MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, M.P.)

Syllabi of
Departmental Courses (DC) Courses
B.Tech IV Semester
(Computer Science and Engineering)
Under Flexible Curriculum
Annexure- 5C

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

Aftercompletionofthecoursestudentswould beable to:

CO1. Outline the Data Communications System and its components.
CO2. Identify the different types of network topologies and protocols.
CO3. Enumerate the layers of the OSI model and function(s) of each layer.
CO4. Identify the different types of network devices and their functions within a network
CO5. Analyze the problems associated with various networking protocols and measure the Performance
CO6. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation

---

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: TransactionProcessing 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

Aftercompletionofthecoursestudentswould beable to:

CO1. Define the terminology, features, classifications, and characteristics embodied indatabase systems.
CO2. Identify different issues involved in the design and implementation of database system.
CO3. Analyse database schema for a given problem domain.
CO4. Justify principles for logical design of databases, including the E-R modeling and Normalization approach.
CO5. Apply transaction processing concepts and recovery methods over real time data.
CO6. Formulate, using relational algebra and SQL, solutions to a broad range of queryProblems.

Department of Computer Science and Engineering

SOFTWARE ENGINEERING
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

Aftercompletionofthecoursestudentswould beable to:

CO1. Explain the various fundamental concepts of software engineering.
CO2. Develop the concepts related to software design & analysis.
CO3. Compare the techniques for software project management & estimation.
CO4. Choose the appropriate model for real life software project.
CO5. Design the software using modern tools and technologies.
CO6. Test the software through different approaches.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, M.P.)

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:

CO1. Explain the basic concepts of switching and finite automata theory & languages.
CO2. Relate practical problems to languages, automata, computability and complexity.
CO3. Construct abstract models of computing and check their power to recognize the languages.
CO4. Analyse the grammar, its types, simplification and normal form.
CO5. Interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.
CO6. Develop an overview of how automata theory, languages and computation are applicable in engineering application.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, M.P.)

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

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes
- Learn Python the Hard Way: 3rd Edition
- T.R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016.
- Kenneth Lambert, Fundamentals of Python: First Programs, Cengage Learning, 1st Ed., 2012.

COURSE OUTCOMES

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

CO1. Tell the use of various built-in data structures used in python.
CO2. Outline the working of file handling operations, normal functions and lambda functions in python.
CO3. Apply the concepts of object oriented programming in python.
CO4. Analyze the data and visualize it using python's matplotlib.
CO5. Rule out various important characteristics of data using scikit-learn package.
CO6. Create efficient algorithms in python to solve real world problems.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR - 474005

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal, M.P.)

Department of Computer Science and Engineering

DISCRETE STRUCTURES

150416

COURSE OBJECTIVES:

- To perceive the knowledge of basic algebra
- To use logical notation to define fundamental mathematical concepts
- To familiarize predicate & propositional logic
- To know about the graph theory and its application in computer engineering
- To familiarize the discrete numeric function and generating function.

Unit 1:

Finite and infinite sets, mathematical induction, Principles of inclusion and exclusion, functions and relations, summations, binary relations, equivalence relations, Congruence Relation and partitions, partial ordering relations and lattices, Pigeonhole principle.

Unit 2:

Propositional logic, syntax, semantics of Atf (atomic formula), Wff'(well formed formula's),validity and satisfiability of wff' by Quine's method, Normal and closure form of prepositional calculus.

Unit 3:

Basic of Graph Theory as a Discrete Structure, planner graphs, Graph Coloring, multi-graphs and weighted graph, shortest path in weighted graph, Introduction to Eularian paths and circuits, Hamiltonian paths and circuits, Introduction to trees, rooted trees, Path length in rooted trees, spanning trees and cut trees.

Unit 4:

Introduction to discrete numeric functions and generating functions, Introduction to recurrence relations, linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions and total solutions.

Unit 5:

Introduction to group, subgroups, generations and evaluation of power, cosets and Lagrange's theorem, group codes, isomorphism and automorphism, homomorphism and normal sub groups, ring, integral domain and field.

RECOMMENDED BOOKS:

● J. Tremblay and R. Manohar: Discrete Mathematical Structures with Application to Computer science. ● Narsingh Deo: Graph Theory.

● C.L.Liu: Discrete Mathematics.

● K.H. Rosen: Discrete Mathematics and its Applications

● S. Lipschutz, Discrete Mathematics

COURSE OUTCOMES:

After completing this course, the students will be able to:

CO1. Understand logical notation to define and reason mathematically about the fundamental data types and structures used in computer algorithms and systems.
CO2. Outline various mathematical concepts along with their applications.
CO3. Implement the applications of various types of graphs to solve real life problem.
CO4. Apply the mathematical concepts to solve engineering problems.
CO5. Analyze the set theory, prepositional logic, graph theory, discrete numeric function and algebraic structure to examine the real world problem.
CO6. Design analytical skill and interpret applications of engineering in real time troubleshooting.