ANNEXURE – I

Syllabi
of
Departmental Elective (DE) Courses
B.Tech VII Semester
(Computer Science & Engineering)
Under Flexible Curriculum

[ITEM-1]

Department of Computer Science and Engineering

NETWORKING WITH TCP/IP
150711 (DE-3)

COURSE OBJECTIVES

- To build an understanding of the fundamental concepts of TCP/IP with computer networking.
- To familiarize the student with the basic taxonomy and terminology of the TCP/IP area.
- To understand the network traffic, congestion, controlling and resource allocation.

Unit-I

Introduction : ARPANET, ISDN and Broadband ISDN, Protocols and Standards, Internet Administration , ATM Model, SONET & SDH, TCP/IP Protocol Suite, Network Addressing at various layer

Unit-II

IP Layer: Connection Oriented & Connection less Internet Working, IPV4 Addressing, Subnetting, Supernetting. Delivery and Forwarding of IP Packets, IPv4,IPV6, ARP, RARP, ICMPv4, IGMP, Mobile IP, Unicast Routing Protocols (RIP, OSPF, and BGP), Multicasting and Multicast Routing Protocols.

Unit-III

TCP and UDP Layer: TCP Reliable data transfer, Connection Establishment & Release, TCP Frame, Header Checksum, Sliding Window Concept for error control, congestion control and TCP timer, UDP Format, Pseudo header, Encapsulation, Checksum, Multiplexing & Demultiplexing. Stream Control Transmission Protocol.

Unit- IV

Application Layer: Client-Server Paradigm, DHCP, DNS, TELNET, FTP, TFTP, World Wide Web and HTTP, Electronic Mail: SMTP, POP, IMAP, and MIME, SNMP, BOOTP.

Unit-V

Multimedia and Next Generation Protocol: Voice over IP, Real Time Transport Protocol, IPv6 Addressing, IPv6 Protocol, ICMPv6, Firewall, PGP, HTTPS.

RECOMMENDED BOOKS

- Data and Computer Communication, W. Stalling, Pearson
- Internetworking with TCP/IP - Vol. – I, D.E. Comer, PHI
- Data Communication & Networking, B.A. Forouzan
- ISDN and Broad band ISDN with Frame Relay & ATM, W. Stalling
- LANs, Keiser

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COURSE OUTCOMES

After completion of this course, the students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	define the concept of computer network and various layered architecture.	Skill development
2.	compare the classless and classful addressing of IPV4 .	Entrepreneurship
3.	Identify the different types of networking devices and their functions within a network.	Employability
4.	analyze various protocols of computer networks for assisting network design and implementation.	Skill development
5.	Design client server applications and communication model and protocols for communication.	Skill development
6.	elaborate various TCP/IP protocols for achieving multimedia and security services.	Entrepreneurship

Department of Computer Science and Engineering

DATA MINING & WAREHOUSING
150712 (DE-3)

COURSE OBJECTIVES

- To understand the value of data mining in solving real-world problems.
- To gain understanding of algorithms commonly used in data mining tools.
- To develop ability for applying data mining tools to real-world problems.

Unit - I

Introduction: Motivation, important, Data type for Data Mining: Relational Databases, Data Ware-Houses. Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis Classification of Data Mining Systems, Major Issues in Data Mining.

Unit - II

Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, Emerging Scenario of Pattern Warehousing System.

Unit - III

Data Pre-processing: Data Cleaning, Data Integration and Transformation, Data Reduction Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical Characterization.

Unit - IV

Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, other Algorithms &

their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

Unit - V

Classification & Predication and Cluster Analysis: Issues Regarding Classification & Predication, Different Classification Methods, Predication, Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.

COURSE OUTCOMES

After completion of this course, the students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	classify various databases systems and data models of data warehouses.	Employability
2.	compare various methods for storing & retrieving data from different data sources/repositories.	Entrepreneurship
3.	apply pre-processing techniques for construction of data warehouses.	Skill development
4.	analyze data mining for knowledge discovery & prediction.	Employability
5.	explain data mining methods for identification of association for transactional databases.	Skill development
6.	develop various classification and clustering algorithms for data using data mining.	Entrepreneurship

Department of Computer Science and Engineering

DISTRIBUTED SYSTEMS
150713 (DE-3)

COURSE OBJECTIVES

- To provide students contemporary knowledge of distributed systems.
- To equip students with skills to analyze and design distributed applications.
- To gain experience in the design and testing of a large software system, and to be able to communicate that design to others.

Unit - I

Introduction to Distributed Systems: Architecture for Distributed System, Goals of Distributed System, Hardware and Software Concepts, Distributed Computing Model, Advantages & Disadvantage Distributed System, Issues in Designing Distributed System.

Unit -II

Distributed Share Memory: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & Its Types, Design & Implementations Issues in DSM System, Structure of Share Memory Space, Consistency Model and Thrashing.

Unit - III

Distributed File System: Desirable Features of Good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault Tolerance.

Unit - IV

Inter Process Communication and Synchronization: Data Representation & Marshaling, Group Communication, Client Server Communication, RPC-Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms - Bully & Ring Algorithms.

Unit - V

Distributed Scheduling and Deadlock Distributed Scheduling- Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. Deadlock- Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms. Case Study of Distributed System: Amoeba, Mach, Chorus.

RECOMMENDED BOOKS

- Distributed Operating System Concept & Design, Sinha, PHI .
- Distributed System Concepts and Design, Coulouris & Dollimore, Pearson Pub.
- Distributed Operating System, Andrew S. Tanenbaum, Pearson.

COURSE OUTCOMES

After completion of this course, the students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	Tell the basic elements and concepts related to distributed system technologies.	Entrepreneurship
2.	Demonstrate knowledge of the core architectural aspects of distributed systems.	Skill development
3.	Identify how the resources in a distributed system are managed by algorithms.	Employability
4.	Examine the concept of distributed file system and distributed shared memory.	Entrepreneurship
5.	Compare various distributed system algorithms for solving real world problems.	Entrepreneurship
6.	Develop application for achieving various services of distributed system	Skill development

Annexure-3

Syllabi
of
Open Category (OC) Courses
offered by Department of CSE in
B.Tech VII Semester
Under Flexible Curriculum

[ITEM-3]

Department of Computer Science and Engineering

SOFT COMPUTING
900208 (OC-2)

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization. Counter propagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, **Defuzzification:** Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Model, Takagi-Sugeno Fuzzy Model.

Unit-IV

Introduction: Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for

Genetic Algorithm Flow, Classification of Genetic Algorithm, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications- S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin PHI.
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH

COURSE OUTCOMES

After completion of this course, the students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	Define basic concepts of neural networks and fuzzy systems.	Entrepreneurship
2.	Compare solutions by applying various soft computing approaches on a given problem.	Skill development
3.	Develop and train different supervised and unsupervised learning.	Employability
4.	Classify various nature inspired algorithms according to their application aspect.	Skill development
5.	Compare the efficiency of various hybrid systems.	Entrepreneurship
6.	Design a soft computing model for solving real world problems.	Employability

Department of Computer Science and Engineering

NETWORK SECURITY
900209 (OC-2)

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

Unit-I

Security: Principles and Attacks, **Basic Number Theory:** Prime Number, Congruence's, Modular Exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block Ciphers and Steam Ciphers, Substitution Ciphers, Transposition Ciphers, Caesar Cipher, Play-Fair Cipher, Hill Cipher, Cipher Modes of Operation.

Unit-II

Cryptography: Symmetric Key Cryptography, Public Key Cryptography, Principles of Public Key Cryptosystem, Classical Cryptographic Algorithms: DES, RC4, Blowfish, RSA, Distribution of Public Keys and Key Management, Diffie-Hellman Key Exchange.

Unit-III

Hash Functions: Hash Functions, One Way Hash Function, SHA (Secure Hash Algorithm). **Authentication:** Requirements, Functions, Kerberos, Message Authentication Codes, Message Digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web Security Overview: SSL (Secure Socket Layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). **IDS (Intrusion Detection System):** Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration Testing, Risk Management. **Firewalls:** Types, Functionality and Polices.

Unit -V

Phishing: Attacks and Its Types, Buffer Overflow Attack, Cross Site Scripting, SQL Injection Attacks, Session Hijacking. **Denial of Service Attacks:** Smurf Attack, SYN Flooding, Distributed Denial of Service. **Hacker:** Hacking and Types of Hackers, Footprinting, Scanning: Types: Port, Network, Vulnerability), Sniffing in Shared and Switched Networks, Sniffing Detection & Prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill.

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COURSE OUTCOMES

After completion of the course students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	Define various aspects of network security.	Entrepreneurship
2.	Illustrate fundamentals of number theory and cryptography.	Skill development
3.	Apply security mechanisms to achieve principles of network security.	Entrepreneurship
4.	Analyze the cause for various existing network attacks.	Employability
5.	Examine the vulnerabilities in applications over the internet.	Entrepreneurship
6.	Develop a secure protocol for achieving various network security services.	Skill development

Department of Computer Science and Engineering

DATA MINING & WAREHOUSING
900210 (OC-2)

COURSE OBJECTIVES

- To understand the value of data mining in solving real-world problems.
- To gain understanding of algorithms commonly used in data mining tools.
- To develop ability for applying data mining tools to real-world problems.

Unit - I

Introduction: Motivation, Important, Data Type for Data Mining: Relational Databases, Data Ware-Houses, Transactional Databases, Advanced Database System and Its Applications, Data Mining Functionalities Concept/Class Description, Association Analysis Classification & Prediction, Cluster Analysis, Outliner Analysis Classification of Data Mining Systems, Major Issues in Data Mining.

Unit - II

Data Warehouse and OLTP Technology for Data Mining: Differences between Operational Database Systems, & Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation Data Cube Technology, Emerging Scenario of Pattern Warehousing System.

Unit - III

Data Pre-processing: Data Cleaning, Data Integration and Transformation, Data Reduction Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and System Architectures, Concept Description, Characterization and Comparison Analytical Characterization.

Unit - IV

Mining Association Rules in Large Databases: Association Rule Mining: Market Basket Analysis, Basic Concepts, Mining Single Dimensional Boolean Association Rules from Transactional Databases: The Apriori Algorithm, Generating Association Rules from Frequent Items, Improving the Efficiency of Apriori, Other Algorithms & their Comparison, Mining Multilevel Association Rules, Multidimensional Association Rules, Constraint Based Association Rule Mining.

Unit - V

Classification & Predication and Cluster Analysis: Issues Regarding Classification & Predication, Different Classification Methods, Predication, Cluster Analysis, Major Clustering Methods, Currently Available Tools, Case Study.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.

COURSE OUTCOMES

After completion of this course, the students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	classify various databases systems and data models of data warehouses.	Employability
2.	compare various methods for storing & retrieving data from different data sources/repositories.	Entrepreneurship
3.	apply pre-processing techniques for construction of data warehouses.	Skill development
4.	analyze data mining for knowledge discovery & prediction.	Employability
5.	explain data mining methods for identification of association for transactional databases.	Skill development
6.	develop various classification and clustering algorithms for data using data mining.	Entrepreneurship

Department of Computer Science and Engineering

R PROGRAMMING
900220 (OC-3)

COURSE OBJECTIVES

- To understand the critical programming language concepts.
- To perform data analysis using R commands.
- To make use of R loop functions and debugging tools.

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Unit-I

Introduction to R: R Commands, Objects, Functions, Simple Manipulations, Matrices and Arrays, Factors, Lists, Data Frames.

Unit-II

Programming Using R: Introduction, Function Creation, Scripts, Logical Operators, Conditional Statements, Loops in R, Switch Statement, Creating List and Data Frames, List and Data Frame Operations, Recursive List.

Unit-III

Object- Oriented Programming in R: Introduction, S3 Classes, S4 Classes, References Classes, Debugging Principle in R, Import and Export Data from CSV, SAS and ODBC.

Unit-IV

Mathematical and Statistical Concepts, Hypothesis Testing, Different Statistical Distribution, Regression, Time Series Analysis.

Unit-V

Graphics in R: Basic Plots, Labelling and Documenting Plots, Adjusting the Axes, Specifying Colour, Fonts and Sizes, Plotting symbols, Customized Plotting, Packages in R for Windows, Linus and Mac.

RECOMMENDED BOOKS

- "R for Beginners", Sandip Rakshit, Tata Mc Graw Hill Education.
- "R programming for Data Science", Roger D. Peng, Learn publishing.

COURSE OUTCOMES

After completion of this course, the students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	define basic programming constructs used in R.	Entrepreneurship
2.	explain the various commands used in R.	Skill development
3.	apply various concepts of programming for controlling the flow of data using R.	Employability
4.	analyze the concept of object oriented programming in R.	Entrepreneurship
5.	choose appropriate packages of R programming for dealing various tasks.	Entrepreneurship
6.	predict results from the datasets using R commands.	Skill development

Department of Computer Science and Engineering

ARTIFICIAL INTELLIGENCE
900221 (OC-3)

COURSE OBJECTIVES

- To enhance the capability of analysis for Machine learning and fuzzy logic.
- To apply the mathematical concepts in designing and executing the knowledge representation and problem solving.
- To design the mathematical model and rule formation for production system.

Unit-I

Introduction: Definition, Scope, Task and Objectives of Artificial Intelligence, AI Problems, Applications of AI. The Importance of AI, AI and related fields. Problems, Problem Spaces and Production System. Components of Production System, Characteristics of Production Systems, Types of Production System. Control Strategies, Application of Production Systems, water-jug, 8 – Puzzle and other advance Problems.

Unit-II

Searching: The Blind and Informed Searches, Breadth First Search, Depth First Search and their implementation using Open and Closed list, Heuristic estimation and evaluation, Hill climbing and their Problems, Best First Search, Searching And-Or Graphs, A * search, AO * search.

Unit-III

Knowledge Representation: General Concept, Introduction, Definition and Importance of Knowledge, Approaches to Knowledge Representation, Issues in Knowledge Representation, Procedural and Declarative Knowledge, Forward Versus Backward Reasoning, Knowledge Representation Techniques: Logics, Prepositional Logic, Predicate Logic.

Unit-IV

Semantic Nets, Partition Semantic Nets, Frames, Conceptual Dependencies, Scripts, Bay's Theorem, Fuzzy Logic, Game Playing: Min – Max Search Procedure.

Unit-V

Planning, Understanding, Natural Language Processing, Speech Recognition, Computer Vision, Expert System and Expert System Cell.

RECOMMENDED BOOKS

- Artificial Intelligence, Rich & Knight
- Introduction to Artificial Intelligence and Expert Systems, Dan. W. Patterson, PHI publication

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COURSE OUTCOMES

After successful completion of the course students will be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	outline the basic concepts of intelligent methods.	Skill development
2.	summarize various algorithms used in artificial intelligence.	Entrepreneurshipt
3.	identify the appropriate search methods to solve specific problems.	Employability
4.	analyze the performance of knowledge representation methods used in artificial intelligence.	Skill development
5.	examine machine learning methods and robotics for listing their applications.	Skill development
6.	design game playing techniques by applying programming methods of puzzle solving techniques.	Entrepreneurship

Department of Computer Science and Engineering

COMPUTER NETWORKS
900222 (OC-3)

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable Students to deal with various networking problems such as flow control, error control and congestion control.

Unit-

Introduction: Computer Network, Types- LAN,MAN & WAN, Data Transmission Modes- Serial & Parallel, Simplex, Half Duplex & Full Duplex, Synchronous & Asynchronous Transmission, Transmission Medium- Guided & Unguided, Cables- Twisted Pair, Coaxial Cable & Optical Fiber, Networking Devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network Topologies- Bus, Ring, Star & Mesh, Line Coding- Unipolar, Polar and Bipolar, Switching- Circuit Switching, Message Switching & Packet Switching, Multiplexing: FDM – Frequency Division Multiplexing, WDM – Wavelength Division Multiplexing & TDM – Time Division Multiplexing.

Unit-III

Data Link Layer: Introduction, Design Issues, Services, Framing, Error Control, Flow Control, ARQ Strategies, Error Detection and Correction, Parity Bits, Cyclic Redundant Code (CRC), Hamming Codes, MAC Sub Layer- The Channel Allocation Problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

Unit-IV

Network Layer & Transport Layer: Introduction, Design Issues, Services, Routing- Distance Vector Routing, Hierarchical Routing & Link State Routing, Shortest Path Algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token Bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Unit-V

Presentation, Session& Application Layer: Introduction, Design Issues, Presentation Layer- Translation, Encryption- Substitutions and Transposition Ciphers, Compression- Lossy and Lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote Login, File Transfer & Electronic Mail.

---------RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	explain the fundamental concepts of computer network.system technologies.	Entrepreneurship
2.	illustrate the basic taxonomy & terminologies of computer networks.	Skill development
3.	Identify various parameters for affecting the performance of computer networks.	Employability
4.	analyze the concepts of communication using various layers of OSI models.	Entrepreneurship
5.	evaluate the performance of computer networks in congestion and the Internet.	Entrepreneurship
6.	design the network environment and applications for implementation of computer networking concepts.	Skill development

Annexure – 4(b)

Syllab
i of
Departmental Core (DC) Courses
B.Tech V Semester
(Computer Science & Engineering) Under Flexible Curriculum
[Item-5]

Department of Computer Science and Engineering

SOFTWARE ENGINEERING
150502 (DC-9)

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, software engineering-layered Technology, Software Characteristics and Components, **Software model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection criteria of model**: Characteristics of Requirements, Status of Development Team, Users participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural design, Procedural design, data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, **Project Management**- Basics-People, Product, Process, Project, **Estimation**- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	explain the various fundamental concepts of software engineering.	Skill development
2.	develop the concepts related to software design & analysis.	Entrepreneurship
3.	compare the techniques for software project management & estimation.	Employability
4.	choose the appropriate model for a real life software project.	Entrepreneurship
5.	design the software using modern tools and technologies.	Employability
6.	test the software through different approaches.	Skill development

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Department of Computer Science and Engineering

THEORY OF COMPUTATION
150503 (DC-10)

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction to Theory of Computation: Automata, Computability and Complexity, Alphabet, Symbol, String, and Formal Languages, Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and Mealy machines, Composite Machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Pumping lemma, applications, Closure properties of regular languages, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, Rightmost and Leftmost derivations of Strings, ambiguity in grammar, simplification of context free grammar, killing null and unit productions, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar,. Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).

Unit-IV

Push down Automata: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack, Example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Context sensitive language and linear bounded automata (LBA).

Unit-V

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem (PCB).

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis & Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	explain the basic concepts of switching and finite automata theory & languages.	Skill development
2.	relate practical problems to languages, automata, computability and complexity.	Entrepreneurship
3.	construct abstract models of computing and check their power to recognize the languages.by algorithms.	Employability
4.	analyse the grammar, its types, simplification and normal form.	Entrepreneurship
5.	interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.	Skill development
6.	develop an overview of how automata theory, languages and computation are applicable in engineering applications.	Employability

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Department of Computer Science and Engineering

MICROPROCESSOR & INTERFACING
150504 (DC-11)

COURSE OBJECTIVES

- To understand different processors and basic architecture of 16 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand 8051 microcontroller.

Unit-I

Microprocessors: Introduction to x86 microprocessors, RISC and CISC processors, 8086 Architecture-Functional Diagram, Register Organization, Memory Segmentation, Programming Model, Memory Address, Physical Memory Organization, Minimum and maximum mode signals, Bus Cycle and Timing Diagrams, Instruction Formats, Addressing Modes, Instruction Set, Interrupts of 8086.

Unit-II

Basic Peripherals and Interfacing: 8212, 8155, 8255, 8755, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing.

Unit-III

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 programmable interval timer, 8259A programmable interrupt controller and 8257 DMA controllers, Keyboard and Display Interfacing.

Unit-IV

Serial and Parallel Data Transfer: Serial and Parallel data transmission, Types of communication system, Baud rate RS-232C, Modem and various bus standards, USART – 8251A.

Unit-V

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 programmable interval timer, 8259A programmable interrupt controller and 8257 DMA controllers, Keyboard and Display Interfacing.

COURSE OUTCOMES

After completion of this course, the students would be able to:

S.No.	COURSE OUTCOMES (COs)	Mapping
1.	compare the architecture and features of different 16-bit microprocessor interfacing chips & microcontrollers.	Employability
2.	develop programming skills in assembly language of 8086 microprocessor and 8051 microcontroller.	Entrepreneurship
3.	demonstrate the concept of interfacing with peripheral devices.	Skill development
4.	make use of different interrupts and addressing modes.shared memory.	Entrepreneurship
5.	design an interfacing for I/O devices.	Employability
6.	build a system based on 8086 microprocessor and 8051 microcontroller.	Skill development

Annexure-5(b)

Syllabi of
Departmental Courses (DC) Courses
B.Tech III Semester
For batch admitted 2020-21
(Computer Science & Engineering)
Under Flexible Curriculum
[Item-7]

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR-474005
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)
Department of Computer Science and Engineering

COMPUTER SYSTEM ORGANIZATION
150311 (DC)

COURSE OBJECTIVES

- To provide the fundamental knowledge of a computer system and its processing units.
- To provide the details of input & output operations, memory management and performance measurement of the computer system.
- To understand how computer represents and manipulate data.

Unit -I

Introduction: Von-Neumann Model, Various Subsystems, CPU, Memory, I/O, System Bus, CPU and Memory Registers, Program Counter, Accumulator, Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Tree-State Bus Buffers, Bus and Memory Transfers, Arithmetic Micro-Operation, Logic Micro-Operation, Shift Micro-Operation Register Transfer Micro Operations, Arithmetic Micro-Operations, Logic Micro-Operations and Shift Micro-Operations.

Unit- II

Computer Arithmetic: Addition and Subtraction with Signed-Magnitude, Multiplication Algorithm, Division Algorithm, Division Algorithms, Floating-Point Arithmetic Operations.

Central Processing Unit (CPU): General Purpose Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).Hardwired and Micro programmed Control.

Unit -III

Microprocessors: Introduction of 8085 Microprocessor: Architecture, Instruction Set, Addressing Modes, Interrupts and Basic Assembly Language Programming.

Unit -IV

Input-Output Organization: Peripheral Devices, I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA (DMA Controller, DMA Transfer),

Input-Output Processor (IOP), Data Transfer- Serial/Parallel, Simplex/ Half Duplex/ Full Duplex.

Unit-V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory- Organization and Mappings, Memory Management Hardware, Introduction to Pipelining & Multiprocessors.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar,
- Computer Organization, Carl Hamacher, THM.
- Computer Architecture and Organization, J P Hayes, Mc-Graw Hills, New Delhi.

COURSE OUTCOMES

After completion of the course students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Recall the basic building blocks of computer Architecture.	Entrepreneurship
2.	Explain different memories and the functional units of a processor.	Employability
3.	Explain the concept of working of microprocessor, multiprocessor and pipelining.	Skill development
4.	Analyze various modes of Input-Output data transfer.	Employability
5.	Evaluate the arithmetic related to the number system.	Skill development
6.	Develop the skill of writing low level programming.	Skill development

Department of Computer Science and Engineering

OPERATING SYSTEMS
150312 (DC)

COURSE OBJECTIVES

- Provide basic knowledge of computer operating system structures and functioning.
- Compare several different approaches to memory management, file management and process management
- Understand various problems related to concurrent operations and their solutions.

.

Unit- I

Basics of operating systems: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Process management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit-II

Process synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

Unit-III

Memory management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit-IV

Storage management: Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, RAID Structure.

Unit-V

File system interface: File Concept, Access Methods, Directory Structure, File System Structure, Allocation Methods, and Free-Space Management.
System Protection: Goals, Principles, Domain of Protection, Access Matrix, Access Control.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
- Operating Systems, Internals and Design Principles, Stallings, Seventh Edition, Pearson Publication.
- Modern Operating Systems, Tanenbaum, Fourth Edition. Pearson Publication.

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Outline the basic concept of operating systems	Skill development
2.	Analyze the working of operating system	Skill development
3.	Examine the working of various scheduling/allocation approaches	Entrepreneurship
4.	Measure the performance of various scheduling/allocation approaches	Skill development
5.	Analyze the various operating system problems/issues	Employability
6.	Develop the Solution of various operating system problems/issues	Employability

Department of Computer Science and Engineering

COMPUTER GRAPHICS
150313(DC)

COURSE OBJECTIVES

- To provide an introduction to the theory and practice of computer graphics.
- To give a good exposure related to Computer Graphics algorithms and to design various graphics primitives.
- To enhance the proficiency in programming skills related to animation and graphics object Design

.

Unit-I

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image representation, Line drawing: DDA, Bresenham's Algorithm. Circle Drawing: General Method, Mid-Point, DDA, Bresenham's Circle Generation Algorithm, And Ellipse Generation Algorithm, Curves: Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D object on Screen, Parallel and Perspective Projections.

Unit-IV

Clipping: Point clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm etc., Polygon Clipping, Convex and Concave Polygon,

Sutherland Hodgeman Polygon Clipping Algorithm etc., Area Filling, Hidden Surface Elimination: Z- Buffer algorithm and Painter's Algorithm.

Unit-V

Basic Illumination Models: Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, and Color Models like RGB, YIQ, CMY, HSV etc., and Introduction to Digital Image Processing (DIP), Fundamental Steps and Components of DIP.

RECOMMENDED BOOKS

- Computer Graphics, Donald Hearn and M.P. Becker, PHI Publication.
- Computer Graphics principle and Practice, FoleyVandam, Feiner, Hughes.
- Principles of Computers Graphics, Rogers, TMH.
- Computer Graphics, Sinha and Udai, TMH.
- Digital Image Processing, Gonzalez.

COURSE OUTCOMES

After completion of the course students will be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Explain interactive Computer Graphics, various display devices and explore applications of computer graphics.	Entrepreneurship
2.	Illustrate various line generations, circle generation, curve generation and shape Generation algorithms.	Entrepreneurship
3.	Apply various 2-Dimensional and 3-Dimensional transformations and projections on Images.	Skill development
4.	Classify methods of image clipping and various algorithms for Line and Polygon clipping.	Employability
5.	Choose appropriate filling algorithms, Hidden Surface Elimination algorithm and apply on various images.	Skill development
6.	Discuss various color models, shading methods, animation and Digital Image Processing.	Employability

Department of Computer Science and Engineering

COMPUTER GRAPHICS
150313(DC)

List of Experiments

1. Installation and Introduction to OpenGL basics, graphic functions, commands for compiling and executing an OpenGL Program.
2. Write an OpenGL Program to create an output window, to plot a point with given coordinates and other basic demonstrations.
3. Write an OpenGL Program to implement DDA Line Drawing Algorithm.
4. Write an OpenGL Program to implement Bresenham Line Algorithm.
5. Write an OpenGL Program to implement Mid-Point Circle Algorithm.
6. Write an OpenGL Program to implement following 2D transformations:
   i. Translation of a point, line and polygon.
   ii. Scaling of a line and polygon.
   iii. Rotation of a line and polygon around origin.
7. Write an OpenGL Program to implement:
   i. Flood Filling Algorithm using polygon.
   ii. Boundary Filling Algorithm using polygon.

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

Sr. No.	Course Outcomes (COs)	Mapping
1.	Demonstrates the fundamental concepts of Computer Graphics and its applications.	Employability
2.	Explain and use hardware's and software's component of computer graphics.	Skill development

3.	Apply various image generation, manipulations and color model techniques in coding.	Employability
4.	Implement algorithms for create and manipulate image in programs.	Skill development
5.	Develop the ability to write computer programs for create image and animation using graphics concepts.	Skill development
6.	Develop application programs and projects in terms of image and animation using computer graphics.	Entrepreneurship

Department of Computer Science and Engineering

DESIGN & ANALYSIS OF ALGORITHMS
150314 (DC)

COURSE OBJECTIVE:

- To introduce the topic of algorithms as a precise mathematical concept.
- To demonstrate the familiarity with major algorithm design paradigms and methods of analysis.
- To design efficient algorithms for common computer engineering problems.
- To enhance the skills using well-known algorithms and data structures for solving real-life problems.

Unit-I

Introduction to Computational Model: RAM model, Algorithms and its importance, Recurrences and Asymptotic Notations, Growth of function, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, Basic Tree and Graph Concept: Binary Search Trees, Height Balanced Tree, B-Trees and Traversal Techniques.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the maximum and minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication.

Unit-III

Greedy Method: Introduction, Characteristics, greedy activity selection. **Minimum Cost Spanning Trees**: Prim's and Kruskal's Algorithm, knapsack Problem, Single Source Shortest Path: Dijkstra's single source shortest path algorithm, Huffman Coding.

Unit-IV

Dynamic Programming: Introduction, The principle of Optimality, Examples of Dynamic Programming Methods such 0/1 Knapsack, Travelling salesman problem, Floyds All Pairs Shortest Path, Longest Common Subsequence and Reliability Design.

Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch and Bound**: Introduction and its Examples like – Travelling
Salesperson Problem etc. **NP Completeness**: Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete problem.

RECOMMENDED BOOKS:

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press
- Introduction to Algorithms, Coreman Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullman, Pearson.
- Algorithm Design, Michael T Goodrich, Robarto Tamassia, Wiley India.

COURSE OUTCOMES:
After Completion of this course, the students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Tell the basic features of an Algorithms.	Entrepreneurship
2.	Outline major Algorithms and Data Structures.	Entrepreneurship
3.	Apply various algorithmic design paradigms.	Skill development
4.	Analyze the asymptotic performance of Algorithms.	Skill development
5.	Compare different design techniques to develop algorithms for computational problems.	Employability
6.	Design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking, branch and bound approach.	Employability

Department of Computer Science and Engineering

DESIGN AND ANALYSIS OF ALGORITHM
150314(DC)

List of Programs

1. WAP to implement the following using array as data structure and analyze its time Complexity.
   a. Insertion sort b. Selection sort c. Bubble sort d. Quick sort
   e. Bucket sort f. Radix sort g. Heap sort h. Merge sort
2. WAP to implement Linear and Binary Search and analyze its time complexity.
3. WAP to implement Matrix Chain Multiplication and analyze its time complexity.
4. WAP to implement Longest Common Subsequence Problem and analyze its time Complexity.
5. WAP to implement Optimal Binary Search Tree Problem and analyze its time complexity.
6. WAP to implement Huffman Coding and analyze its time complexity.
7. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
8. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
9. WAP to implement DFS and BFS and analyze their time complexities.
10. WAP to Implement 0/1 knapsack using dynamic programming**.**

COURSE OUTCOMES

After completion of this course, the students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping

1.	Relate the principles of algorithm design in solving problems.	Entrepreneurship
2.	Demonstrate basic algorithms and different problem solving strategies.	Skill development
3.	Build creativeness and confidence to solve non-conventional problems.	Employability
4.	Analyze running times of algorithms using asymptotic analysis.	Entrepreneurship
5.	Compare various algorithm design approaches for solving real world problems.	Employability
6.	Design and implement optimization algorithms in specific applications.	Skill development

Department of Computer Science and Engineering

COMPUTER HARDWARE & TROUBLESHOOTING LAB
150315 (DLC)

COURSE OBJECTIVES:

- To understand the components on the motherboard.
- To perform system administration tasks.
- To be aware of different memories, I/O devices, installation and SMPS.
- To understand system related problems and methods of troubleshooting

Unit-I

Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, FDD, HDD, SSD, CD, DVD and add on cards. Front panel indicators & switches and Front side & rear side Connectors.

Unit-II

Understanding of Motherboard and its interfacing component.

Unit-III

Install and configure computer drivers and system components. Disk formatting, Partitioning, Disk Image, Clone and Disk operating system commands, Disassembly and Reassembly of hardware. BIOS, Overclocking, Booting with USB/CD.

Unit-IV

Install, upgrade and configure Windows and Linux operating systems.

Unit -V

Remote desktop connections and file sharing. Identify, install and manage network connections -Configuring IP address and Domain name system. Installation of printer and scanner software. Using Disk Defragmenter, Check Disk and Disk Clean-up, Window restore point, Window Registry, Troubleshooting and Managing Systems.

RECOMMENDED BOOKS:

- Craig Zacker & John Rourke, "The Complete Reference:PC hardware", New Delhi, Tata McGraw-Hill
- Mike Meyers, "Introduction to PC Hardware and Troubleshooting", New Delhi, Tata McGraw-Hill

COURSE OUTCOMES:

After completion of this course, the students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Outline the features and functions of motherboard, BIOS and Storage devices.	Employability
2.	Assemble personal computer.	Entrepreneurship
3.	Create partitioning of hard disk.	Skill development
4.	Install system and application software.	Entrepreneurship
5.	Configure network, Printer, Scanner and other devices.	Entrepreneurship
6.	Troubleshoot and Managing Systems.	Skill development

Department of Computer Science and Engineering

COMPUTER HARDWARE & TROUBLESHOOTING LAB
150315 (DLC)

List of Experiments

1. Study the different parts of computer system.
2. Study different parts of motherboard
3. Study various types of connectors.
4. Draw the pin details of various connectors.
5. Study of CMOS setup and PC Troubleshooting.
6. Partition and format the hard disc
7. Installation of OS: Linux and windows
8. Connect systems in network using switch
9. Connect the systems in peer-to-peer network
10. Configure e-mail client and e-mail server
11. Configure browser for Internet access using proxy server
12. Configure Virtual Private Network (VPN)
13. Create Disk Image/Clone.
14. Overclocking, Booting with USB/CD.
15. Using Disk Defragmenter, Check Disk and Disk Clean-up, Window restore point and Window Registry

Department of Computer Science and Engineering

SELF-LEARNING/PRESENTATION (SWAYAM/NPTEL/ MOOC)
150316 (SEMINAR / SELF STUDY)

S.No.	Course Name	Duration	Offered by	Course Link
1	C Programming and Assembly Language	4 Weeks	IIT Madras	https://onlinecourses.nptel.ac.in/noc21_cs81/preview

Note: Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance, assignments and presentation

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

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Syllabi of
Departmental Courses (DC) Courses
B.Tech IV Semester
(Computer Science & Engineering)
Under Flexible Curriculum

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
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Department of Computer Science and Engineering

COMPUTER NETWORKS
150411 (DC)

COURSE OBJECTIVES

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

Unit-I

Introduction: Computer Network, Types- LAN,MAN &WAN, Data transmission modes- Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission, Transmission medium- Guided & Unguided, Cables- Twisted pair, Coaxial cable & Optical fiber, Networking devices-Repeaters, Hub, Switch, Bridge, Router, Gateway, Modem, Proxy Server, Wireless router, & Wireless Access Point (WAPs). Performance Criteria- Bandwidth, Throughput, Latency (Delay), Propagation Time, Transmission time & Queuing Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network topologies- Bus, Ring, Star Topology & Mesh, Switching- Circuit switching, Message switching & Packet switching, Multiplexing; FDM – Frequency division multiplexing, WDM – Wavelength division multiplexing & TDM – Time division multiplexing, Wireless transmission- Electromagnetic spectrum, Radio transmission & Microwave transmission.

Unit-III

Data Link Layer: Introduction, Design issues, Services, Framing, Error control, Flow control, ARQ Strategies, Error Detection and correction, Parity bits, Cyclic Redundant Code (CRC), Hamming codes, MAC Sub Layer- The channel allocation problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD,CSMA/CA, IEEE 802.3 frame format.

Unit-IV

Network Layer& Transport Layer: Introduction, Design issues, Services, Routing- Distance vector routing, Hierarchical routing & Link state routing, Shortest path algorithm- Dijkstra's Algorithm& Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token bucket Algorithm. Connection Oriented & Connectionless Service, Port addressing basics.

Unit-V

Presentation, Session& Application Layer: Introduction, Design issues, Presentation layer- Translation, Encryption & Compression. Session Layer – Dialog Control, Synchronization. Application Layer- Remote login, File transfer & Electronic mail.

RECOMMENDED BOOKS

- Behrouz A. Forouzan "Data Communication and Networking", McGraw – Hill Publications.
- Andrew Tanenbaum – Computer Networks, PHI
- Peterson and Davie, "Computer Networks, A systems Approach", 5th ed., Elsevier, 2011.
- Ying-Dar Liu, Ren-Hwang, Fred Baker, "Computer Networks: An open Source Approach", McGraw – Hill, 2001.

COURSE OUTCOMES

After completion of the course students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Outline the Data Communications System and its components.	Skill development
2.	Identify the different types of network topologies and protocols.	Employability
3.	Enumerate the layers of the OSI model and function(s) of each layer.	Entrepreneurship
4.	Identify the different types of network devices and their functions within a network.	Skill development
5.	Analyze the problems associated with various networking protocols and measure the Performance.	Employability
6.	Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.	Employability

COMPUTER NETWORKS
150411 (DC)

List of Experiments

1) Study of different types of network cables and practically implement cross wired cable and straight through cable using clamping tool.
2) Install and configure Network Devices: HUB, Switch and Routers.
3) Configure Internet connection and use Ipconfig, tracert, ping, arp and Netstat utilities to debug the network issues.
4) Configure a Network topology using simulation software.
5) Simulation and analysis of Error and Flow Control protocols.
6) Simulation & Analysis of Routing Protocols.
7) Network Traffic flow analysis using Wireshark utility.
8) Installation and working of web proxy software's(CCproxy).
9) Data transfer between two systems using Socket programming
10) Simulate stop and wait protocol using Socket programming.

COURSE OUTCOMES

After completion of this course, the students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Outline various techniques for encoding, decoding and digital data communication.	Entrepreneurship
2.	Analyze network topologies and Protocols.	Employability
3.	Configure various networking devices and softwares.	Skill development
4.	Design and Simulate networking protocols.	Employability
5.	Design Error Control and Flow Control techniques.	Employability
6.	Troubleshot networking issues.	Skill development

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Department of Computer Science and Engineering

DATABASE MANAGEMENT SYSTEM
150412 (DC)

COURSE OBJECTIVES

- To understand the fundamental concepts of a database management system.
- To analyses database requirements and determine the entities involved in the system and their relationship to one another.
- To develop the logical design of the database using data modelling concepts & normalization.
- To manipulate a database using SQL commands.

Unit-I

Introduction: DBMS Concepts & Architecture, File processing system, limitation of file processing system, Advantages of Database System, Schemas, Instances, Data Independence, Data dictionary, Functions of DBA, Database languages, Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, E-R Model, Comparison between Models, Introduction of File organization Techniques.

Unit-II

Relational Data Models: Entities & Attributes, Entity types, Key Attributes, Relationships, Domains, Tuples, types of Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints.
Relational Algebra: Concept and Relational Algebra operations like Select, Project, Join, Division, Union etc.

Unit-III

SQL: Introduction of SQL, features of SQL, Data Definition & Data Manipulation commands in SQL, SQL operators, Update Statements & Views in SQL, Query & Sub query, Data Retrieval Queries & Data Manipulation Statements examples etc. Overview of Tuple Oriented Calculus & Domain Oriented Relational Calculus.

Unit-IV

Normalization: Introduction to Normalization, concepts of anomalies and its types, closure set of dependencies and of attributes, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Decomposition, Dependency Preservation, Loss Less & Lossy Join, Definition of Dangling Tuple, and Multi-values Dependencies.

Unit-V

Transaction Processing & Concurrency Control: Transaction Processing Concepts, ACID properties, State Diagram, Types of Transaction, Basic idea of serializability,

Concurrency Control, Concurrent operation of Databases, Recovery, Types of Recovery, Basic overview of Distributed Databases System and Relational Database Management System, Concepts of Object-Oriented Database System and its tools.

RECOMMENDED BOOKS

- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 6th Edition.
- Raghu Ramakrishnan, Johannes Gehrke,"Database Management System", McGraw Hill., 3rd Edition.
- Elmasri & Navathe, "Fundamentals of Database System", Addison-Wesley Publishing, 5th Edition.
- Date C.J, "An Introduction to Database", Addison-Wesley Pub Co, 8th Edition.
- B.C. Desai, "An introduction to Database systems"

COURSE OUTCOMES

After completion of the course students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Define the terminology, features, classifications, and characteristics embodied in database systems.	Skill development
2.	Identify different issues involved in the design and implementation of database system.	Entrepreneurship
3.	Analyse database schema for a given problem domain.	Employability
4.	Justify principles for logical design of databases, including the E-R modelling and Normalization approach.	Employability
5.	Apply transaction processing concepts and recovery methods over real time data.	Entrepreneurship
6.	Formulate, using relational algebra and SQL, solutions to a broad range of query Problems.	Skill development

DATABASE MANAGEMENT SYSTEM
150412 (DC)
List of Experiments

1. Implementation of DDL commands of SQL with suitable examples
   1. Create table
   2. Alter table
   3. Drop table

2. Implementation of DML commands of SQL with suitable examples
   1. Insert
   2. Update
   3. Delete

3. Implementation of different types of function with suitable examples
   1. Number function
   2. Aggregate function
   3. Character function
   4. Conversion function
   5. Date function

4. Implementation of different types of operators in SQL
   1. Arithmetic operators
   2. Logical operators
   3. Comparison operators
   4. Set operation

5. Implementation of different types of joins
   1. Inner join
   2. Outer join
   3. Natural join

6. Study and implementation of
   1. Group by and having clause
   2. Order by clause
   3. Indexing

7. Study and implementation of
   1. Sub queries
   2. Views

8. Study and implementation of different types of constraints.

9. Study and implementation of Database Backup and Recovery commands. Study and implementation of Rollback, Commit, Savepoint.

150413 (DC)

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit-I

Introduction to Software Engineering: Definition, software engineering-layered Technology, Software Characteristics and Components, Software model: Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. Selection criteria of model: Characteristics of Requirements, Status of Development Team, Users participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , Types of Requirement- Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit – III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural design, Procedural design, data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, Project Management- Basics-People, Product, Process, Project, Estimation- Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit – V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Explain the various fundamental concepts of software engineering.	Employability
2.	Develop the concepts related to software design & analysis.	Skill development
3.	Compare the techniques for software project management & estimation.	Skill development
4.	Choose the appropriate model for real life software project.	Entrepreneurship
5.	Design the software using modern tools and technologies.	Employability
6.	Test the software through different approaches.	Entrepreneurship

Department of Computer Science and Engineering

THEORY OF COMPUTATION
150414 (DC)

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction to Theory of Computation: Automata, Computability and Complexity, Alphabet, Symbol, String, and Formal Languages, Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and Mealy machines, Composite Machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Pumping lemma, applications, Closure properties of regular languages, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, Rightmost and Leftmost derivations of Strings, ambiguity in grammar, simplification of context free grammar, killing null and unit productions, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar,. Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).

Unit-IV

Push down Automata: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack, Example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA.

Unit-V

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem (PCB).

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis & Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Explain the basic concepts of switching and finite automata theory & languages.	Entrepreneurship
2.	Relate practical problems to languages, automata, computability and complexity.	Employability
3.	Construct abstract models of computing and check their power to recognize the languages.	Skill development
4.	Analyse the grammar, its types, simplification and normal form.	Employability
5.	Interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.	Skill development
6.	Develop an overview of how automata theory, languages and computation are applicable in engineering application.	Employability

Department of Computer Science and Engineering

PROGRAMMING LAB.

150415(DLC)

Python Programming

COURSE OBJECTIVES

- To understand components of Python Program
- To learn the basic construct of python programming for solving real world research-based problems.
- To visualize and analyze data using python libraries

Unit 1:

Setting up programming environment, running python programs from a terminal, variables and simple data types: variables, strings, numbers and maths, comments, conditional statements.

Unit 2:

Introducing loops, working of input function, various operations on Tuples, lists, Set and Dictionary, Loops, Conditional Statement,

Unit 3:

Built in function, defining a function, passing arguments, return value, lambda function, exception handling

Unit 4:

Object oriented programming, Creating and using class and object, methods, inheritance, debugging.

Unit 5:

Working with packages, pandas, NumPy, Matplotlib and scikit-learn

RECOMMENDED BOOKS

- Java: The Complete Reference Hebert Schildt, Mc Graw Hill.

- Object-Oriented Programming with C++ and Java Debasis Samanta, Prentice Hall India.

COURSE OUTCOMES

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

Sr. No.	Course Outcomes (COs)	Mapping
1.	Tell the use of various built-in data structures used in python.	Employability
2.	Outline the working of file handling operations, normal functions and lambda functions in python.	Skill development
3.	Apply the concepts of object oriented programming in python.	Entrepreneurship
4.	Analyze the data and visualize it using python's matplotlib.	Skill development
5.	Rule out various important characteristics of data using scikit-learn package.	Employability
6.	Create efficient algorithms in python to solve real world problems.	Skill development

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Department of Computer Science and Engineering

PROGRAMMING LAB.
150415(DLC)
Python Programming

List of Program

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1. Python program to take input from user and display "Hello MITS Gwalior".
2. Python program to do arithmetic operations.
3. Python program to find area of rectangle, circle and triangle.
4. Python program to check number is even or odd, prime not prime.
5. Python program find factorial of a number.
6. Python program to check year is leap year or not.
7. Python Program to implement the operation on List, Tuple, Set and Dictionary.
8. Python Program to handle the exception and file handling operation.
9. Python Program to create and use of user defined function.
10. Python Program to solve a problem using Lambda function
11. Python Program for creating an object with and without inheritance.

Annexure-6

Experiments List/Lab manuals
of
Laboratory Courses
B.Tech V Semester
(Computer Science & Engineering)
Under Flexible Curriculum
[Item-8]

Department of Computer Science and Engineering

SOFTWARE ENGINEERING LAB
150502 (DC-9)

COURSE OBJECTIVES

- To explain methods of capturing, specifying, visualizing and analyzing software requirements.
- To understand concepts and principles of software design and user-centric approach and principles of effective user interfaces.
- To know the basics of testing and understand the concept of software quality assurance.

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LIST OF EXPERIMENTS

Experiment 1: Identify the requirements from problem statements

Requirements | Characteristics of Requirements | Categorization of Requirements | Functional Requirements | Identifying Functional Requirements

Experiment 2: Estimation of project metrics using estimation techniques like COCOMO model

Project Estimation Techniques | COCOMO | Basic COCOMO Model | Intermediate COCOMO Model | Complete COCOMO Model | Advantages of COCOMO | Drawbacks of COCOMO | Halstead's Complexity Metrics

Experiment 3: Modeling UML Use Case diagrams and capturing Use Case Scenarios

Use case diagrams | Actor | Use Case | Subject | Graphical Representation | Association between Actors and Use Cases | Use Case Relationships | Include Relationship | Extend Relationship | Generalization Relationship | Identifying Actors | Identifying Use cases | Guidelines for drawing Use Case diagrams

Experiment 4: E-R modeling from the problem statements

Entity Relationship Model | Entity Set and Relationship Set | Attributes of Entity | Keys | Weak Entity | Entity Generalization and Specialization | Mapping Cardinalities | ER Diagram | Graphical Notations for ER Diagram | Importance of ER modeling

Experiment 5: Modeling UML Class diagrams and Sequence diagrams

Structural and Behavioral aspects | Class diagram | Elements in class diagram | Class | Relationships | Sequence diagram | Elements in sequence diagram | Object | Life-line bar | Messages

Experiment 6: Modeling Data Flow diagrams

Data Flow Diagram | Graphical notations for Data Flow Diagram | Explanation of Symbols used in DFD | Context diagram and leveling DFD

Experiment 7: Create flow chart for an algorithm using Raptor

Assignment, Call, Input, Output, Selection and Loop symbols

Experiment 8: Estimation of Test coverage metrics and structural complexity

Control Flow Graph | Terminologies | McCabe's Cyclomatic Complexity | Computing Cyclomatic Complexity | Optimum Value of Cyclomatic Complexity | Merits | Demerits

Experiment 9: Designing Test Suites

Software Testing | Standards for Software Test Documentation | Testing Frameworks | Need for Software Testing | Test Cases and Test Suite | Types of Software Testing | Unit Testing | Integration Testing | System Testing | Example | Some Remarks

Experiment 10: Do requirement analysis and develop Software Specification Sheet (SRS) for suggested system.

Experiment 11: To prepare time line chart/Gantt chart/PERT chart for selected software project.

Experiment 12: To perform the implementation view diagram: Component diagram for the system.

RECOMMENDED TOOLS

- Selenium
- Star UML
- UMLet
- Raptor

REFERENCE

- Virtual Labs (http://vlabs.iitkgp.ernet.in/se/)

COURSE OUTCOMES

After completion of this course, the students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Demonstrate the basic concept of UML.	Skill development
2.	Discuss the software development process using different tools.	Entrepreneurship
3.	Display the various ways for solving different common modelling problems using UML.	Employability
4.	Use the knowledge of Software engineering and project management.	Skill development
5.	Identify the vocabulary, rules and idioms of the UML and learn how to model it effectively.	Employability

Sr. No.	Course Outcomes (COs)	Mapping
6.	Design the software systems using software engineering concepts.	Entrepreneurship

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Department of Computer Science and Engineering

THEORY OF COMPUTATION LAB
150503 (DC-10)

LIST OF EXPERIMENTS

1. Design a Program for creating machine that accepts three consecutive one.
2. Design a Program for creating machine that accepts the string always ending with 101.
3. Design a Program for Mode 3 Machine
4. Design a program for accepting decimal number divisible by 2.
5. Design a program for creating a machine which accepts string having equal no. of 1's and 0's.
6. Design a program for creating a machine which count number of 1's and 0's in a given string.
7. Design a Program to find 2's complement of a given binary number.
8. Design a Program which will increment the given binary number by 1.
9. Design a Program to convert NDFA to DFA.
10. Design a Program to create PDA machine that accept the well-formed parenthesis.
11. Design a PDA to accept WCW^R where w is any string and W^R is reverse of that string and C is a Special symbol.
12. Design a Turing machine that's accepts the following language $a^n b^n c^n$ where n>0.

COURSE OUTCOMES

After completion of this course, the students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Judge various computational models.	Employability
2.	Construct abstract models of computing.	Employability
3.	Justify the power of abstract models in computing to recognize the languages.	Entrepreneurship
4.	Demonstrate analytical thinking and intuition for problem solving in the related areas.	Skill development
5.	Discuss the limitations of computation in problem solving.	Employability
6.	Follow set of rules for syntax verification.	Skill development

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Department of Computer Science and Engineering

MICROPROCESSOR & INTERFACING LAB
150504 (DC-11)
LIST OF EXPERIMENTS

1. Write an assembly language program to perform the addition of two 8-bit number using 8085/8086 instruction set.
2. Write an assembly language program to find the sum of numbers in array of data using 8085/8086 instruction set.
3. Write an assembly language program to perform the subtraction of two 8-bit number using 8085/8086 instruction set.
4. Write an assembly language program to move data block starting at location 'X' to location 'Y' without overlap using 8085/8086 instruction set.
5. Write an assembly language program to arrange set of 8-bit numbers starting at location in ASCENDING/DESCENDING order. Display the stored vector in address data field using 8085/8086 instruction set.
6. Write an assembly language program to perform the multiplication of two 8-bit numbers using 8085/8086 instruction set.
7. Write an assembly language program to find the larger number in array of data using 8085/8086 instruction set.
8. Write an assembly language program to perform the division of two 8-bit numbers using 8085/8086 instruction set.
9. Write an assembly language program to convert two BCD numbers in memory of the equivalent HEX number using 8085/8086 instruction set.
10. Write an assembly language program to convert given hexadecimal number into its equivalent BCD number using 8085/8086 instruction set.
11. Write an assembly language program to convert given hexadecimal number into its equivalent ASCII number using 8085/8086 instruction set.
12. Write an assembly language program to convert given ASCII character into its equivalent hexadecimal number using 8085/8086 instruction set.

COURSE OUTCOMES

After completion of this course, the students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Differentiate the various types of instructions and addressing modes.	Skill development
2.	Identify the Hex code/ Machine code of instructions in assembly language.	Entrepreneurship
3.	Perform interfacing of various peripheral devices and memory with microprocessor.	Employability
4.	Demonstrate the arithmetic & Logical operation using instruction set of 8086/8051 microprocessor.	Skill development
5.	Use of 8086/8051 for interfacing with I/O devices.	Skill development
6.	Build the assembly language programs in 8086/8051 to solve real world problems.	Entrepreneurship

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Department of Computer Science and Engineering

Internet of Things (IoT) OC-II

800204

Course Objectives

- Familiarize student with the taxonomy and terminology of the internet of things
- Provide detail knowledge about various IoT protocols that facilitate the connection of things.
- Enable students to understand applicability of IoT in various other fields

Unit I

IoT Introduction and Fundamentals: Introduction to Internet of Things (IoT), Background, Applications where IoT can be deployed, Benefits/challenges of deploying an IoT, IoT components: Sensors, Types of sensors, Actuators, IoT Reference Architectures: oneM2M,

Unit II

IOT PROTOCOLS - IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks

Unit III

Design Methodology: Embedded computing logic – Microcontroller, System on Chips, IoT system building blocks, Arduino – Board details, IDE programming, Raspberry Pi – Interfaces and Raspberry Pi with Python Programming.

Unit IV

Cloud Computing in IoT: SDN for IoT, Data Handling and Analytics, Cloud Computing, Sensor-Cloud, Wireless communication for IoT: channel models, power budgets, data rates, IoT Security and Privacy, MQTT Protocol, Publisher and Subscriber Model, REST/HTTP

Unit V

Case Study & Industrial Applications: Cisco IoT system, IBM Watson IoT platform, IoT Agriculture and Farming, IoT Energy Solutions, IoT Smart Building Solutions, IoT Finance, IoT Healthcare, Industrial IoT.

RECOMMENDED BOOKS

1. Arshdeep Bahga, Vijay Madisetti, ―Internet of Things – A hands-on approach, Universities Press, 2015

2. Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things – Key applications and Protocols, Wiley, 2012
3. Internet of Things From Hype to Reality The Road to Digitization Second Edition, Ammar Rayes Samer Salam

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Course Outcomes:

After completion of this course student would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Identify the everywhere presence of the internet of things	Skill development
2.	compare devices using various communication platforms	Employability
3.	Analyze various protocols for IoT	Entrepreneurship
4.	Design a PoC of an IoT system using Raspberry Pi/Arduino	Employability
5.	Apply data analytics and use cloud offerings related to IoT	Employability
6.	explain different verticals where IOT can be used	Skill development

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Department of Computer Science and Engineering

Deep Learning OC-II

800205

Unit – I:

Introduction to Artificial Neural Networks: Introduction, History, capabilities, the perceptron. Feedforward Neural networks. Gradient descent and the backpropagation algorithm. Taxonomy Of Neural Network Architectures and Applications. Overfitting and generalization.

Unit – II:

Convolutional Neural Networks: Intro to CNNs, Convolution, Correlation, Filtering. CNN architectures. Case studies: Alex net, VGGNet, GoogLeNet. Detection and Segmentation. Visualizing and Understanding. CNNs for computer vision.

Unit – III:

Recurrent Neural Networks: RNN architecture, LSTM, GRU, Generative Adversarial Networks (GANs), Encoder Decoder architectures.

Unit – IV:

Deep Unsupervised Learning: Autoencoders – standard, sparse, denoising, contractive, etc, Variational Autoencoders, Adversarial Generative Networks, Autoencoder and DBM.

Unit – V:

Applications of Deep Learning: Image segmentation, object detection, automatic image captioning, Image generation with Generative adversarial networks, video to text with LSTM models. Parsing and Sentiment Analysis using Recursive Neural Networks.

RECOMMENDED BOOKS:

- CharuC.Aggarwal "Neural Networks and Deep learning" Springer International Publishing, 2018.
- Satish Kumar, "Neural Networks, A Classroom Approach", Tata McGraw -Hill, 2007.
- Simon Haykin, "Neural Networks, A Comprehensive Foundation", 2nd Edition, Addison Wesley Longman, 2001.
- Bishop, Christopher M. Pattern Recognition and Machine Learning. Springer, 2006

COURSE OUTCOMES:

After completion of this course, the students would be able to:

Sr. No.	Course Outcomes (COs)	Mapping
1.	Define the basic concepts in Neural Networks and applications	Skill development
2.	Explain Convolutional Neural Networks and their training issues	Entrepreneurship
3.	Illustrate the concepts of RNN and their applications	Employability
4.	Apply the concepts of deep learning for solving real world problems.	Skill development
5.	Distinguish different types of ANN architectures	Employability
6.	Evaluate various ANN architectures for Object Detection and image Retrieval.	Entrepreneurship