DETAILED SYLLABUS 2022-24

A22 Regulations

Syllabus for
III and IV Years

FOR

B.Tech – CSE – Data Science

(Applicable for the Batches admitted in 2022 and 2023)

DEPARTMENT OF DATA SCIENCE
SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY
(An Autonomous Institution approved by UGC and affiliated to JNTUH)
Yamnampet, Ghatkesar, Hyderabad - 501 301

Syllabus for B. Tech CSE-DS III year I Semester
DATABASE SECURITY
(Professional Elective – I)

L	T	P	C
3	0	0	3

Code: 9MC11

Prerequisite: Database Management System, Information Security

Course Objective:

Get familiarity of database security concepts and techniques and describe new directions of database security in the context of Internet information management with respect to database application security models, database access control policies, mechanisms and intrusion detection systems.

Course Outcomes:

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

1. Comprehend the various access control rules available to assign privileges and protect data in databases.
2. Differentiate popular Security Models.
3. Categorize the security mechanisms and their functions.
4. Identify the Security Software Design principles to protect data in databases.
5. Classify and compare the Statistical Database Protection & Intrusion Detection Systems.
6. Study the new models of database systems and the models of protection.

UNIT - I

Introduction: Introduction to Databases, Security Problems in Databases, Security Controls Conclusions.

UNIT - II

Security Models: Introduction Access Matrix Model, Take-Grant Model, Acten Model, PN Model, Hartson and Hsiao's Model, Fernandez's Model, Bussolati and Martella's Model for Distributed databases, Bell and LaPadula's Model, Biba's Model, Dion's Model, Sea View Model, Jajodia and Sandhu's Model, The Lattice Model for the Flow Control.

UNIT - III

Security Mechanisms: Introduction User Identification/Authentication, Memory Protection, Resource Protection, Control Flow Mechanisms, Isolation Security Functionalities in Some Operating Systems, Trusted Computer, System Evaluation Criteria.

UNIT - IV

Security Software Design: Introduction, A Methodological Approach to Security. Software Design, Secure Operating System, Design Secure DBMS Design, Security Packages, Database Security Design.

UNIT - V

Statistical Database Protection & Intrusion Detection Systems: Introduction Statistics Concepts and Definitions, Types of Attacks, Inference Controls Evaluation Criteria for Control Comparison, Introduction IDES System, RETISS System, ASES System, Discovery.

UNIT -VI

Models for the Protection of New Generation Database Systems: Introduction, A Model for the Protection of Frame Based Systems, A Model for the Protection of Object- Oriented Systems , SORION Model for the Protection of Object-Oriented Databases, A Model for the Protection of New Generation Database Systems, The Orion Model Jajodia and Kogan's Model, A Model for the Protection of Active Databases.

Textbooks:

1. S. Castano, M. Fugini, G. Martella, P. Samarati (eds.), Database Security, Addison- Wesley,1994.

REFERENCES:

1. RonBenNatan, Implementing Database Security and Auditing, Elsevier, Indian reprint 2006
2. Michael Gertz, Sushil Jajodia, Handbook of Database Security : Applications and Trends, Springer,2008

Syllabus for B. Tech CSE-DS III year I Semester

INFORMATION RETRIEVAL SYSTEMS

(Professional Elective –I)

Code: 9FC08 **L T P C**

Course Objectives **3 0 0 3**

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

Course Outcomes :

1. Ability to apply IR principles to locate relevant information large collections of data
2. Ability to design different document clustering algorithms
3. Implement retrieval systems for web search tasks.
4. 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.

UNIT - II

Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous.
Capabilities Cataloguing and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction.

UNIT - III

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 - IV

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 - V

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 - VI

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems
Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval.

TEXT BOOKS :

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

REFERENCES :

1. Frakes, W.B. ,RicardoBaeza- Yates: Information Retrieval Data Structures and Algorithms ,PrenticeHall,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 CSE-DS III year I Semester

SOFTWARE PROJECT MANAGEMENT
(Professional Elective –I)

Code: 9FC13

Prerequisites: Software Engineering Concepts

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.

UNI-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.

REFERENCES:

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.***
4. ***Software Project Management in practice, Pankaj Jalote, Pearson Education.2005.***

Syllabus for B.Tech CSE-DS III year I Semester
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. Understand fundamental 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, includingviewing transformations, hierarchical modeling, color, lighting and texture mapping.
5. Apply single and multiple 3-D viewing techniques like viewing coordinates etc and alsoback-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 projectiontransforms 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, 2ndedition.
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 CSE-DS III year I Semester
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 CSE-DS III year I Semester
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 – 1st Ed, by Pang-Ning Tan, Michael Steinbach and Vipin Kumar, ISBN-13: 978-0321321367

Syllabus for B.Tech CSE-DS III year I Semester
DATA VISUALIZATION AND BUSINESS INTELLIGENCE

L	T	P	C
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Course Code: 9MC01

Course Objectives:

1. This course is concerned with extracting data from the information systems that deal with the day-to-day operations and transforming it into data that can be used by businesses to drive high-level decision making
2. Students will understand a data warehouse, and learn how to utilize the process of extracting, transforming, and loading (ETL) data into data warehouses.

Course Outcomes:

1. Understand architecture of data warehouse and OLAP operations.
2. Understand Fundamental concepts of BI and Analytics
3. Understand basic reporting and querying and Design of Dashboards
4. Learn BI Strategy, Architecture
5. Design / Build a BI project plan with best practices.
6. Understand BI target

UNIT I – Introduction and Data Foundation: Basics - Relationship between Visualization and Other Fields - The Visualization Process - Pseudo code Conventions - The Scatter plot. Foundation - Types of Data - Structure within and between Records - Data Preprocessing - Data Sets - Foundations for Visualization: Visualization stages – Semiology of Graphical Symbols - The Eight Visual Variables - Historical Perspective –Taxonomies - Experimental Semiotics based on Perception Gibson's Affordance theory – A Model of Perceptual Processing.

UNIT – II Business Intelligence – Introduction and Basics:

Defining BI – Understanding Business Intelligence – BI's big four – Brief history of BI – BI Life Cycle – Fitting BI with Other Technology Disciplines – Resolving differences of BI and DWH – ERP and BI – Meeting the BI Challenge – Best and worst practices

UNIT – III Business Intelligence User Models:

Reporting and Querying: Basic Reporting and Querying – Building and using ad-hoc queries – Adding capabilities through managed querying/reporting – Data Access — BI's Push-Pull – **Dashboards:** Dashboard Origins – Metric System – BI Dashboards – Briefing Books – Visualization – Trends in BI

UNIT – IV BI Strategy, Architecture and Roadmap:

BI Strategy – Assessing current BI capabilities – Building a Roadmap – Centralized Vs Decentralized Architecture – Making a choice – BI Architecture alternatives – Examining costs and technology risks – Developing a phased, incremental roadmap – Planning for contingencies.

UNIT – V Implementing BI:

Building the BI Project Plan – Collecting User Requirements – Requirements-Gathering Techniques – Validating, Prioritizing and Changing requirements – BI Design and Development – Keeping users in mind – Best practices for design – Proof of concept – Maintaining BI environment – Extending capabilities – Olympic approach

UNIT – VI Key to a successful BI:

The Part of Tens – Ten Keys to BI Success – BI Risks and how to overcome – Keys to Gathering Good BI Requirements – Secrets to a Successful BI Deployment and a Healthy BI Environment

TEXT BOOKS:

1. Matthew Ward, Georges Grinstein and Daniel Keim, "Interactive Data Visualization Foundations, Techniques, Applications", 2010.
2. Business Intelligence for Dummies – Swain Scheps, Wiley Publications

REFERENCE BOOKS:

1. Rajiv Sabherwal "Business Intelligence" Wiley Publications, 2012.
2. Efraim Turban, Ramesh Sharda, Jay Aronson, David King, Decision Support and Business Intelligence Systems, 9th Edition, Pearson Education, 2009.

3. David Loshin, Business Intelligence - The Savy Manager's Guide Getting Onboard withEmerging IT, Morgan Kaufmann Publishers, 2009.
4. Philo Janus, Stacia Misner, Building Integrated Business Intelligence Solutions with SQL Server, 2008 R2 & Office 2010, TMH, 2011.
5. Business Intelligence Data Mining and Optimization for decision making [Author: Carlo-Verellis] [Publication: (Wiley)].
6. Building the Data Warehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd.

Syllabus for B. Tech. CSE-DS III Year I semester
OPERATING SYSTEMS

Code: 9EC06
Prerequisite: Computer Organization and C

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COURSE OBJECTIVES:

Learn basics of operating Systems. Understand the process management 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 Deadlocks in the Operating System.
4. Illustrate the concepts of Memory Management.
5. Outline the directory structure & analyze disk scheduling algorithms.
6. Summarize the aspects of Protection and Security, and understand the concepts of I/O systems.

UNITI: Introduction to Operating System, Computer System Architecture: Single Processor System, Multiprocessor System, Clustered System, Multiprogramming System, Multitasking (Time sharing) system, Operating System Services, System Calls, Types of System Calls, System Programs, Operating System Structure: single structure, layered approach, micro kernels, modules.

Application: system calls in the file systems

UNIT II: Process Management: Process concept, process scheduling, operation on processes; CPU scheduling, scheduling criteria, scheduling algorithms -First Come First Serve (FCFS), Shortest-Job-First (SJF), Priority Scheduling, Round Robin(RR), Multilevel Queue Scheduling. Engg. Applications – Process scheduling in Windows, Linux.

UNIT III: Process-Synchronization & Deadlocks: Critical Section Problems, semaphores; Monitors; Deadlock Characterization, methods for handling deadlocks-deadlock prevention, Avoidance & Detection; Deadlock recovery. Applications: Handling deadlocks in computer system

UNIT IV: Memory Management: Logical& Physical Address Space, swapping, Contiguous memory allocation, Paging and Segmentation techniques, Segmentation with paging; Virtual memory: Demand Paging, Page-Replacement Algorithms, Thrashing. Engg. Applications – Memory management in Windows, Linux.

UNIT V: FileSystem: Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms.

Applications: File allocation, FAT

UNIT VI: I/O Systems: I/O Hardware, Application I/O Interface, Kernel, Transforming I/O requests, Performance Issues. Protection and Security: Goals of protection, Principles of protection, Access matrix, Access control list, Capability List. Security Attacks, Program threats. Applications: Handling I/O requests

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

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. CSE-DS III Year I semester
COMPUTER NETWORKS

Code: 9EC05

L	T	P	C
3	0	0	3

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 CSE-DS III year I Semester
DATA WAREHOUSING AND DATA MINING LAB

Code: 9FC65
Prerequisite: NIL

L	T	P	C
0	0	3	1.5

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
    a. Determine the numbers of instances of each class are present in the data
    b. Load the weather dataset and remove all instances where the attribute _humidity‘ has the value _high‘?
    c. Load the iris dataset and view the Visualizer panel.

Syllabus for B.Tech CSE-DS III year I Semester
COMPUTER NETWORKS AND DATA VISUALIZATION LAB

Course Code: 9MC65

L	T	P/D	C
0	0	4	2

Prerequisite: Data Structures
Course Objectives:

- To provide an understanding of the design concepts of framing Error Detection & correction, Routing, Congestion concepts and Network tools.
- To provide an understanding of the design aspects of operating system concepts through simulation

Course Outcomes:

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

1. Implement and analyze framing methods of the data link layer.
2. Implement and analyze framing methods of the data link layer.
3. Illustrate and implement error detection & correction techniques.
4. Implement different Routing Algorithms.
5. Understand basic Network Commands.
6. Use of Wireshark and NS-2 tools
7. Simulate and implement operating system concepts such as scheduling, deadlock management, page replacement techniques, file management and memory management

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. Take an example subnet graph with weights indicating delay between nodes. Now obtain a Routing table for each node using a distance vector routing algorithm.
6. Implement Congestion control using Leaky-Bucket Algorithm
7. Execute the basic Networking Commands

i. Arp	ii. Hostname
iii. ipconfig	iv. ipconfig/all
v. Ipconfig/renew	vi. Ipconfig/release
vii. Ipconfig/flushdns	viii. Pathping
ix. Ping	x. Route
xi. tracert	

8. Demonstration of NS-2

DATA VISUALIZATION LAB

List of Experiments:

1. Acquiring and plotting data.
2. Statistical Analysis – such as Multivariate Analysis, PCA, LDA, Correlation regression and analysis of variance.
3. Financial analysis using Clustering, Histogram and HeatMap.
4. Visualization of various massive dataset - Finance - Healthcare - Census – Geospatial.
5. Market-Basket Data analysis-visualization.
6. Text visualization using web analytics.

Syllabus for B.Tech CSE-DS III year I Semester
SUMMER INDUSTRY INTERNSHIP-I

L	T	P	C
-	-	-	1

Code: 9M586
Prerequisite: All Courses till this Semester

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 1or 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 CSE-DS III year II Semester

BASICS OF ENTREPRENEURSHIP

(Open Elective –I)

	L	T	P	C
Code: 9ZC22	**3**	**0**	**0**	**3**

Prerequisite: Economics, Accountancy and Management Science

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 CSE-DS III year II Semester
BANKING OPERATIONS AND INSURANCE
(Open Elective –I)

Code: 9ZC05

L	T	P	C
3	0	0	3

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.

Course Outcomes:

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 CSE-DS III year II Semester

INTRODUCTION TO ADDITIVE MANUFACTURING PROCESSES

(Open Elective –I)

Code: 9BC51

L	T	P	C
3	0	0	3

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 prototype processes, devices, capabilities and materials that are available.
3. Apply the principles of casting in Additive manufacturing processes
4. Articulate the various tradeoffs of Additive manufacturing software's/data format that must be made in selecting advanced/additive manufacturing processes, devices and materials to suit particular product requirements.
5. 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 CSE-DS III year II Semester

DESIGN LITERACY AND DESIGN THINKING

(Open Elective –I)

	L	T	P	C
Code: 9ZC08	**3**	**0**	**0**	**3**

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
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 CSE-DS III year II Semester

FUNDAMENTALS OF MEASUREMENTS AND INSTRUMENTATION

(Open Elective –I)

	L	T	P	C
Code: 9AC44	**3**	**0**	**0**	**3**

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, 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 CSE-DS III year II Semester
FUNDAMENTALS OF DIGITAL CIRCUITS & MICROPROCESSORS
(Open Elective –I)

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.

L	T	P	C
3	0	0	3

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**	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 units (latches and flip-flops) and sequential circuits*	3	2	2	2	2								2	2	
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 CSE-DS III year II Semester
WEB SECURITY
(Professional Elective – II)

	L	T	P	C
Code: 9MC12	**3**	**0**	**0**	**3**

Course Objectives:

- Give an Overview of information security
- Give an overview of Access control of relational databases

Course Outcomes: Students should be able to

- Understand the Web architecture and applications
- Understand client side and service side programming
- Understand how common mistakes can be bypassed and exploit the application
- Identify common application vulnerabilities

UNIT - I The Web Security, The Web Security Problem, Risk Analysis and Best Practices. Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification.

UNIT - II The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications.

UNIT - III Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems.

UNIT - IV Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention

UNIT – V Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and Future Trends.

UNIT - Vi Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location-based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment.

TEXT BOOKS:

1. Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O'Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia.

Syllabus for B.Tech CSE-DS III year II Semester
MOBILE APPLICATION DEVELOPMENT
(Professional Elective – II)

Pre-requisite: Java Programming

Code: 9FC14	**L**	**T**	**P**	**C**
Course Objectives:	**3**	**0**	**0**	**3**

- 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 life cycle.
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: 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 CSE-DS III year II Semester
IMAGE PROCESSING
(Professional Elective - II)

Code: 9FC09	**L**	**T**	**P**	**C**
Prerequisite: Computer Graphics	**3**	**0**	**0**	**3**

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 CSE-DS III year II Semester
MOBILE COMPUTING
(Professional Elective – II)

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,
3. ―Fundamentals of Mobile and Pervasive Computing‖, ISBN: 0071412379, McGraw-Hill Professional, 2005.
4. Hansmann, Merk, Nicklous, Stober, ―Principles of Mobile Computing‖, Springer, second edition, 2003.
5. Martyn Mallick, ―Mobile and Wireless Design Essentials‖, Wiley DreamTech, 2003
6. A. Tanenbaum ―Computer Networks‖, 4th edition.
7. Android Programming (Big Nerd Ranch Guide), by Phillips,Stewart, Hardy and Marsicano
8. Android Programming – Pushing the limits by Hellman

Syllabus for B.Tech CSE-DS III year II Semester
CRYPTOGRAPHY AND NETWORK SECURITY
(Professional Elective – III)

Code: 9EC09

L	T	P	C
3	0	0	3

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 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, analyze Message Authentication, Secure Hash functions and outline concepts of Kerberos & email privacy
4. Recognize architecture, key management and header formats of IPsec; Outline various security threats, 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 CSE-DS III year II Semester
NATURAL LANGUAGE PROCESSING
(Professional Elective – III)

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 CSE-DS III year II Semester
SOFTWARE REQUIREMENTS AND ESTIMATION
(Professional Elective – III)

Code: 9EC12
Prerequisite: Software Project Management

L	T	P	C
3	0	0	3

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 distributedsystem 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 andpriorities.
3. Explain software Modeling and Requirements Management.
4. Apply Estimation methods for size using Mark II FPA, Full Function Points, LOCEstimation.
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, implementingrequirements 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:
- Software Requirements and Estimation by Rajesh Naik and Swapna Kishore, Tata Mc GrawHill.

Syllabus for B.Tech CSE-DS III year II Semester
ROBOTICS PROCESS AUTOMATION
(Professional Elective – III)

L	T	P	C
3	0	0	3

Code: 9MC13
Course Objectives: To make learners familiar with the concepts of Robotic ProcessAutomation.

Course Outcomes:
1. Describe RPA, where it can be applied and how it's implemented.
2. Identify and understand Web Control Room and Client Introduction.
3. Understand how to handle various devices and the workload.
4. Understand Bot creators, Web recorders and task editors.

UNIT - I
Introduction to Robotic Process Automation & Bot Creation Introduction to RPA and Use cases – Automation Anywhere Enterprise Platform – Advanced features and capabilities – Ways to create Bots.

UNIT - II
Web Control Room and Client Introduction - Features Panel - Dashboard (Home, Bots, Devices, Audit, Workload, Insights) - Features Panel – Activity (View Tasks in Progress and Scheduled Tasks) - Bots (View Bots Uploaded and Credentials).

UNIT - III
Devices (View Development and Runtime Clients and Device Pools) - Workload (Queues and SLA Calculator) - Audit Log (View Activities Logged which are associated with Web CR) –

UNIT - IV
Administration (Configure Settings, Users, Roles, License and Migration) - Demo of Exposed API's – Conclusion – Client introduction and Conclusion.

UNIT - V
Bot Creator Introduction – Recorders – Smart Recorders – Web Recorders – Screen Recorders - TaskEditor – Variables - Command Library – Loop Command – Excel Command – Database Command - String Operation Command - XML Command.

UNIT - VI
Terminal Emulator Command - PDF Integration Command - FTP Command - PGP Command - Object Cloning Command - Error Handling Command - Manage Windows Control Command - Workflow Designer - Report Designer.

TEXT BOOKS:
1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool – UiPath Kindle Edition.

REFERENCES:
1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.

Syllabus for B.Tech CSE-DS III year II Semester
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.
2. Conceptualize context free grammars and normal forms.
3. Design the push down automata and Turing Machine for complex languages.
2. Understand LEX tool and relate parsing techniques,
3. Demonstrate and solve problems on SLR, CLR, LALR, operator precedence parser, LR (0) grammar and use YACC tool.
4. 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 CSE-DS III year II Semester
WEB TECHNOLOGIES

Code: 9FC06

L	T	P	C
2	1	0	3

Prerequisite:

1. Data Communications and Computer Networks Concepts.
2. Object Oriented Programming through Java.

Course Objectives:

1. To understand the basics of Web Designing using HTML and CSS
2. Perform the client-side scripting with JavaScript.
3. Understand the different data stores XML, and JSON with full-stack web application development using Angular and study with Server-side programming using Java Servlets and PHP.

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/
2. E – resource :https://tailwindcss.com/
3. E – resource :https://expressjs.com/
4. E – resource :https://web.dev/learn/css
1. E – resource :https://web.dev/learn/html

Syllabus for B.Tech CSE-DS III year II Semester

MACHINE LEARNING

Code: 9LC03	**L**	**T**	**P**	**C**
Prerequisite: Introduction to Data Science	**3**	**0**	**0**	**3**

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 linear models, tree and Probabilistic Models.
3. Understand various Dimensionality Reduction Techniques & Apply Various Evolutionary Algorithms with models
4. Understand the Graphical models and Analytical Learning.

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.

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.

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.

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.

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.

UNIT – VI

ANALYTICAL LEARNING: Learning with perfect domain theory– Explanation based Learning – Inductive analytical approach to learning – KBANN algorithm.

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 CSE-DS III year II Semester
INTELLECTUAL PROPERTY RIGHTS

Code: 9IC04

L	T	P	C
2	0	0	-

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.

REFERENCES:
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 CSE-DS III year II Semester
MACHINE LEARNING AND COMPILER DESIGN LAB

Code: 9LC65	**L**	**T**	**P**	**C**
Course Objectives:	**0**	**0**	**3**	**1.5**

1. To experiment various machine learning algorithms.
2. To experiment on the basic techniques of compiler construction and tools that can be used to perform syntax-directed translation of a high-level programming language into an executable code.

Course Outcomes:

1. Apply common Machine Learning algorithms in practice and implementing their own.
2. Perform experiments in Machine Learning using real-world data.
3. Implementation of DFA for a given Languages/ Regular Expression.

LIST OF EXPERIMENTS (MACHINE LEARNING):

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 schooldays 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. GiventhefollowingdataWhichspecifyclassificationsforninecombinationsof VAR1andVAR2predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k-means clustering with 3means(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. Implement linear regression using python.
6. Implement Naïve Bayes theorem to classify the English text.
7. Implement an algorithm to demonstrate the significance of genetic algorithm.
8. Implement the finite words classification system using Back-propagation algorithm.

LIST OF EXPERIMENTS (COMPILER DESIGN):

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.

TEXTBOOKS:

1. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Introduction to Theory of Computation, Sipser 2nd edition Thomson.

REFERENCES:

1. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.
2. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.
3. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014.
4. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
5. Introduction to languages and the Theory of Computation ,John C Martin, TMH.

Syllabus for B.Tech CSE-DS III year II Semester
WEB TECHNOLOGIES LAB

Code: 9FC66

L	T	P	C
0	0	3	1.5

Prerequisite: Object Oriented Programming through Java Lab

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 CSE-DS III year II Semester
COMPREHENSIVE VIVA VOCE

Code: 9M687

L	T	P	C
-	-	-	1

Prerequisite: All core Courses till this Semester

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:

1. 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. Out of 100 marks 40 marks are evaluated internally and 60 marks for external evaluation.

Internal:

Comprehensive Viva Voce is conducted twice in a Semester and evaluated for 40 marks each and average will be considered for internal.

Internal Examination	:	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, and subject experts.

Syllabus for B.Tech CSE-DS IV year I Semester
ADVANCED ENTREPRENEURSHIP
(Open Elective –II)

Code: 9ZC23

L	T	P	C
3	0	0	3

Prerequisite: Basics of Entrepreneurship

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

Syllabus for B.Tech CSE-DS IV year I Semester
FINANCIAL MARKETS AND SERVICES
(Open Elective –II)

	L	T	P	C
Code: 9ZC15	**3**	**0**	**0**	**3**

Prerequisite: Banking Operations and Insurance

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.

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 CSE-DS IV year I Semester
PRINCIPLES OF OPERATIONS RESEARCH
(Open Elective –II)

Code: 9BC52

L	T	P	C
3	0	0	3

Prerequisite: Linear Algebra and Calculus, Differential Calculus and Numerical Methods

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 CSE-DS IV year I Semester
CO-CREATION AND PRODUCT DESIGN
(Open Elective –II)

	L	T	P	C
Code: 9ZC09	**3**	**0**	**0**	**3**

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 CSE-DS IV year I Semester
FUNDAMENTALS OF RENEWABLE ENERGY SOURCES
(Open Elective –II)

Code: 9AC45

L	T	P	C
3	0	0	3

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 CSE-DS IV year I Semester
FUNDAMENTALS OF COMMUNICATION
(Open Elective –II)

Code: 9CC37

L	T	P	C
3	0	0	3

Course Objectives:
The objective of this subject is to:
1. Introduce students to communication systems, frequency spectrum, need for modulation, antenna, 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 CSE-DS IV year I Semester
WEB AND SOCIAL MEDIA ANALYTICS
(Professional Elective – IV)

Code: 9MC14

L	T	P	C
3	0	0	3

Course Objectives:
Exposure to various web and social media analytic techniques.

Course Outcomes:
1. Knowledge on decision support systems.
2. Apply natural language processing concepts on text analytics.
3. Understand sentiment analysis.
4. Knowledge on search engine optimization and web analytics.

UNIT - I
An Overview of Business Intelligence, Analytics, and Decision Support: Analytics to Manage a Vaccine Supply Chain Effectively and Safely, Changing Business Environments and Computerized Decision Support, Information Systems Support for Decision Making, The Concept of Decision Support Systems (DSS), Business Analytics Overview, Brief Introduction to Big Data Analytics.

UNIT - II
Text Analytics and Text Mining: Machine Versus Men on Jeopardy!: The Story of Watson, Text Analytics and Text Mining Concepts and Definitions, Natural Language Processing, Text Mining Applications, Text Mining Process, Text Mining Tools.

UNIT - III
Sentiment Analysis: Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process, Sentiment Analysis and Speech Analytics.

UNIT - IV
Web Analytics, Web Mining: Security First Insurance Deepens Connection with Policyholders, Web Mining Overview, Web Content and Web Structure Mining, Search Engines, Search Engine Optimization, Web Usage Mining (Web Analytics), Web Analytics Maturity Model and Web Analytics Tools.

UNIT - V
Social Analytics and Social Network Analysis: Social Analytics and Social Network Analysis, Social Media Definitions and Concepts, Social Media Analytics.

UNIT - VI
Prescriptive Analytics - Optimization and Multi-Criteria Systems: Multiple Goals, Sensitivity Analysis, What-If Analysis, and Goal Seeking.

TEXT BOOK:
1. Ramesh Sharda, Dursun Delen, Efraim Turban, BUSINESS INTELLIGENCE AND ANALYTICS: SYSTEMS FOR DECISION SUPPORT, Pearson Education.

REFERENCE BOOKS:
1. Rajiv Sabherwal, Irma Becerra-Fernandez," Business Intelligence – Practice, Technologies and Management", John Wiley 2011.
2. Lariss T. Moss, ShakuAtre, "Business Intelligence Roadmap", Addison-Wesley It Service.
3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting", SPD Shroff, 2012.

Syllabus for B.Tech CSE-DS IV year I Semester
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 CSE-DS IV year I Semester
SOFTWARE TESTING METHODOLOGIES
(Professional Elective – IV)

Code: 9LC11

L	T	P	C
3	0	0	3

Course Objectives:

To Understand the Basic concepts in Software testing, concepts of flow graphs, path testing and data flow testing, understand the concept of metrics and their types. Understand and implement various testing techniques and to make a thorough study on various testing tools. Set a strategy for testing environment and to learn the testing methodologies in detail.

Course Outcomes:

After completing this course, student shall be able to

1. Describe concepts of software testing.
2. Describe and apply the concepts Flow graphs, Path testing and Data Flow Testing.
3. Practice Software testing strategy and Environment with economics and apply Software Metrics useful in software development and maintenance.
4. Software Testing Methodology, finding defects hard to find, Verification and validation, Functional and structural, Workbench concept, Eight Consideration of software testing methodology, checklist. Describe Agile computing with agile testing.
5. Demonstrate Software Testing Techniques such as JADs, Pareto Analysis , Regression Tasting, Structured walkthroughs, Thread testing , Performance testing and White box testing.
6. Describe Graph matrices and applications, and practice and apply automated testing tools such load Runner, UFT and QTP.

UNIT-I

What is Testing, Characteristics of Test Engineers, Software Testing Life Cycle, Levels of Testing, Testing Approaches, Test Cases: Format for Writing Test Case, Test plan: Format to prepare Test plan, Purpose of testing, Dichotomies, Consequences of bugs.

UNIT-II

Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, application of path testing. Data Flow Testing: Basics of Data Flow Testing Logic Based Testing, Decision Tables.

UNIT-III

Software testing strategy and Environment, establishing testing policy, structured approach to testing, Test factors, Economics of SDLC testing.

Software Metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

UNIT-IV

Software Testing Methodology, Defects hard to find, Verification and validation, Functional and structural, Defects and Failures, testing that parallels the software Development process, Workbench concept, Eight Consideration of software testing methodology, testing tactics checklist. Importance of Agility, Building an Agile Testing Process.

UNIT-V

Software Testing Techniques, Black-box, Boundary value, Branch coverage, Cause Effect graphing, CRUD, Database, Histogram, Gray box, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk based testing, Regression Testing, Structured walkthroughs, Thread testing, Performance testing, Stress Testing, Accepting Testing, White box testing, Alpha and Beta Testing.

UNIT-VI

Graph matrices and application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm. Need for Automated testing tools, Taxonomy of Testing Tools, Exposure to Software Testing Tools: Load Runner, UFT and QTP.

TEXT BOOKS:

1. Software testing techniques – Boris Beizer, Dreamtech, Second Edition.(Unit 1,2,6)
2. Software testing tools – by Dr. K.V.K.K Prasad Dreamtech (Unit 1,6)
3. Effective Methods for Software Testing, 2nd Edition by William E.Perry, Wiley publications.(Unit 3,4)
4. Software Testing and continuous Quality Improvement, by William E.Lewis,Gunasekaran,2nd Edition Auerbach publications (Unit 5,Refer Internet)

REFERENCES:

1. Software Testing Techniques ,byBoriesBeizer, Second Edition,Dreamtech Press.
2. Testing and Quality Assurance for Component based software ,byGao,Tsao and Wu,Artech House Publishers.
3. Managing the Testing Process,by Rex Black,Wiley.

Syllabus for B.Tech CSE-DS IV year I Semester
BLOCKCHAIN TECHNOLOGIES
(Professional Elective – IV)

Code: 9JC05

L	T	P	C
3	0	0	3

Course Objectives:

To understand how block chain systems (mainly Bit coin and Ethereum) work.
To securely interact with them, design, build, and deploy smart contracts and distributed applications.
Integrate ideas from blockchain technology into their own projects.

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.

UNIT II: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.

UNIT IV: 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:InternetofThings,MedicalRecord Management System, Domain Name Service and future of Blockchain.

UNIT VI: (Trends and Topics)-Zero Knowledge proofs and protocols in Blockchain-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 CSE-DS IV year I Semester
SPATIAL AND MULTIMEDIA DATABASES
(Professional Elective – V)

Code: 9MC17

L	T	P	C
3	0	0	3

Course Objective:
Introduce the basic concepts, data models and indexing structures for spatial data, multimedia data.

Course Outcomes:
1. Understand data models, storage, indexing and design of spatial databases.
2. Represent image database with R-tree.
3. Store and retrieve multimedia data.

UNIT - I
Introduction to Spatial Databases: Overview, beneficiaries, GIS and SDBMS, users, Space taxonomy, query language, query processing, query optimization. Spatial Concepts and Data Models: Models of Spatial information, three step database design, Extending the ER model with spatial concept, object-oriented data modeling. Spatial Query Languages.

UNIT - II
Spatial Storage and Indexing: Storage-disks and files, spatial indexing, TR*, spatial join index. Query processing and optimization – Evaluation of Spatial operations, query optimization, Analysis of Spatial index structures, distributed and parallel spatial database system. Multidimensional Data Structures: kd Trees, Point Quadtrees, The MX-Quadtree, R-Trees, comparison of Different Data Structures.

UNIT - III
Image Databases: Raw Images, Compressed Image Representations, Image Processing: Segmentation, Similarity-Based Retrieval, Alternative Image DB Paradigms, Representing Image DBs with Relations, Representing Image DBs with R-Trees, Retrieving Images by Spatial Layout, Implementations. Text/Document Databases: Precision and Recall, Stop Lists, Word Stems, and Frequency Tables, Latent Semantic Indexing, TV-Trees, Other Retrieval Techniques.

UNIT - IV
Video Databases: Organizing Content of a Single Video, Querying Content of Video Libraries, Video Segmentation, video Standards Audio Databases: A General Model of Audio Data, Capturing Audio Content through Discrete Transformation

UNIT - V
Indexing Audio Data Multimedia Databases: Design and Architecture of a Multimedia Database, Organizing Multimedia Data Based on The Principle of Uniformity, Media Abstractions, Query Languages for Retrieving Multimedia Data, Indexing SMDSs with Enhanced Inverted Indices, Query Relaxation/Expansion.

UNIT - VI
Creating Distributed Multimedia Presentations: Objects in Multimedia Presentations, Specifying Multimedia Documents with Temporal Constraints, Efficient Solution of Temporal Presentation Constraints, Spatial Constraints. Distributed Media Servers: Distributed multimedia server architecture, distributed retrieval plans, optimal distributed retrieval plans.

TEXT BOOKS:
1. Shashi Shekhar, Sanjiv Chawla, Spatial Databases-A Tour, Pearson Education.
2. V.S. Subrahmanian, Principles of Multimedia Database Systems, Morgan Kauffman.

REFERENCE BOOK:
1. Multimedia Databases: An object relational approach, Lynne Dunckley, Pearson Education.
2. Multimedia Database Systems, Prabhakaran, Springer.

Syllabus for B.Tech CSE-DS IV year I Semester
EXPLORATORY DATA ANALYSIS
(Professional Elective – V)

Code: 9MC18

L	T	P	C
3	0	0	3

Course Objectives:
1. This course introduces the methods for data preparation and data understanding.
2. It covers essential exploratory techniques for understanding multivariate data by summarizing it through statistical methods and graphical methods.
3. Supports to Summarize the insurers use of predictive analytics, data science and Data Visualization.

Course Outcomes:
1. Handle missing data in the real-world data sets by choosing appropriate methods.
2. Summarize the data using basic statistics. Visualize the data using basic graphs and plots.
3. Identify the outliers if any in the data set.
4. Choose appropriate feature selection and dimensionality reduction.
5. Techniques for handling multi-dimensional data.

UNIT - I:
Introduction to Exploratory Data Analysis: Data Analytics lifecycle, Exploratory Data Analysis (EDA)– Definition, Motivation, Steps in data exploration, The basic data types Data Type Portability.

UNIT - II:
Preprocessing - Traditional Methods and Maximum Likelihood Estimation: Introduction to Missing data, Traditional methods for dealing with missing data, Maximum Likelihood Estimation – Basics, Missing data handling, Improving the accuracy of analysis. Preprocessing Bayesian Estimation: Introduction to Bayesian Estimation, Multiple Imputation-Imputation Phase, Analysis and Pooling
Phase, Practical Issues in Multiple Imputation, Models for Missing Notation Random Data.

UNIT - III:
Data Summarization & Visualization: Statistical data elaboration, 1-D Statistical data analysis, 2-D Statistical data Analysis, N-D Statistical data analysis.

UNIT - IV:
Outlier Analysis: Introduction, Extreme Value Analysis, Clustering based, Distance Based and Density Based outlier analysis, Outlier Detection in Categorical Data.

UNIT – V:
Feature Subset Selection: Feature selection algorithms: filter methods, wrapper methods and embedded methods, Forward selection backward elimination, Relief, greedy selection, genetic algorithms for features selection.

UNIT – VI:
Dimensionality Reduction: Introduction, Principal Component Analysis (PCA), Kernel PCA, Canonical Correlation Analysis, Factor Analysis, Multidimensional scaling, Correspondence Analysis.

TEXT BOOKS:
1. Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt.

REFERENCE BOOKS:
1. Charu C. Aggarwal, “Data Mining The Text book”, Springer, 2015.
2. Craig K. Enders, “Applied Missing Data Analysis”, The Guilford Press, 2010.
3. Inge Koch, “Analysis of Multivariate and High dimensional data”, Cambridge University Press, 2014.
4. Michael Jambu, “Exploratory and multivariate data analysis”, Academic Press Inc., 1990.
5. Charu C. Aggarwal, “Data Classification Algorithms and Applications”, CRC press, 2015.

Syllabus for B.Tech CSE-DS IV year I Semester
AGILE SOFTWARE DEVELOPMENT
(Professional Elective – V)

Code: 9FC15

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 CSE-DS IV year I Semester

INTRODUCTION TO INTERNET OF THINGS

(Professional Elective –V)

Code: 9IC45

Prerequisite: Data Communications and Networks

L	T	P	C
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Course Objectives:

1. To understand the fundamentals of internet of things.
2. To understand Raspberry PI platform.

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

1. Getting familiar with terminology, technology and applications of IOT
2. Understand and explain IoT system management using M2M (machine to machine) with necessary protocols
3. Design & develop Python Scripting Language programs preferred for many IoT applications
4. Use Raspberry PI as a hardware platform for designing the IoT sensor interfacing
5. Implement web based services for IoT
6. 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:

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

REFERENCES:

1. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan
2. Peter Friess, 'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014
3. N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.

Syllabus for B.Tech CSE-DS IV year I Semester
CLOUD COMPUTING

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

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 CSE-DS IV year I Semester
INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Code: 9LC01
Prerequisite: Knowledge on Data Structures.

L	T	P	C
3	0	0	3

Course Objectives:

1. To learn the distinction between optimal reasoning vs. human like reasoning.
2. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
3. To learn different knowledge representation techniques.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Course Outcomes:

1. Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.
2. Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.
3. Learn different knowledge representation techniques.
4. Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
5. Comprehend the applications of Probabilistic Reasoning and Bayesian Networks,analyze Supervised Learning vs. Learning Decision Trees.

UNIT-I

Introduction to AI- Intelligent Agents, Problem-Solving Agents,
Searching for Solutions - Breadth-First Search, Depth-First Search, Hill-climbing Search, Simulated Annealing Search, Local Search in Continuous Spaces.

UNIT-II

Games- Optimal Decisions in Games, Alpha-Beta Pruning, Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Knowledge-Based Agents.
Logic-Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

UNIT-III

First-Order Logic-Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution.
Knowledge Representation: Ontological Engineering, Categories and Objects, Events.

UNIT-IV

Planning-Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches, Hierarchical planning

UNIT-V

Probabilistic Reasoning: Acting under Uncertainty, Basic Probability Notation Bayes' Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain.

UNIT-VI

Bayesian Networks- The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability.

TEXT BOOKS:

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

REFERENCES:

1. Artificial Intelligence, 3rd Edn.,E. Richand K. Knight(TMH)
2. Artificial Intelligence, 3rd Edn.,Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, ShivaniGoel, Pearson Education.
4. Artificial Intelligence and Expert systems–Patterson, Pearson Education.

Syllabus for B.Tech CSE-DS IV year I Semester
BIG DATA ANALYTICS

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 CSE-DS IV year I Semester
AI AND CLOUD COMPUTING LAB

	L	T	P/D	C
Course Code: 9MC67	**0**	**0**	**3**	**1.5**

Course Objectives:
1. Become familiar with basic principles of AI toward problem solving, knowledge representation, and learning.
2. To develop web applications in cloud.
3. To learn the design and development process involved in creating a cloud-based application

Course Outcomes:
1. Apply basic principles of AI in solutions that require problem solving, knowledge representation, and learning.
2. Possess the skill for representing knowledge using the appropriate technique.
3. Possess the ability to apply AI techniques to solve problems of Game Playing
4. Configure various virtualization tools such as Virtual Box, VMware workstation.
5. Design and deploy a web application in a PaaS environment.

List of Experiments (AI)

1) Write a program in prolog to implement simple facts and Queries
2) Write a program in prolog to implement simple arithmetic
3) Write a program in prolog to solve Monkey banana problem
4) Write a program in prolog to solve Tower of Hanoi
5) Write a program in prolog to solve 8 Puzzle problems
6) Write a program in prolog to solve 4-Queens problem
7) Write a program in prolog to solve Traveling salesman problem
8) Write a program in prolog for Water jug problem

TEXT BOOK:
1. Artificial Intelligence: A Modern Approach Third Edition Stuart Russell and Peter Norvig, 2010. Pearson Education, Inc. ISBN: 978-0-13-604259-4

LIST OF EXPERIMENTS: (CLOUD COMPUTING LAB)

1. Install Virtualbox/Vmware Workstation with different flavors of linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create a hello world app and other simple web applications using python/java.
4. Find a procedure to transfer the files from one virtual machine to another virtual machine.
5. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
6. Install Hadoop single node cluster and run simple applications like word count. E-

RESOURCES:
1. https://www.iitk.ac.in/nt/faq/vbox.htm
2. https://www.google.com/urlsa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjqrNG0z a73AhXZt1YBHZ21DWEQFnoECAMQAQ&url=http%3A%2F%2Fwww.cs.columbia.edu%2F~ sedwards%2Fclasses%2F2015%2F1102fall%2Flinuxvm.pdf&usg=AOvVaw3xZPuF5xVgkAQnBRsTtHz
3. https://www.cloudsimtutorials.online/cloudsim/
4. https://edwardsamuel.wordpress.com/2014/10/25/tutorial-creating-openstack-instance-intrystack/
5. https://www.edureka.co/blog/install-hadoop-single-node-hadoop-cluster

Syllabus for B.Tech CSE-DS IV year I Semester
BIG DATA ANALYTICS LAB

Code: 9MC68

L	T	P	C
0	0	3	1. 5

Course Objectives:

1. To provide the students with the knowledge of Big data Analytics principles and techniques.
2. To give an exposure of the frontiers of Big data Analytics.

Course Outcomes: Upon the Successful Completion of the Course, the Students would be able to:

1. Use Excel as an Analytical tool and visualization tool.
2. Program using HADOOP and Map Reduce.
3. Perform data analytics using ML in R.
4. Use Cassandra to perform social media analytics.

LIST OF EXPERIMENTS (BIG DATA ANALYTICS LAB):

1. Implement a simple map-reduce job that builds an inverted index on the set of input documents (Hadoop)
2. Process big data in HBase
3. Store and retrieve data in Pig
4. Perform Social media analysis using cassandra
5. Buyer event analytics using Cassandra on suitable product sales data.
6. Using Power Pivot (Excel) Perform the following on any dataset
   i. Big Data Analytics
   ii. Big Data Charting
7. Use R-Project to carry out statistical analysis of big data
8. Use R-Project for data visualization of social media data

TEXT BOKS:

1. Big Data Analytics, SeemaAcharya, Subhashini Chellappan, Wiley 2015.
2. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business, Michael Minelli, Michehe Chambers, 1st Edition, AmbigaDhiraj, Wiely CIO Series, 2013.
3. Hadoop: The Definitive Guide, Tom White, 3rd Edition, O"Reilly Media, 2012.
4. Big Data Analytics: Disruptive Technologies for Changing the Game, Arvind Sathi, 1st Edition, IBM Corporation, 2012.

REFERENCES:

1. Big Data and Business Analytics, Jay Liebowitz, Auerbach Publications, CRC press (2013)
2. Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop, Tom Plunkett, Mark Hornick, McGraw-Hill/Osborne Media (2013), Oracle press.
3. Professional Hadoop Solutions, Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, Wiley, ISBN: 9788126551071, 2015.
4. Understanding Big data, Chris Eaton, Dirk deroos et al., McGraw Hill, 2012.

Syllabus for B.Tech CSE-DS IV year I Semester
SUMMER INDUSTRY INTERNSHIP – II

Code: 9M788
Prerequisite: All Courses till this Semester

L	T	P	C
0	0	0	1

Students shall carry out the project in industry during summer vacation for 3 - 6 weeks and the evaluation is carried out in fourth year first Semester.

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 1or 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
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	60 marks

Syllabus for B.Tech CSE-DS IV year II Semester

PRODUCT AND SERVICES

(Open Elective –III)

	L	T	P	C
Code: 9ZC24	**3**	**0**	**0**	**3**

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 Outcomes:

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 & Cases, McGraw-Hill Int'l, 2006.
- Christopher Lovelock: Services Marketing People, Technology, Strategy, Fourth Edition, Pearson Education, 2006

Syllabus for B.Tech CSE-DS IV year II Semester

ENTREPRENEURSHIP AND BUSINESS DESIGN

(Open Elective –III)

L	T	P	C
3	0	0	3

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 & 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*.

Syllabus for B.Tech CSE-DS IV year II Semester
PROJECT AND RISK MANAGEMENT
(Open Elective –III)

L	T	P	C
3	0	0	3

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 CSE-DS IV year II Semester
PRINCIPLES OF AUTOMATION AND ROBOTICS
(Open Elective-III)

Code: 9BC53

L	T	P	C
3	0	0	3

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 – VI

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 CSE-DS IV year II Semester
POWER ELECTRONIC DEVICES AND CONVERTERS
(Open Elective-III)

Code: 9AC46

L	T	P	C
3	0	0	3

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 CSE-DS IV year II Semester

(Open Elective-III)

Code: 9CC38

L	T	P	C
3	0	0	3

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.*
5.

CO	**Embedded Systems Concepts (8CC53)**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	*Identify the design constraints and challanges of a modern embedded system.*	2		3	2	1							2	2	2	
CO 2	*Write ALP for 8051 architecture*	2	2	3	2	1							2	2	2	
CO 3	*Write ALP for 8051 architecture and Design hardware interface with 8051 to DC motor, keyboard, LCD*	2	2	3	2	1							2	2	2	
CO 4	*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.

Syllabus for B.Tech CSE-DS IV year II Semester
CYBER SECURITY AND CYBER LAWS

Code: 9FC07	**L**	**T**	**P**	**C**
Course Objectives:	**2**	**0**	**0**	**2**

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 & Comprehend E-Commerce frame work, models & 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; Role of Electronic Evidence and miscellaneous provisions of 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 CSE-DS IV year II Semester
PROJECT

Code: 9M890
Prerequisite: All Courses till this Semester

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 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 Internal Evaluation and 60 marks for the External Evaluation at the end of the Semester.

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 Internal Evaluation –	40 Marks
Division of Marks for External Evaluation –	60 Marks