing, Image representations (continuous and discrete), Edge detection

UNIT IV:

Motion Estimation: Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion

UNIT V:

Shape Representation and Segmentation: Contour based representation, Region based representation, Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multire solution analysis

UNIT VI:

Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Shape priors for recognition

Text books:

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.

Reference Books:

1. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
2. D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs, 1982.
3. Richard Szeliski, Computer Vision: Algorithms and Applications (CVAA). Springer, 2010 4. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
4. E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012
5. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012
6. Mark Nixon and Alberto S. Aquado, Feature Extraction & Image
7. Processing for Computer Vision, Third Edition, Academic Press, 2012

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
CLOUD COMPUTING
(Professional Elective – V)

Code: 9FC17

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

Understand the basic characteristics of cloud computing and technologies that support to implement cloud computing. Analyze the basic cloud computing models that are used to implement cloud technology and available cloud resources in the market. Analyzing the security issues in cloud computing environment and understanding different case studies in cloud computing and IOT platform.

COURSE OUTCOMES :

At the end of this course, the students will be able to
1.Summarize the characteristics of cloud and differentiate the cloud service and deployment models and to explore vendor specific services
2.Analyze different architectures for cloud applications, Create and run Amazon ec2 instance through python programs, assess the performance of cloud services and summarize the innovative applications of IOT on cloud.
3.Design architecture of an Apps such as map reduce, image processing app etc on cloud and understand various security aspects in cloud.

UNIT-I

Introduction to Cloud Computing: Introduction, characteristics, Cloud Models and examples , Applications of Cloud Services .Cloud Concepts and Technologies .

UNIT-II

Cloud Services and Platforms: Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment and Management Services, Identity and Access Management Services, Open Source Private cloud Software.

UNIT-III

Cloud Application Design: Design Considerations for Cloud Application, Reference Architectures for Cloud Applications .Cloud Application Design Methodologies , Data Storage Approaches. Python For Cloud: Python for Amazon Web Services, Map Reduce

UNIT – IV

Cloud and the Internet of Things: Performance of Distributed Systems and the Cloud-Enabling Technologies for the Internet of Things- Innovative Applications of the Internet of Things- Online Social and Professional Networking

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UNIT-V

Cloud Application Development in Python: Design Approaches, Image Processing App, Document Storage App, Map Reduce App, Social Media Analytics App.

UNIT-VI

Cloud Security: Introduction, Cloud Security Architecture (CSA), Authentication, Authorization, Identity Access Management (IAM), Data Security, Key Management, Auditing. Cloud for Industry, Healthcare and Education.

TEXT BOOKS:

1. Cloud Computing –A Hands on Approach ,Arshdeep,VijayMedisetti,University Press.
2. Distributed and Cloud Computing,1st Edition,From Parallel Processing to the Internet of Things,Authors: Kai Hwang Jack Dongarra Geoffrey Fox(Unit4)
3. Cloud Computing: Raj Kumar Buyya,JamesBroberg,AndrzejGOscinski,Wiley.

REFERENCES:

1. Cloud Computing: Dr.Kumar Saurab Wiley India 2011 .
2. Code in the cloud computing: K Chandrasekharan CRC Press.
3. Cloud Compuitng: John W. Rittinghouse ,JamesRansome,CRC press.
4. Virtualization Security: Dave Shackleford2013,SYBEX a Willy Brand.
5. Cloud Computing and Software Service: Ahson, iiyas.2011.
6. Cloud Computing Bible: Sosinsky 2012 Wiley India.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
ETHICAL HACKING
(Professional Elective – V)

Code: 9JC04

L	T	P	C
3	0	0	3

Prerequisite: Knowledge in information security, Web application

Course Objectives:
1. Introduce the methodologies and framework of ethical hacking for enhancing the security.
2. The course includes-Impacts of Hacking; Types of Hackers; Information Security Models; Information Security Program; Business Perspective; Planning a Controlled Attack.

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

1. Gain the knowledge of the use and availability of tools to support an ethical hack.
2. Interpret the results of a controlled attack.
3. Explain the role of inherent and imposed limitations and metrics for planning of a test.
4. Comprehend the dangers associated with penetration testing.

UNIT- I

Introduction: Hacking Impacts, The HackerFramework: Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration
Information Security Models: Computer Security, Network Security, Service Security, Application Security, Security Architecture

UNIT - II

Information Security Program: The Process of Information Security, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking
The Business Perspective: Business Objectives, Security Policy, Previous Test Results, Business Challenges

UNIT - III

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 – IV

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

UNIT – V

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

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UNIT – VI

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

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
QUANTUM COMPUTING
(Professional Elective – V)

Code: 9LC21

L	T	P	C
3	0	0	3

Course Objectives:
1. To introduce the fundamentals of quantum computing
2. The problem-solving approach using finite dimensional mathematics

Course Outcomes:
1. Understand basics of quantum computing
2. Understand physical implementation of Qubit
3. Understand Quantum algorithms and their implementation
4. Understand the Impact of Quantum Computing on Cryptography

UNIT – I

Introduction to Essential Linear Algebra: Some Basic Algebra, Matrix Math, Vectors and Vector Spaces, Set Theory. Complex Numbers: Definition of Complex Numbers, Algebra of Complex Numbers, Complex Numbers Graphically, Vector Representations of Complex Numbers, Pauli Matrice, Transcendental Numbers.

UNIT – II

Basic Physics for Quantum Computing: The Journey to Quantum, Quantum Physics Essentials,
Basic Atomic Structure, Hilbert Spaces, Uncertainty, Quantum States, Entanglement.

UNIT-III

Basic Quantum Theory: Further with Quantum Mechanics, Quantum Decoherence, Quantum Electrodynamics, Quantum Chromodynamics, Feynman Diagram Quantum Entanglement and QKD,Quantum Entanglement, Interpretation, QKE.

UNIT – IV

Quantum Architecture: Further with Qubits, Quantum Gates, More with Gates, Quantum Circuits, The D-Wave Quantum Architecture. Quantum Hardware: Qubits, How Many Qubits Are Needed? Addressing Decoherence, Topological Quantum Computing, Quantum Essentials.

UNIT – V

Quantum Algorithms: What Is an Algorithm? Deutsch's Algorithm, Deutsch-Jozsa Algorithm, Bernstein-Vazirani Algorithm, Simon's Algorithm, Shor's Algorithm, Grover's Algorithm.

Current Asymmetric Algorithms: RSA, Diffie-Hellman, Elliptic Curve. The Impact of Quantum Computing on Cryptography: Asymmetric Cryptography, Specific Algorithms, Specific Applications.

TEXT BOOKS:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press.
2. Dr. Chuck Easttom, Quantum Computing Fundamentals, Pearson.

REFERENCES:

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci.
2. Principles of Quantum Computation and Information, Volume II: Basic Tools and Special Topics By Benenti G., Casati G. and Strini G., World Scientific Publishing Co Pte Ltd.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
ADVANCED ALGORITHMS
(Professional Elective – V)

Code: 9EC23

L	T	P	C
3	0	0	3

Pre-requisites:
1. A course on "Computer Programming & Data Structures"
2. A course on "Advanced Data Structures & Algorithms"

Course Objectives:
- Introduces the recurrence relations for analyzing the algorithms
- Introduces the graphs and their traversals.
- Describes major algorithmic techniques (divide-and-conquer, greedy, dynamic programming,
- Brute Force, Transform and Conquer approaches) and mention problems for which each
- technique is appropriate;
- Describes how to evaluate and compare different algorithms using worst-case, average-case
- and best-case analysis.
- Introduces string matching algorithms
- Introduces linear programming.

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

UNIT – I

Introduction: Role of Algorithms in computing, Order Notation, Recurrences, Probabilistic Analysis and Randomized Algorithms. Sorting and Order Statistics: Heap sort, Quick sort and Sorting in Linear Time.
Advanced Design and Analysis Techniques: Dynamic Programming- Matrix chain Multiplication, Longest common Subsequence and optimal binary Search trees.

UNIT – II

Greedy Algorithms - Huffman Codes, Activity Selection Problem. Amortized Analysis.
Graph Algorithms: Topological Sorting, Minimum Spanning trees, Single Source Shortest Paths, Maximum Flow algorithms.

UNIT - III
Sorting Networks: Comparison Networks, Zero-one principle, bitonic Sorting Networks, Merging Network, Sorting Network.
Matrix Operations- Strassen's Matrix Multiplication, Inverting matrices, solving system of linear Equations

UNIT – IV

String Matching: Naive String Matching, Rabin-Karp algorithm, matching with finite Automata, KnuthMorris - Pratt algorithm.

UNIT- V

NP-Completeness and Approximation Algorithms: Polynomial time, polynomial time verification, NP-Completeness and reducibility, NP-Complete problems.

UNIT-VI:

Approximation Algorithms- Vertex covers Problem, Travelling Sales person problem

TEXT BOOK:

1. Introduction to Algorithms," T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein, Third Edition, PHI.

REFERENCE BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Galgotia publications pvt. Ltd.
2. Design and Analysis Algorithms - Parag Himanshu Dave, Himanshu Bhalchandra Dave Publisher: Pearson
3. Algorithm Design: Foundations, Analysis and Internet examples, M.T. Goodrich and R. Tomassia, John Wiley and sons.
4. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearson education

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – I)
BANKING OPERATIONS AND INSURANCE

Code : 9ZC05

Course Objectives: To make the students understand the concepts and principles of Indian Banking and Insurance Business and the role of RBI in regulating the Indian Financial System.

1. Describe the Indian Banking System in detail
2. Gain awareness about the prudential norms and capital requirements of banks in India
3. Understand the role of RBI as a regulator of Indian Banking
4. Describe the new dimensions and products served by the banking system in INDIA
5. Provide awareness on Insurance industry and its principles
6. Recognize the importance of regulatory and legal frame work of IRDA

UNIT I

INTRODUCTION TO BANKING BUSINESS: Introduction to banking services - History of banking business in India, Structure of Indian banking system: Types of accounts, advances and deposits in a bank, KYC norms.

UNIT II

BANKING REGULATIONS: Banking Sector Reforms with special reference to Prudential Norms, Capital Adequacy Norms, Classification of Assets and NPA's, Functions of RBI, Role of RBI in regulating Indian Banking, Banking Ombudsman scheme

UNIT III

CREDIT CONTROL BY RBI: Definition, Objectives of Credit Control, Quantitative methods of Credit Control by RBI: Bank Rate Policy, Open Market Operations, Variation of Reserve Ratio, Qualitative methods of Credit Control by RBI: Fixation of Margin Requirements, Regulation of consumer Credit, Rationing of Credit, Direct Action, Moral Suasion and Publicity

UNIT IV

NEW DIMENSIONS IN BANKING: Financial Inclusion – Micro finance, E-Banking: Mobile-Banking, Net Banking, Digital Banking, Artificial Intelligence in Banking, CIBIL Score, Negotiable Instruments: Cheque Truncation system.

UNIT V

INTRODUCTION TO INSURANCE: Introduction to insurance, Need and importance of Insurance, principles of Insurance, characteristics of insurance contract, types of insurance: Life insurance and its products, General Insurance and its variants.

UNIT VI

INSURANCE BUSINESS ENVIRONMENT: Procedure for issuing an insurance policy – Nomination - Surrender Value - Policy Loans – Assignment - Revivals and Claim Settlement; Insurance as a tax mitigation tool, Role of IRDA in Insurance Regulation.

Essential Readings:

- Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
- General Principles of Insurance Harding and Evantly
- Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.

References:

- Scott E. Harringam Gregory R. Nichanus: Risk Management & Insurance, TMH, 2009.
- Geroge E. Rejda: Principles of risk Management & Insurance, 9/e, pearson Education. 2009.
- G. Koteshwar: Risk Management Insurance and Derivatives, Himalaya, 2008.

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – I)
BASICS OF ENTREPRENEURSHIP

Code : 9ZC22

Course Objective:

The objective of the course is to make students understand the nature of Entrepreneurship, and its importance to business to the engineering students, which will allow them to get the required intuition and interest in starting their own start-up's

Course Outcomes:

C01 Demonstrate the basic knowledge and skill set required for entrepreneurship.[L2]
C02 Distinguish business models and their validation in entrepreneurship.[L4]
C03 Examine cost and financial structures and decide suitable pricing strategies.[L4]
C04 Relate team building and project management styles to project management and entrepreneurship.[L2]
C05.Identify different marketing strategies and understand business regulations for startups.[L3]

UNIT I:

Introduction to Entrepreneurship & Self Discovery: - Define Entrepreneurship, Entrepreneurship as a Career option, Find your Flow, Stock of Your Means, Characteristics, Qualities and Skills of Entrepreneurship, Effectuation, Principles of Effectuation, Life as an Entrepreneur, Stories of Successful Entrepreneurs.

UNIT II:

Opportunity & Customer Analysis: - Identify your Entrepreneurial Style, Methods of finding and understanding Customer Problems, Run Problem Interview, Process of Design Thinking, Identify Potential Problems worth Solving, Customer Segmentation, Niche Marketing and Targeting, Craft your Values Proportions, Customer-driven Innovation.

UNIT III:

Business Model & Validation: - Introduction to Business Models, Lean approach to Business Model Canvas, Blue and Red Ocean Strategies, the Problem-Solution Fit, Build your Solution Demo, Solution Interview Method, Identify Minimum Viable Product (MVP), Product-Market fit test.

UNIT IV:

Economics & Financial Analysis: - Revenue Analysis, Identify different Revenue Streams and Costs Analysis – Startup Cost, Fixed Cost and Variable Cost, Break Even Analysis, Profit Analysis, Introduction to Pricing, different Pricing Strategies, Sources of Finance, Bootstrapping and Initial Financing, Practice pitching to Investors and Corporate.

UNIT V:

Team Building & Project Management: - Leadership Styles, Shared Leadership Model, Team Building in Venture, Roles and Responsibilities of team in venture, Explore collaboration tools and techniques, Brainstorming, Introduction to Project Management, Project Life Cycle, Create a Project Plan.

UNIT VI:

Marketing & Business Regulations: - Positioning, Positioning Strategies, Branding, Branding Strategies, Selecting and Measuring Channels , Customer Acquisition, Selling Process, Selling Skills, Sales Plans. Business regulations – List of Required Registrations, Compliance Check List, Business Structures and Legal Entities.

Essential Readings:

- Robert D Hisrich, Michael P Peters, Dean A Shepherd, Entrepreneurship, Sixth Edition, New Delhi, 2006.
- Thomas W. Zimmerer, Norman M. Scarborough, Essentials of Entrepreneurship And Small Business Management, Fourth Edition, Pearson, New Delhi, 2006
- Alfred E. Osborne, Entrepreneur's Toolkit, Harvard Business Essentials, HBS Press, USA, 2005.
- MadhurimaLall, ShikhaSahai, Entrepreneurship, Excel Books, First Edition, New Delhi, 2006.

References:

- S.S. Khanka, Entrepreneurial Development, S. Chand and Company Limited, New Delhi, 2007.
- H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.
- S.R. Bhowmik, M. Bhowmik, Entrepreneurship-A tool for Economic Growth   And A key to Business Success, New Age International Publishers, First Edition, (formerly Wiley Eastern Limited), New Delhi, 2007.
- *https://www.wfglobal.org/*
- *https://www.learnwise.org/#/IN/en/home/login,*

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – I)
DESIGN LITERACY AND DESIGN THINKING

Code: 9ZC08

Course Objective:

The objective of the course is to make students understand the fundamental concepts of design thinking, and to familiarize with product design process and to motivate the students to ideate new products and services.

Course Outcomes:

1. The students gain the knowledge on the inputs required for design thinking and also gain familiarity on concepts related to design thinking.
2. The students learn the techniques of idea generation
3. The students gain knowledge on different phases of design thinking
4. The students realize the product design process.
5. The students gain familiarity on design thinking for service design.
6. The students gain knowledge on variouscases related to design thinking.

UNIT I:

Design Thinking – Introduction to Design thinking, Principles of design thinking, Benefits of design thinking, Applications of Design thinking, Social Innovation, Impact of Design thinking, Design thinking tools and techniques. Innovation and Design thinking.

UNIT II:

 Idea Generation: New Idea generation methods - Principles of Idea Generation, Techniques, Creativity thinking techniques and tools, types of creative thinking, select ideas from ideation methods.

UNIT III:

Design Thinking Foundations: The Design Double Diamond: Discover-Define-Develop-Deliver, User-centric design approaches: Importance of user-centricity for design, Empathisation, Empathy Maps, Data collection from users and for users, Data Validation Responsible Innovation and Ethical Design:

UNIT IV:

Product Design Process: Identification of opportunities, Problem Statement, Product planning, Characteristics of Successful product Development, New product development process, Stanford design thinking iterative model

UNIT V:

 Design Thinking for Service Design: Attributes of a good service design, service design tools – blueprint, customer journey mapping Identifying the user needs in a service-driven economy; Process Flows and Customer Experience considerations for designing and improving services; 5 Whys; Service Delivery Pathways

UNIT VI:

Case Studies on Design thinking: Case 1: Arcturus IV by John E.Arnold, Case – 2: How can we make AI to make things better for humans. Case – 3: User Centered Helmet Design by Prof. B.K. Chakravarthy- Part 1 and Part 2; Case – 4: Challenges of Reaching a Million Users by Prof. Chetan Solanki and Prof Jayendran V.

Essential Readings:

1. Brown, T. (2008). Design thinking. *Harvard business review*, *86*(6), 84.
2. "Innovation by Design", Gerald H. (Gus) Gaynor, AMACOM {American Management Association), NYC, 2002
3. Ansell, C., &Torfing, J. (2014). Collaboration and design: new tools for public innovation. In *Public innovation through collaboration and design* (pp. 19-36). Routledge.
4. Lewrick, M., & Link, P. (2015). Design thinking tools: Early insights accelerate marketers'success. *Marketing Review St. Gallen*, *32*(1), 40-51.

References:
1. Mæhlum, A. R. (2017). *Extending the TILES Toolkit-from Ideation to Prototyping* (Master's thesis, NTNU).
2. Norman, D. (2013). *The design of everyday things: Revised and expanded edition*. Basic books.
3. Design Thinking – A primer,Prof: Dr. BalaRamadurai, Indian Institute of Technology, Madras.

Websites:
1. **www.smashingmagazine .com**
2. **www.ID**

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – I)
INTRODUCTION TO ADDITIVE MANUFACTURING PROCESSES

Code: 9BC51
Prerequisites: Metal Cutting

Course Objectives:

To teach students the fundamental concepts of Additive Manufacturing, techniques involved and their advantages and limitations and various applications of these technologies in relevant fields such as mechanical, Bio-medical, Aerospace, electronics etc.

Course Outcomes:

1. Understand the Additive manufacturing processes and their relationship with subtractive manufacturing
2. Demonstrate comprehensive knowledge of the broad range of liquid based rapid proto type processes, devices, capabilities and materials that are available.
3. Demonstrate comprehensive knowledge of the broad range of liquid based rapid proto type processes, devices, capabilities and materials that are available.
4. apply the principles of casting in Additive manufacturing systems
5. Articulate the various tradeoffs of Additive manufacturing softwares / data format that must be made in selecting advanced/additive manufacturing processes, devices and materials to suit particular product requirements.
6. Learn various applications of additive manufacturing, such as in architecture, art, health care direct part production and mass customization

UNIT-I

Introduction:
Development of AM, Fundamentals of AM, Classification of AMS, Advantages,Standards on AM, Commonly used terms, AM process chain.

UNIT-II

Liquid-based Additive manufacturing Systems: Stereo lithography Apparatus (SLA), process, working principle, photopolymers, photo polymerization, Layering technology, laser and laser scanning, Applications, Advantages and Disadvantages, 3D bioprinting**Solid-based Additive manufacturingSystems:**, Laminated Object Manufacturing (LOM): process, working principle, Applications, Advantages and Disadvantages, Fused Deposition Modeling (FDM): working principle, Applications, Advantages and Disadvantages

UNIT-III

Powder Based Additive manufacturingSystems: Selective laser sintering (SLS): working principle, Applications, Advantages and Disadvantages, Color Jet printing, working principle, Applications, Advantages and Disadvantages, **Build time calculations –** SLA, FDM**,** Problems.

UNIT-IV

Additive manufacturing Data Formats: STL Format, STL File Problems, Consequence of Building Valid and Invalid Tessellated Models, STL file Repairs: Generic Solution, Features of various AM software's like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3

Data Expert and 3 D doctor. **Design for AM** – Basic Principles and Practices

UNIT-V

Rapid Tooling: Introduction to Rapid Tooling (RT), Conventional Tooling Vs RT, Need for RT. Rapid Tooling Classification, Spray Metal Deposition, Silicone rubber molds, , Casting-Sand Casting ,Investment Casting,evaporative Casting
Reverse engineering – what is RE, Why use RE, RE Generic process, Overview of RE-Software and Hardware, CMMs-applications and types.

UNIT-VI

Applications and examples : Application - Material Relationship, Application in Design, Application in Engineering, Analysis and Planning, Aerospace Industry, Automotive Industry, Jewelry Industry, Coin Industry, Arts and Architecture. Medical and Bioengineering Applications: Planning and simulation of complex surgery, Customized Implants and Prosthesis, Design and Production of Medical Devices, Bionic ear, dentistry.

Suggested Reading:

1.Chua C.K., Leong K.F. and LIM C.S, Rapid prototyping; Principles and Applications, World Scientific Publications , Third Edition, 2010.

2. Reverse Engineering: An Industrial Perspective, Springer- Verlag, 2008. ISBN: 978-1-84628-855-5

3. Ian_Gibson_· David_Rosen, Brent_Stucker, AdditiveManufacturingTechnologies3D Printing, Rapid Prototyping, andDirect Digital Manufacturing,Springer

4.PaulF.Jacobs, Rapid Prototyping and Manufacturing ASME Press, 1996.

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – I)
FUNDAMENTALS OF   MEASUREMENTS AND INSTRUMENTATION

Code: 9AC44

Course Objective:
The basic principles of all measuring instruments and in measurement of electrical and non-electrical parameters viz., Resistance, Inductance, Capacitance, voltage, current Power factor, Power, Energy, Strain, Temperature, Torque, Displacement etc. and the different types of electrical and non electrical transducers. It introduces the different signal analyzers and oscilloscopes.

Course Outcomes
The student should be able to

1. Explain the principle of operation of different types of instruments viz., PMMC, moving iron type of instruments, the required characteristics of an instrument in general. (L2)
2. Demonstrate the Potential transformer, Current transformers, dynamometer type of Watt meter and Induction type of Energy meter. (L2)
3. Illustrate the operation of watt meter to measure the Active and Reactive power. (L2)
4. Classify and use different techniques of measurement of Resistance, Inductance and Capacitance values. (L4)
5. Distinguish the principle of operation of Different type of digital voltmeters, wave analyzers, spectrum analyzers, Cathode ray Oscilloscope and types of transducers. (L4)

UNIT-I
MEASURING INSTRUMENTS- INSTRUMENT TRANSFORMERS:
Significance of Measurement, static characteristic of system- Linearity, Sensitivity, Precision, Accuracy - Classification - Deflecting, Control and Damping torques, Ammeters and Voltmeters, PMMC, Moving iron type instruments, Expression for the Deflecting torque and Control torque, Errors and Compensations, Extension of range using Shunts and Series resistance.

UNIT –II:
INSTRUMENT TRANSFORMERS
Introduction, advantages, burden of instrument transformer, Current Transformer - errors in current transformer, Effect of secondary open circuit, Potential transformer- errors in potential transformer, Testing of current transformers with silsbee's method.
 Power Factor Meters: Type of P.F. Meters, Dynamometer and Moving iron type, 1- ph and 3-ph meters.

UNIT –III
MEASUREMENT OF POWER& ENERGY:
Single phase dynamometer wattmeter-LPF and UPF-Double element and three element dynamometer wattmeter, Expression for deflecting and control torques, Extension of range of wattmeter using instrument transformers, Measurement of active and reactive powers in balanced and unbalanced systems, Single phase induction type energy meter, Driving and braking torques, Testing by phantom loading, Three phase energy meter .

UNIT – IV
 MEASUREMENT OF RESISTANCE - MAGNETIC MEASUREMENTS- A.C. BRIDGES:
Principle and operation of D.C. Crompton's potentiometer, Standardization, Measurement of unknown resistance, current, voltage. Method of measuring low- Medium and High resistance, sensitivity of Wheatstone's bridge, Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, Measurement of high resistance, loss of charge method, Measurement of inductance, Quality Factor,

Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle, Desauty Bridge, Wien's bridge, Schering Bridge.

UNIT-V
DIGITAL VOLTMETERS- SIGNAL ANALYZERS- CRO:
Digital voltmeters, Successive approximation, Ramp, Dual slope integration continuous balance type, Wave Analyzers, Frequency selective analyzers, Heterodyne, Application of Wave analyzers, Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, Spectral displays, Q meter and RMS voltmeters . CRO- Cathode Ray Tube (CRT), Screens, Probes, Applications of CRO, Measurement of frequency and phase using CRO, Block diagram.

UNIT-VI
 MEASUREMENT OF NON-ELECTRICAL QUANTITIES:
Transducers - Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers, Principle operation of Resistor, Inductor, LVDT and Capacitor transducers, LVDT Applications, Strain gauge and its principle of operation, Guage factor- Thermistors, Thermocouples, Piezo electric transducers, Photovoltaic, Photo conductive cells. Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque, Measurement of Temperature.

TEXT BOOKS:

1.   Electrical Measurements and measuring Instruments – E.W. Golding and F.C. Widdis, 5th Edition, Wheeler Publishing.
2.   Transducers and Instrumentation– D.V.S Murthy, Prentice Hall of India, 2nd Edition.
3.   A course in Electrical and Electronic Measurements and Instrumentation -A.K.   Sawhney, Dhanpatrai & Co. 18th Edition.

REFERENCE BOOKS:

1.   Measurements Systems, Applications and Design – D O Doeblin- Tata MC Graw-Hill.
2.   Principles of Measurement and Instrumentation – A.S Morris, Pearson /Prentice Hall of India.
3.   Electronic Instrumentation- H. S. Kalsi Tata MC Graw – Hill Edition, 3rd Edition.
4.   Modern Electronic Instrumentation and Measurement techniques – A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India.

Syllabus for B.Tech (IT) III YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – I)
Fundamentals of digital circuits & Microprocessors

Code: 9CC36

Course objectives: To develop the skills for understanding the design of digital circuits, learn programming skills for 8086 Microprocessor and interfacing peripherals to it.

Course outcomes:

1. *To apply the rules of Boolean algebra to simplify Boolean expressions using theorems and K-maps and to understand number systems*
2. *To design combinational circuits such as full adders, multiplexers, decoders, encoders. Code converters etc.*
3. *To design basic memory units (latches and flip-flops) and sequential circuits*
4. *To understand Architecture, Instructions and I/O devices interfacing of 8086 and analyzing in single mode and in multi processor mode.*

CO	Fundamentals of digital circuits & Microprocessors(7CC37)	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	*To apply the rules of Boolean algebra to simplify Boolean expressions using theorems and K-maps and to understand number systems*	3	2	2	2	2									2	2	
CO2	*To design combinational circuits such as full adders, multiplexers, decoders, encoders. Code converters etc.*	3	2	2	2	2									2	2	
CO3	*To design basic memory*	3	2	2	2	2									2	2	

	units (latches and flip-flops) and sequential circuits														
CO4	*To understand Architecture, Instructions and I/O devices interfacing of 8086 and analyzing in single mode and in multi processor mode.*	3	2	2	2	2							2	2	
CO	Overall	3	2	2	2	2							2	2	

UNIT – I
Number System and Boolean Algebra: Binary, decimal, octal, hexa decimal, weighted and un-weighted codes. Axiomatic definition of Boolean algebra, Binary operators, postulates of and theorems. Boolean addition, subtraction, 1's complement, 2's complement. Switching functions, Canonical forms and Standard forms, Simplification of switching functions using theorems. K-map representation, simplification of logic functions using K-map.

UNIT - II
Combinational Logic Design: Single output and multiple output combinational logic circuit design, Binary adders/subtractors, Encoder, Decoder, Multiplexer, Demultiplexer, Parity bit generator, Code-converters.

UNIT - III
Sequential circuits: Classification of sequential circuits, the clocked SR flip flop, J- K, T and D-types flip flops, triggering mechanism of flip-flops, flip-flop conversion, introduction to counters and registers

UNIT - IV
Architecture of 8086 Microprocessor: Memory segmentation, BIU and E.U General Purpose registers, 8086 flag register and function of 8086 Flags, Pin diagram of 8086-Minimum mode and maximum mode of operation.

UNIT – V
Instruction set of 8086: Addressing modes of 8086, Assembly directives, Simple programs. Assembly language programs: involving logical, Branch & Call instructions, sorting.

UNIT - VI
Interfacing with 8086: Interfacing with RAM, ROM, 8255 PPI – Interfacing with key board, ADC and DAC Stepper Motor.

Text Books:
1. Morris Mano-,Digital design –PHI, 2nd Edition.
2. ZviKohavi and Niraj K Jha -Switching & Finite Automata theory – Cambridge, 3rd Edition.
3. Microprocessors and interfacing – Douglas V. Hall, TMH, 2nd Edition, 1999.
4. Advanced microprocessor & Peripherals - A.K.Ray & K.M.Bhurchandi, TMH, 2000.

References:
1. Fletcher -An Engineering Approach to Digital Design – PHI.
2. Fundamentals of Logic Design, Roth, Kenny, Seventh Edition, Cengage Learning
3. R.P.Jain-Switching Theory and Logic Design- TMH Edition,2003.
4. CVS Rao -Switching Theory and Logic Design –Pearson Education, 2005
5. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd Edition.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
(Open Elective – II)
FINANCIAL MARKETS AND SERVICES

Code: 9ZC15
Course Objective: The objective of the course is to provide students an understanding of Financial Markets and the Services offered in Indian Financial System within this framework.

Course Outcomes:

1. Understand the structure of Indian Financial System and the investment Objectives
2. Understand the role of money market and its instruments
3. Provide awareness about Indian Capital Markets.
4. Describe various Fund based financial services provided in India
5. Gain knowledge on Indian Mutual Fund Industry.
6. Describe various fee based financial services provided in India

UNIT I
INTRODUCTION: Investment – Investment Attributes, Structure of Indian Financial System, Financial Markets, Classification of Financial Markets, Financial Sector reforms- 1991.

UNIT II
FINANCIAL AND SECURITIES MARKETS: Role and functions of SEBI, Structure and functions of Call Money Market, Government Securities Market – T-bills Market, Commercial Bills Market, Commercial paper and Certificate of Deposits.

UNIT III
CAPITAL MARKETS: Securities Market – Organization and Structure, Listing, Trading and Settlement, Buying and Selling of shares, Stock Market Quotations, Stock Market Indices, SEBI and Regulation of Primary and Secondary Markets.

UNIT IV
FUND BASED FINANCIAL SERVICES: Lease Finance, Hire purchase Finance, Factoring - Definition, Functions, Advantages, Evaluation, Forfeiting, Bills Discounting, Venture Capital Financing.

UNIT V
MUTUAL FUNDS: Definition, Structure and functioning of Unit Trust of India and Mutual Funds, Types of Mutual Fund Schemes, Growth of Indian Mutual funds and their Regulation, Role of AMFI.

UNIT VI
FEE BASED FINANCIAL SERVICES: Stock Broking, Credit Rating, Underwriting, Banker to an Issue, Debenture Trustees and Portfolio managers, Challenges faced by Investment Bankers. Merchant Banking: Definition, Services of Merchant Banks.

Essential Readings:

- L.M. Bhole: Financial Institutions and Markets, TMH, 2009.
- E. Gordon, K. Natarajan: Financial Markets and Services, Himalaya Publishing House, 2013.
- Vasant Desai: Financial Markets and Financial Services, Himalaya,2009
- Pathak: Indian Financial Systems, Pearson, 2009
- M.Y. Khan: Financial Services, TMH, 2009.
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References:

- S. Gurusamy: Financial Services and System, Cengage,2009
- Justin Paul and Padmalatha Suresh: Management of Banking and Financial Services, Pearson, 2009.
- Gomez, Financial Markets, Institutions and Financial Services, PHI, 2012.
- R M Srivatsava: Dynamics of Financial Markets and Institutions in India, Excel, 2013.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
(Open Elective – II)
ADVANCED ENTREPRENEURSHIP

Code: 9ZC23

Course Objective: The course is designed to impart the necessary managerial skills and tactics required for an emerging Entrepreneur for the Engineering students to enhance their prospects as an Entrepreneur.

Course Outcomes:
- Explains the students to gain knowledge on the need of revisitng business model and also learning about types of business models. (L2).
- Discovers the various types of business planning that are needed to implement the business model (L4)
- Identify various funding options for an entrepreneur and also the team members involved in it (L3)
- Explains the digital platforms and tools available for marketing and also for online storage of documents (L2).
- Evaluate the growth of the stratups using performance and financial metrics (L5)

UNIT I:
Fundamentals of Entrepreneurship & Refining Business Model and Product:
Fundamentals and key concepts of entrepreneurship, refining the business model, products and services, pivoting, types of business models, business model evolution, generating new business models, analyzing the business model, adding new customer segment, product manager, significance and role of product manager.

UNIT II:
Business Planning & Exploring Revenue:
Business plan, sales plan, hiring sale team, people plan, financial planning, financial forecasting, create a procurement plan, negotiating role play, understanding primary revenue sources, exploring customer lifecycle for growth customers, exploring and identify secondary sources of revenue.

UNIT III:
Funding the Growth & Building the A-Team:
Overview of funding, funding options for an entrepreneur, explore the right funding options, create funding plan, pitch deck, introduction to building A-Team, pitching to attract the talent, setting your team, defining roles, hiring the A-Team members.

UNIT IV:
Brand and Channel Strategy & Leveraging Technologies:
Introduction to branding, drawn the venture's golden circle, positioning and positioning statements, creating brand name, logo, social media handle, Identify right channels, leaping ahead with technology, digital marketing for startups, plan a social media campaign, digital collaboration, store documents online, other technology platforms, make tech plan, platform wish list.

UNIT V:
Measuring Progress and Legal Matters:
Metrics for customer acquisition (CAC, CLV, and ARPU), metrics for customer retention and satisfaction, find CAC, CLV and ARPU, key financial metrics, communicate metrics, new revenue stream through key financial metrics, re-forecasting of financial plan, identify professional help for legal and compliance requirements, searching of trademark and brand name and company name.

UNIT VI:
Seeking Support and Final Project:
Mentors help to create successful startups, identify mentors and advisors, importance of mentors and advisors, scout the board of directors, overview on final project, capstone project presentation, contents of capstone project.

Essential Readings:

- Entrepreneurship Rajeev Roy "" oxford ,2012
- Entrepreneurship Development Khanka, ,S.Chand 2012

References:

- Small Scale industries and Entrepreneurship Vasanth Desai "Himalya publishing 2012
- Robert Hisrich et al "enterpreneruship TMH 2012
- Entrepreneurship Development Khanka, ,S.Chand 2012
- Entrepreneurship Development B.Janikairam and M Rizwana
- e-source: - www.learnwise.org
  Social Science Stream

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
(Open Elective – II)
CO-CREATION AND PRODUCT DESIGN

Code: 9ZC09

Course Objective: The objective of the course is to make students understand the fundamental concepts of design thinking, and to familiarize with product design process and to motivate the students to ideate new products and services.

Course Outcomes:
CO1: Outline the significance of Human Centered Design from customer perspective. (L2)
CO2: Examine the scope of emerging technologies in the field of product design. (L4)
CO3: Designing the product prototypes and developing the testing solutions. (L6)
CO4: Determine the relevance of reverse engineering and ergonomics at work place. (L5)
CO5: Application of the knowledge into practice with regard to IPR's. (L3)

Unit – I:
HUMAN CENTERED DESIGN: Understanding user and Customer perspectives, Identify insights and opportunities, Interviewing, User Experience design. Frame your design challenge**.** Empathy tools and techniques.

UNIT II:
IDEATION PROCESS: Articulation of Problem Statement, Visualizing Ideas, Communicating ideas and compelling story telling, Brainstorming, Divergent thinking in exploring solutions, 3- box thinking, 3-box framework and Box-3 ideation.

UNIT III:

EMERGING TECHNOLOGIES AND DESIGN: Emerging technologies, utilization and growth, Automation through Industry 4.0, IOT for Network and Intelligent world, efficient and effective manufacturing aided by Robotics, Custom manufacturing by Additive / 3D printing, Augmented reality for product and process.

UNIT IV:

PROTOTYPING: Introduction to Prototype, types of prototype, prototyping strategies, Design consideration in the five stages of the product life cycle. Prototype building by different engineering disciplines. Testing Solution and taking the solution to the users. Create a pitch for your design.

UNIT V:
REVERSE ENGINEERING IN PRODUCT DEVELOPMENT: Reversing engineering methods, identifying the bad features in a product, reduction in size and weight, usage of new materials, importance of ergonomics in product development, environmental considerations in design, and safety considerations in design.

UNIT VI:
INTELLECTUAL PROPERTY RIGHTS: Introduction to IPR, Patents – Types of Patents, elements of patentability, Patents registration Procedure, Patent office and Appellate Board, Rights and Duties of Patentee, Restoration of Lapsed patents.

Essential Readings:

1. Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, "Exploring Engineering: An Introduction to Engineering and Design", 4th edition, Elsevier, 2016.
2. David Ralzman, "History of Modern Design", 2nd edition, Laurence King Publishing Ltd., 2010 3. An AVA Book, "Design Thinking", AVA Publishing, 2010.
3. Ingle, B. R. (2013). *Design thinking for entrepreneurs and small businesses: Putting the power of design to work*. Apress.
4. Norman, D. A. (2016). *Living with complexity*. MIT press.
5. Chapman, J. (2017). *Routledge handbook of sustainable product design*. Taylor & Francis.
6. Nithyananda, K.V. (2019), IPR, protection and Management, India, Cengage learning India.

References:

1. G. Pahl, W.Beitz, J. Feldhusen, KH Grote, "Engineering Design: A Systematic Approach", 3rd edition, Springer, 2007. 2. Tom Kelley, Jonathan Littman, "Ten Faces in Innovation", Currency Books, 2006.
2. Kumar, V. (2012). *101 design methods: A structured approach for driving innovation in your organization*. John Wiley & Sons.
3. Chapman, J. (2012). *Designers Visionaries and Other Stories: A Collection of Sustainable Design Essays*. Taylor & Francis.
4. Garrett, J. J. (2010). *The elements of user experience: user-centered design for the web and beyond*. Pearson Education.
5. Neeraj, P. &Khusdeep, D (2014), IPR, India, IN: PHI Learning.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
(Open Elective – II)
PRINCIPLES OF OPERATIONS RESEARCH

Code: 9BC52
Course Objectives:
The course aims at building capabilities in the students for analyzing different situations in the industrial/ business scenario involving limited resources and finding the optimal solution within constraints.

Course Outcomes:

CO1: Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.

CO2: Recognize and Solve the problem of transportation involving a large number of shipping routes with least transportation cost and generate optimal assignment strategy for different situations

CO4: Use Johnson's rule to create the optimal sequencing schedule for a sequencing problem and make decisions about replacing an item using replacement policy

CO5: Analyze the performance measures of Queing system and Calculate the EOQ for minimizing the total inventory cost

CO6: Apply simulation techniques for solving various types of problems and general idea development about Markov chains

UNIT – I

INTRODUCTION: Definition, Characteristics and Phases and Types of models, applications.

LINEAR PROGRAMMING PROBLEM- Formulation – Graphical solution, Simplex method-Types of variables, Unique and Multiple optimal solution, Redundancy & Degeneracy in LPP, Unbounded solution, Artificial variables techniques - Big-M method with feasible and infeasible solutions, Two–phase method, Primal to Dual formation with Duality Principle.

UNIT – II

TRANSPORTATION PROBLEM – Formulation – methods of finding initial solution (NW corner, VAM, Least cost Method) Optimal solution (Stepping stone Method, MODI method) Special cases in TP: unbalanced, Degeneracy, Restriction and maximization case.

ASSIGNMENT PROBLEM – Formulation – Optimal solution (Hungarian Method) - Variants of Assignment Problem-Unbalanced, Restriction, Maximization, Airlines layover case, Traveling Salesman problem.

UNIT – III

SEQUENCING – Introduction – Terminology, Assumptions, Johnson's procedure- Processing n jobs through two machines – Processing n jobs through three machines – Processing two jobs through 'm' machines (Gantt Chart).

REPLACEMENT: Introduction – Types of failure, Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, Group replacement.

UNIT – IV

THEORY OF GAMES: Introduction and Terminologies, Criterion and optimal strategy – Solution of games with saddle points: Mixed Strategies-Rectangular games without saddle points, Dominance principle, Average Relational Dominance, m X 2 & 2 X n games -Graphical method and Sub Game Method, Matrix Method, Application of LPP in game theory.

UNIT – V

WAITING LINES: Introduction, Terminology, Structure of a queue, calling population characteristics-size, behavior, pattern of arrivals, Kendall-Lee notation, Queuing Models: Single Channel: Poisson arrivals: exponential service times: with finite and infinite population, Multichannel: Poisson arrivals: exponential service times with infinite population

INVENTORY : Introduction, Inventory costs, Concept of EOQ, Single item Deterministic models with and without shortages, Single item inventory models with one price break and multiple price breaks, Stochastic models – Instantaneous demand and no set up cost.

UNIT – VI

SIMULATION: Definition – Types of simulation – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages

Markov chains: Introduction to Markov chains, Analysis Assumptions, Input output probabilities, Applications (Only basic understanding)

TEXT BOOKS:

1. Operations research / Hira & Gupta

2. Operation Research /J.K.Sharma/Macmillan Publishers.

REFERENCES:

1. Quantitative Techniques in Management: N D Vohra, TMH

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
(Open Elective – II)
FUNDAMENTALS OF RENEWABLE ENERGY SOURCES

Code: 9AC45

Course Objectives:
Becomes familiar with solar energy, its radiation, Collection, storage and application and also gets introduced to other forms of Renewable Energy sources viz., the Wind energy, Biomass energy, geothermal energy and ocean energy.

Course Outcomes:
The student should be able to
1. Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment.
2. Demonstrates the knowledge of different techniques of solar collection and storage.
3. The student becomes familiar with the different types of horizontal and vertical axis wind mills and understands the performance characteristics of the same.
4. Aware of the potential of geothermal energy in India and will be able to characterize different types of geothermal wells.
5. Aware of the different methods of kinetic energy extraction from Ocean waves and tides and thermal energy extraction from Oceans.
6. Demonstrates the knowledge of Direct Energy Conversion in different phenomena viz., Joule Thomson effect, Seebeck effect, Peltier effect etc. and the principle of operation of Fuel Cells.

UNIT – I –
PRINCIPLES OF SOLAR RADIATION:
Role and potential of new and renewable source, The solar energy option, Environmental impact of solar power, Physics of the sun, the solar constant, Extraterrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, Solar radiation data.

UNIT-II-
SOLAR ENERGY COLLECTION STORAGE AND APPLICATIONS: Flat plate and concentrating collectors, Classification of concentrating collectors, orientation and thermal analysis, advanced collectors.
Different methods, Sensible, Latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT – III
WIND ENERGY:
Sources and potentials, Horizontal and vertical axis windmills, Performance characteristics, Betz criteria
BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, Types of Bio-gas digesters, Gas yield, Combustion characteristics of bio-gas, Utilization for cooking, I.C.Engine operation and economic aspects.

UNIT – IV
GEOTHERMAL ENERGY:
Resources, types of wells, methods of harnessing the energy, Potential in India.

UNIT-V
OCEAN ENERGY:
OTEC, Principles utilization, Setting of OTEC plants, Thermodynamic cycles. Tidal and wave energy, Potential and conversion techniques, Mini-hydel power plants and their economics.

UNIT-VI

DIRECT ENERGY CONVERSION:

Need for DEC, Carnot cycle, Limitations, principles of DEC. Thermoelectric generators, seebeck, Peltier and joul Thomson effects, Figure of merit, materials, Applications, MHD generators, Principles, Dissociation and ionization, Hall effect, Magnetic flux, MHD accelerator, MHD Engine, Power generation systems, Electron gas dynamic conversion, economic aspects. Fuel cells – principles - Faraday's law's - Thermodynamic aspects - selection of fuels and operating conditions.

TEXT BOOKS:

1.   Non-Conventional Energy Sources - G.D. Rai
2.   Renewable Energy Technologies - Ramesh & Kumar /Narosa.

REFERENCE BOOKS:

1.   Renewable energy resources - Tiwari and Ghosal/ Narosa.
2.   Non-Conventional Energy - Ashok V Desai /Wiley Eastern.
3.   Non-Conventional Energy Systems - K Mittal /Wheeler.

Syllabus for B.Tech (IT) IV YEAR I SEM
INFORMATION TECHNOLOGY
(Open Elective – II)
Fundamentals of Communication

Code: 9CC37

Course Objectives:
The objective of this subject is to:
1.Introduce the students to communication systems, frequency spectrum ,need for modulation , antenna and measurable parameters.
2. Introduce to various analog and digital modulation schemes.
3. Introduce Radio system, Antenna and Wave propagation.
4. Knowledge in telecommunication systems and Networking
5. Knowledge of satellite communication and Optical communication
6. Cellular and mobile communication, knowledge in wireless technologies.

Course Outcomes: By completing this subject, the student can able to
CO1. Work on various types of modulations.
CO2. Use these communication modules in implementation.
CO3. Understanding basics of various wireless and cellular, mobile and telephone Communication
       systems.

CO	Fundamentals of Communication (8CC52)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	Work on various types of modulations.		2		2	2		2						2	1	
CO2	Use these communication modules in implementation	2	3	3	3	3		2						3	2	
CO3	Understanding basics of various wireless and cellular, mobile and telephone communication systems.	2	3	3	3	3		2						3	2	
CO			2	3	2	2	2		2						3	2	

UNIT - I
Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels. Fundamentals of antenna and wave propogation.

UNIT - II
Simple description on Modulation: Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

UNIT - III
Radio System:
Transmitter fundamentals, Power amplifier, and Typical transmitter circuit.
Super heterodyne receiver, Typical receiver circuit and Noise.
Antenna and Wave Propagation :
Antenna fundamentals, commonly usedantenna ,wave propagation and transmission line.

UNIT - IV
Telecommunication Systems: Telephones Telephone system, Paging systems, Internet
Telephony.
Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet
LANs, Token Ring LAN.

UNIT - V
Satellite Communication: Satellite Orbits, satellite communication systems, satellite
subsystems, Ground Stations Satellite Applications, Global Positioning systems.
Optical Communication: Optical Principles, Optical Communication Systems, Fiber –Optic
Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

UNIT - VI
Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA,
and WCDMA.
Wireless Technologies: Wireless LAN, PANs and Bluetooth, Zig Bee and Mesh Wireless
networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

Text Books:
1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGraw Hill
publications,4th edition, 2016.
2. Electronic Communications systems, Kennedy, Davis 4e, MC GRAW HILL
EDUCATION, 1999

Reference Books:
1. Theodore Rapp port, Wireless Communications - Principles and practice, Prentice
Hall, 2002.
2. Roger L. Freeman, Fundamentals of Telecommunications, 2e, Wiley publications.
3. Introduction to data communications and networking, Wayne Tomasi, Pearson
Education, 2005.

Syllabus for B.Tech (IT) IV YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – III)
PROJECT AND RISK MANAGEMENT

Code: 9ZC19

Course Objective: The objective of the course is to provide students with detailed knowledge of Project Management and Risk management avenues for making better financial decisions.

Course Outcomes:

1. Gain knowledge regarding project, its life cycle and organization
2. Understand the process of project formulation
3. Describe the procedure for project implementation
4. Identify the risk management process and methods
5. Understand the role of Derivatives as a risk management tool
6. Create awareness on Options and Swaps as a tool for risk mitigation

UNIT I
BASICS OF PROJECT MANAGEMENT: Concept and characteristics of a project - types of projects - Project life cycle - Challenges and problems of project management - Qualities & functions of a project manager.

UNIT-II
PROJECT FORMULATION: Generation of Project Ideas; Monitoring the environment; Preliminary Screening of Projects; Feasibility study; Project Selection, Detailed Project Report: Market, Technical, Financial and Economic aspects

UNIT III
PROJECT IMPLEMENTATION: Pre-requisites for Successful Project Implementation; Control of in-progress Projects (Gantt chart, PERT, CPM); Financing of Projects, Project Risk Management Process, Post-audit; Abandonment Analysis

UNIT-IV
RISK MANAGEMENT: Risk – Definition, Types of Risk, Approaches to Risk Management, Risk Management Process and Techniques.

UNIT-V
DERIVATIVES – I: Introduction to Financial Derivatives, Types of Derivative Instruments – Forwards, Futures, Differences between Forwards and Futures, Margin Limits.

UNIT-V1
DERIVATIVES –II:
a) Options: Definition, Operation of Option contracts, Call Option, Put Option, Factors determining Option values.
b) Swaps: Definition, Types of Swap agreements, Mechanics of Interest rate swaps, Mechanics of Currency swaps.

Essential Readings:
- H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.
- Jeffrey K. Pinto "Project Management", 2nd edition, Pearson
- DhandapaniAlagiri "Structured Finance – Concepts & Perspectives", ICFAI University press.
- Projects by Prasanna Chandra, McGraw-Hill Publishing Co. Ltd

References:

- Project Management: Systems approach to Planning Scheduling and Controlling, H. Kerzner.
- The Complete Real Estate Documents by Mazyar M. Hedayat, John J. Oleary
- The Fundamentals of Listing and Selling Commercial Real Estate - By Keim K. Loren (Author)

Syllabus for B.Tech (IT) IV YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – III)
PRODUCT AND SERVICES

Code: 9ZC24

Course Objectives: This course helps to provide the basic concepts of Product and Services. This course will enable the students to study areas of basic insights in product management and Services Design.

Course Out Comes:
1) Explain the students about basic concepts of product (L2)
2) Demonstrate ten the students with the process of new product development and stages in the process. (L2)
3) Inspect the new product using testing, product planning and the preparatory groundwork for launching a new product (L4)
4) Explains the students to understand the nature of services, its differences with the goods and the application of marketing principles for services (L2)
5) Examines the quality of services and and also helps in knowing various forms of delivering services (L4)

UNIT- I
INTERPRETATIONS ON PRODUCT
Meaning of Product, Product Market Fit Analysis, Product Levels, Product Mix, Product Pruning, and Product Cannibalization.Types of Product Classification.

UNIT- II
PRODUCT INNOVATION and VALIDATION
New products-What is a new product, New Product Development Process, Idea generationSystems,Concept test,Product testing, Pre-launch,Market test, Final evaluation using "Stage / Gate Process. Product Validity, Break Even Analysis, Financial and Market Analysis.

UNIT- III
LAUNCHING PRODUCT
Cost Analysis, Steps to fix the final price, Promotion planning, Digital Marketing and Methods, Retailing, Types of Retailing online Retailing, Post Market Analysis of the Launch

UNIT - IV:
INTRODUCTION TO SERVICE:
Meaning and Definition of Service, Characteristics of Services, Classification of Service, Five levels of Service, Service verses Physical Goods, 7 P's for Marketing of Services, Servicescape

UNIT – V:
SERVICE PROCESS DESIGN and SERVICE DISTRIBUTION:
Service Design Meaning, Tools for Service Design, Attributes of a Good Design Customer involvement in the Production Process, Role of Intermediaries, Methods of Distribution of Services

UNIT – VI: QUALITY OF SERVICE: Definition of Service Quality, Elements of Service Quality, Service Quality Measuring Tools; SERVQUAL Scale, Service Quality Gap Analysis, Objective Service Metrics, Cost of Quality in Service. Challenges and Problems of Service Quality in India.

Essential Readings:

- Dr. S.L. Gupta, Product Management, Wisdom Publications
- C.Merle Crawford ,New Product Management
- Valarie A.Zeithaml& Mary Jo-Bitner: Services Marketing—Integrating Customer Focus Across the Firm, 3/e, Tata McGraw Hill, 2007.

References:

- Thomas J.Delong&Asish Nanda: Managing Professional Servies—Text and Cases, McGraw-Hill International, 2006.
- Christopher Lovelock: Services Marketing People, Technology, Strategy, Fourth Edition, Pearson Education, 2006

Syllabus for B.Tech (IT) IV YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – III)
ENTREPRENEURSHIP AND BUSINESS DESIGN

Code: 9ZC10

Course Objective: The objective of the course is to make students understand the essentials of building their startups and to familiarize with business design process develop business models, and market their product.

Course Outcomes:
1. Explains the students to understand knowledge on the essentials of entrepreneurship and the key role played by the entrepreneurs.(L2)
2. Distinguishes the different phases of UI /UX.(L4)
3. Develop the attentiveness on designing a business strategy(L6)
4. Demonstrates to understand reverse engineering methods in product development.(L2)
5. Explains the students to understand on IPR, and patent application.(L2)

UNIT I:
Introduction to Entrepreneurship: Meaning of Entrepreneurship. Reasons feeding the Entrepreneurial fire. Understanding Entrepreneurship as a Process. Multiple roles of Entrepreneur: Intrapreneur, Inventor, Coordinator, Manager and Controller. Psychological and behavioral aspects of First-Generation Entrepreneur.

UNIT II:
Introduction to UI/UX: Human centered design and benefits, the distinction between UX and UI, UX process – user research, prototyping strategies, UI principles, UI analysis, UI design, UI components and Responsive design.

UNIT III:
Designing a Business Strategy: Define a problem and frame a strategic question, map the lives of users, journey mapping and ideation, color theory, killing the ideas through Stage Gate Models, pitching of full-fledged, idea, choosing the Start-Up Team.

UNIT IV:
Designing Services and Services Delivery: Services as solutions, Service delivery pathways, rapid branding and marketing strategies, key metrics for Design thinking. Types of New services, Mix of core services and secondary and enhancing services, service flower and service design matrix.

UNIT V:
Business Model: Meaning of business model, Difference between business model and business planning, the business model canvas, Risks and Assumptions, Validation of business models, building solution demo and MVP, revenue streams and pricing strategies.

UNIT VI:

Entrepreneurial Funding and Risk Management: Bootstrapping, Angel Investors, Venture capitalists, Private equity funding, customer acquisition, return on equity and Break even analysis, Risk propensity Vs. Risk avoidance, Locus of control of entrepreneur, Risk estimation techniques, risk avoidance strategies.

Essential Readings:

1. Adrian McEwen, Hakim Cassimally – "Designing the Internet of Things", Wiley Publications, 2012
2. Hedman, J., &Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations. *European journal of information systems*, *12*(1), 49-59.
3. Cabrera, J. (2017). *Modular Design Frameworks: A Projects-based Guide for UI/UX Designers*. Apress.

References:

1. J. Chris Leach & Ronald W. Melicher "Entrepreneurial Finance, Fourth Edition", South Western, Cengage Learning, 2012.

2. Robert D. Hisrich&VelandRamadani – " Effective Entrepreneurial Management, Strategy, Planning, Risk Management, and Organization" , Springer, 2017.
3. Mæhlum, A. R. (2017). *Extending the TILES Toolkit-from Ideation to Prototyping* (Master's thesis, NTNU).
4. Norman, D. (2013). *The design of everyday things: Revised and expanded edition*. Basic

Syllabus for B.Tech (IT) IV YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – III)
PRINCIPLES OF AUTOMATION AND ROBOTICS

Code: 9BC53

Course Outcomes:
After completing the subject, students will be able to:
- Understand a production system, principles of automobile
- understand the methods of work part transfer mechanical buffer storage control functions
- understand the implementation of automated flow lines
- know the analysis and design of material handling systems, automated guided vehicle system
- understand adaptive control systems and Applications.
- understanding the business process Engineering. Concept of concurrent Engineering, techniques of rapid prototype.

UNIT – I
Introduction: Production system, Automated manufacturing systems, Reasons, Principles and strategies of automation, Basic elements of automated system, pneumatic and hydraulic circuit components, Assembly system and line balancing: Manual Assembly process, and work transport systems, Line pacing, Analysis of manual assembly lines, line balancing methods-problems, ways of improving line balance
lines.

UNIT – II
Analysis of Automated flow lines: System configuration, Workpart transfer, General terminology and analysis of transfer lines without and with buffer storage.
Automated Assembly systems: Fundamentals and Design of assembly systems.

UNIT – III
Automated material handling: Principles, Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems-technology, Analysis of material transport systems.
Automated storage systems: Basic terminology, AS/RS; Carousel storage, work in process storage,

UNIT – IV
Adaptive control systems: Introduction, Adaptive control with optimization, Adaptive control with constraints, Application of A.C. in Machining operations. Use of various parameters such as cutting force, Temperature, vibration and acoustic emission. Concept of Concurrent Engineering, MRP,MRP II, Techniques of Rapid Proto typing.

Unit – V: **Robotics**:
Classification and structure of Robotic systems, structure of continuous path robot systems, drives and control systems, control approaches for robots.

Unit – VII
Robot arm kinematics, the direct kinematics problem and inverse kinematic solutions, planning of manipulator trajectories, robot sensors, range sensors, proximity sensors, touch sensors, force and torque sensors, programming, manual teaching, lead through teaching, programming languages, storing and operating task programmes, robot selection and application.

TEXT BOOKS:

1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Groover./PE/PHI
2. Mittal and Nagrath, 'Robotics and Control', Tata Mc Graw Hill.

REFERENCES:
1. Computer control of Manufacturing Systems by Yoram Coreom.
2. CAD / CAM/ CIM by Radhakrishnan.

Syllabus for B.Tech (IT) IV YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – III)
POWER ELECTRONIC DEVICES AND CONVERTERS

Code: 9AC47

Course Objective:

With the advent of semiconductor devices, Revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, Converters and choppers and their analysis.

Course Outcomes:

After completion of this course the students are able to
1) Understand the construction and operation of various power semiconductor devices and analyze about the series and parallel operation of SCRs.
2) Analyze the operation of different configurations of single phase converters for different loads.
3) Analyze the operation of different configurations of three phase converters for different loads.
4) Explain the operation of different type's choppers.
5) Explain the operation of inverter and applications of inverters.
6) Explain the working of an AC voltage controller and Cyclo-Converters for different configurations.

UNIT – I
POWER SEMI CONDUCTOR DEVICES:
Thyristors, Silicon Controlled Rectifiers (SCR's), BJT, Power MOSFET, Power IGBT, DIAC, TRIAC, GTO and their characteristics. Basic theory of operation of SCR, Static characteristics, Two transistor analogy, Turn on and turn off methods, Dynamic characteristics of SCR, Turn on and Turn off mechanism., SCR, UJT firing circuit, Series and parallel connections of SCR's, Snubber circuit details, Specifications and Ratings of SCR's, BJT, IGBT.

UNIT – II
SINGLE PHASE CONTROLLED CONVERTERS:
Phase control technique, Single Phase Line commutated converters, Midpoint and Bridge connections; Half controlled and Fully controlled converters, Derivation of average load voltage and current with R and RL loads.

UNIT – III
THREE PHASE CONTROLLED CONVERTERS:
Three phase half controlled and fully controlled bridge converters with R and RL loads, Effect of Source inductance, Waveforms, Numerical Problems.

UNIT – IV
CHOPPERS:
Choppers, Time ratio control and Current limit control strategies, Step down choppers Derivation of load voltage and currents with R, RL and RLE loads, Step up Chopper, load voltage expression, Jones chopper and waveforms, Problems, Buck, Boost, Buck-Boost choppers.(Qualitative treatment).

UNIT – V
INVERTERS:
Inverters, Single phase inverter, Half and Full bridge VSI & CSI inverters, Waveforms, Voltage control techniques for inverters, Three phase inverters with 120degrees and 180 degrees mode of conduction, Pulse width modulation techniques (Multiple Pulse and Sinusoidal), Numerical problems.

UNIT –VI

AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS:
AC voltage controllers, Single phase two SCR's in anti parallel with R and RL loads, Derivation of RMS load voltage, current and power factor wave forms, Firing circuits, Numerical problems, Cyclo converters, Single phase midpoint cyclo converters with Resistive and inductive load (Principle of operation only), Bridge configuration of single phase cyclo converter (Principle of operation only), Waveforms

TEXT BOOKS:
1. Power Electronics - P.S.Bimbhra, Khanna Publishers.
2. Power Electronics Circuits, Devices and Applications - M. H. Rashid, Prentice Hall of India, 2nd edition.

REFERENCES:
1.   Power Electronics - Vedam Subramanyam, New Age International (P) Limited, Publishers.
2.   Power Electronics - V.R.Murthy   1st edition, OXFORD University Press.
3.   Power Electronics - P.C.Sen,Tata Mc Graw Hill Publishing.
4.   Power Electronics - M. D. Singh & K. B. Kanchandhani, Tata Mc Graw Hill Publishing Company.

Syllabus for B.Tech (IT) IV YEAR II SEM
INFORMATION TECHNOLOGY
(Open Elective – III)
Embedded Systems

Code: 9CC38

Course Objectives - The student will learn about
1. *The constraints and challenges of an Embedded System design*
2. *The 8051 Architecture, Assembly Language Programming , Interfacing and Interrupt handling mechanism*
3. *Interfacing with various bus protocols*
4. *Concepts and constraints related to real-time systems*

Course Outcomes – After completing this course, student shall be able to
1. *Identify the design constraints and challanges of a modern embedded system.*
2. *Write ALP for 8051 architecture and Design hardware interface with 8051 to DC motor, keyboard, LCD.*
3. *Implement interfaces for Embedded System using various protocols and hardware modules.*
4. *Explain the concepts and design requirements related to a real time systems, getting embedded software into target system – Debugging.*

CO	Embedded Systems Concepts (8CC53)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	*Identify the design constraints and challanges of a modern embedded system.*	2		3	2	1							2	2	2	
CO2	*Write ALP for 8051 architecture*	2	2	3	2	1							2	2	2	
CO3	*Write ALP for 8051 architecture and Design hardware interface with 8051 to DC motor, keyboard, LCD*	2	2	3	2	1							2	2	2	
CO4	*Explain the concepts and design requirements related to a real time systems, getting embedded software into target system – Debugging.*	2	2	3	2	1							2	2	2	

CO	OVERALL	2	2	3	2	1							2	2	2	

UNIT – I:
Introduction to Embedded Systems
Embedded Systems, Comparing Embedded and General Computing, Complex System Design and Processors, Classification of Embedded Systems, Embedded System Design Process, Formalization of System Design, Embedded SOC and VLSI Circuit Technology, Application examples of Embedded Systems.

UNIT – II:
8051 Architecture, Memory Organization and Programming
8051 Architecture, features, Addressing modes, Instruction set, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data, Input/Output, Interrupts; The Assembly Language programming Process, Programming the 8051, Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, use of C programming for 8051.

UNIT – III:
8051 Real World Interfacing
Part A - Real World Interfacing, Performance metrics, Memory map, Processor and Memory selection,
Part B - IO Subsystem, Sensors and Actuators, LED and LCD Interfacing, Keyboard Interfacing, Stepper Motor Interfacing, DC motor Interfacing Using PWM

UNIT – IV:
Embedded Communication Interface
Serial and Parallel Communication, Timer and Counting Devices, Watchdog Timer, Real Time Clock, I^2C, SPI protocol, ISA , PCI, Internet Enabled Systems, Wireless and Mobile Systems Protocols

UNIT – V:
Introduction to Real - Time Operating Systems
Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment. (Chapter 6 and 7 from Text Book 3, SImon).

UNIT – VI:
Basic Design Using a Real-Time Operating System : Principles, Semaphores and Queues, HardReal-Tjme Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source);
Embedded Software Development Tools: Host and Target machines, Linker! Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging

TEXT BOOKS:
1. Embedded Systems- Architectuer, Programming and Design 2E, Raj Kamal, TMH
2. Introduction to Embedded Systems, K.Shibu, Tata McGraw-Hill
3. The 8051 Microcontroller And Embedded Systems Using Assembly And C – Mazidi, Pearson Education India, 2nd edition, 2008.
4. An Embedded Software Primer, David E. Simon, Pearson Education

REFERENCES:
1. Computers and Components: principles of embedded *computing* system design, Wayne Wolf, Elseveir.
2. 8051 Application Notes by Atmel.