Mahakaushal University, Jabalpur (M.P.)

Scheme & Syllabus

For

M.Tech

in

Computer Science Engineering

2021-2022 onwards

Duration of Course: 2 Years

Examination Mode: Semester

Examination System: CBCS

Mahakaushal University
Village-Aithakheda, Mukunwara Road, Post- Tilwara Jabalpur (M.P.) 482003

MAHAKAUSHAL UNIVERSITY JABALPUR

Advanced Computational Mathematics

UNIT I **Marks:14**

Linear Algebra: Linear transformation, vector spaces, hash function, Hermit polynomial, Heaviside's unit function and error function. Elementary concepts of Modular mathematics.

UNIT II **Marks:14**

Solution of Partial Differential Equation (PDE) by separation of variable method, numerical solution of PDE (Laplace, Poisson's, Parabolic) using finite difference methods, Elementary properties of FT, DFT, W FT, Wavelet transform, Haar transform.

UNIT III **Marks:14**

Probability, compound probability and discrete random variable. Binomial, Normal and Poisson's distributions, Sampling distribution, elementary concept of estimation and theory of hypothesis, recurred relations.

UNIT IV **Marks:14**

Stochastic process, Markov process transition probability transition probability matrix, just and high erorder Markov process, Application of Eigen value problems in Markov Process, Markov chain. Queuing system, transient and steady state, traffic intensity, distribution queuing system, concepts of queuing models (M/M/1: Infinity/ Infinity/ FC FS), (M/M/1: N/ Infinity/ FC FS), (M/M/S: Infinity/ Infinity/ FC FS)

UNIT IV **Marks:14**

Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics MATLAB introduction, programming in MATLAB scripts, functions and their application.

Reference Books:

1. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
2. Advance Engineering Mathematics by Ervin Kreszig, W iley Easten Edd.
3. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH.
4. Advance Engg Mathematics, O' Neil, Cengage (Thomson)
4. Introductory Methods of Numerical Analysis by S.S. Shastry,
5. Introduction of Numerical Analysis by Forberg
6. Numerical Solution of Differential Equation by M. K. Jain
7. Numerical Mathematical Analysis By James B. Scarborogh
8. Fourier Transforms by J. N. Sheddon
9. Fuzzy Logic in Engineering by T. J. Ross
10. Fuzzy Sets Theory & its Applications by H. J. Zimmersoms

MAHAKAUSHAL UNIVERSITY JABALPUR

Advanced Data Structures

UNIT I **Marks:14**

INTRODUCTION: Basic concepts of OOPs – Templates – Algorithm Analysis – ADT – (Singly, Doubly and Circular) Implementation - Array, Pointer, Cursor Implementation

UNIT II **Marks:14**

BASIC DATA STRUCTURES: Stacks and Queues – ADT, Implementation and Applications -Trees General, Binary, Binary Search, Expression Search, AVL, Splay, B-Trees – Implementations - Tree Traversals.

UNIT III **Marks:14**

ADVANCED DATA STRUCTURES: Set – Implementation – Basic operations on set Priority Queue Implementation Graphs – Directed Graphs – Shortest Path Problem Undirected Graph Spanning Trees– Graph Traversals.

UNIT IV **Marks:14**

MEMORY MANAGEMENT : Issues - Managing Equal Sized Blocks – Garbage Collection Algorithms for Equal Sized Blocks - Storage Allocation for Objects with Mixed Sizes – Buddy Systems – Storage Compaction.

UNIT V **Marks:14**

SEARCHING, SORTING AND DESIGN TECHNIQUES: Searching Techniques, Sorting – Internal Sorting – Bubble Sort, Insertion Sort, Quick Sort, Heap Sort, Bin Sort, Radix Sort – External Sorting – Merge Sort, Multi-way Merge Sort, Poly-phase Sorting - Design Techniques - Divide and Conquer – Dynamic Programming - Greedy Algorithm – Backtracking - Local Search Algorithms.

Reference Books :

1. Mark Allen W eiss, "Data Structures and Algorithm Analysis in C++", Pearson P
2. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education P
3. Drozdek, Data Structures and algorithm in Jawa, Cengage (Thomson)
4. Gilberg, Data structures Using C++, Cengage
3. Horowitz, Sahni, Rajasekaran, "Computer Algorithms", Galgotia,
4. Tanenbaum A.S., Langrarn Y, Augestien M.J., "Data Structures using C & C++",Prentice Hall of India, 2002

MAHAKAUSHAL UNIVERSITY JABALPUR

Advanced Computer Architecture

UNIT I **Marks:14**

Flynn's and Handler's Classification of parallel computing structures. Pipelined and Vector Processors.

UNIT II **Marks:14**

Data and control hazards and method to resolve them. SIMD multiprocessor structures.

UNIT III **Marks:14**

Parallel Algorithms for array processors, Search algorithms, MIMD multiprocessor systems

UNIT IV **Marks:14**

Scheduling and load balancing in multiprocessor systems, Multiprocessing control and algorithms.

UNIT-V **Marks:14**

Interconnection networks, MISD multiprocessor systems

Reference Books:

1. Advance Computer Architecture, parthsarthy, Cengage (Thomson)
2. Computer Architecture and Organisation- John Hays, Mc.Graw-Hill.
3. Computer Architecture and Parallel Processing- Hwang And Briggs, TMH.

MAHAKAUSHAL UNIVERSITY JABALPUR

Object Oriented Technology

UNIT I **Marks:14**

Overview of object oriented concepts: Need for object oriented programming, characterization of object oriented languages.

UNIT II **Marks:14**

Object oriented Design : object structure concepts, methodology for object oriented design (Booch, and chen), Design modeling, system design life cycle.

UNIT III **Marks:14**

Object oriented programming: An overview of C++ programming, loops and decisions, structures and functions, objects and classes, Array and pointers, Inheritance, virtual function, files and stream.

UNIT IV **Marks:14**

Object oriented Databases: Relational v/s object oriented databases, The architecture of OO databases, Query languages for OO databases, Gemstone/O2/orion.

UNIT V **Marks:14**

Distributed object oriented systems: Object management group, CORBA.

REFERENCE BOOKS :

1. Object Oriented Analysis and Design, Satzinger, Cengage (Thomson)
2. Object Oriented S/W Development by Mc. Gregor & Sykes DA, Van Nostrand.
2. OOP in C++ by Lafore, Galgotia Pub.
3. The C++ Programming Language by Stroustrup B, Addison W esely
4. Introduction to OOP by W itt KV, Galgotia Pub.
5. Object Data Management by Cattel R., Addison W esely
6. Modern Data Base System by Kim W , ACM Press, Addison W esely
7. OOP by Blaschek G, Springer Verlag
8. An Introduction to Jawa Programming and OOAD, Johnson, Cengage

MAHAKAUSHAL UNIVERSITY JABALPUR

Advanced Computer Networking

UNIT I **Marks: 14**

Review of Networking and O.S. Fundamentals, ISO-OSI Model, different layers and their functions, LAN, MAN, W AN, Communication media & principles IEEE standards etc.

UNIT II **Marks: 14**

Internetworking with TCP/IP, Basic concepts, Principles, Protocols and Architecture, Address handling Internet protocols and protocol layering. DNS, Applications: TELNET, RLOGN, FTP, TFTP, NFS, SMTP, POPL, IMAP, MIME, HTTP, STTP, DHCP, VOIP, SNMP.

UNIT III **Marks: 14**

Introduction to Router, Configuring a Router, Interior & Exterior Routing, RIP, Distance Vector Routing, OSPF, BGP, Uni-cast, Multicast and Broadcast. Multicast routing protocols: DVMRP, MOSPF, CBT, PIM, MBONE, EIGRP, CIDR, Multicast Trees, Comparative study of IPv6 and IPv4.

UNIT IV **Marks:14**

VPN addressing and routing, VPN Host management, ATM Concepts, Services Architecture, Equipments and Implementation

UNIT V **Marks: 14**

Introduction to wireless transmission and medium access control, wireless LAN: IEEE 802.11, Hyper LAN, Bluetooth Mobile Network and Transport layer, W AP GSM and CDMA: Network architecture and management

Reference Books:

1. Computer Networks: Tanenbaum.
2. Internetworking with TCP/IP: Comer.
3. Data Communications, Computer Networks and Open Systems: Hallsall.
4. Data Communications, Stalling.
5. Mobile Communication: Schiller, Pearson Education
6. Computer Communications and network Technology, Gallo, Cengage (Thomson)
7. W ireless and Mobile Network Architecture: Yi Bing Lin, W iley
8. ATM Network: Kasara, TMH
9. TCP/IP protocol Suite, Forouzan ,TMH

MAHAKAUSHAL UNIVERSITY, JABALPUR (M.P.)

Advanced Data Structures Lab

1. Implementation of Singly Linked List (Insertion, Deletion, Traversal)
2. Implementation of Doubly Linked List (Insertion, Deletion, Traversal)
3. Implementation of Circular Linked List
4. Polynomial representation and addition using Linked List
5. Stack implementation using Array and Linked List
6. Queue implementation (Linear Queue, Circular Queue, Deque)
7. Expression evaluation (Infix, Postfix, Prefix)
8. Parenthesis matching using Stack
9. Binary Tree: Creation and Traversal (Inorder, Preorder, Postorder)
10. Binary Search Tree: Insertion, Deletion, Searching
11. AVL Tree: Insertion, Deletion, and Rotations
12. Red-Black Tree: Insertion and Deletion
13. Threaded Binary Tree Implementation
14. Min Heap and Max Heap Implementation
15. Priority Queue using Heap
16. Heap Sort Algorithm
17. Graph Representation: Adjacency List & Adjacency Matrix
18. Graph Traversals: BFS and DFS
19. Topological Sorting of a Graph
20. Minimum Spanning Tree: Kruskal's Algorithm

MAHAKAUSHAL UNIVERSITY, JABALPUR (M.P.)

Advanced Computer Networking Lab

1. Study of Network Topologies and Protocols using Simulation Tools (NS2/NS3/Packet Tracer)
2. Implementation of Data Link Layer Protocols (Stop-and-Wait, Go-Back-N, Selective Repeat)
3. Implementation of Error Detection Techniques (Parity Check, CRC, Checksum)
4. Simulation of Routing Algorithms:
    - Distance Vector Routing (RIP)
    - Link State Routing (OSPF)
5. Implementation of Congestion Control Algorithms (Leaky Bucket, Token Bucket)
6. Implementation of Flow Control Mechanisms
7. Study of TCP and UDP Socket Programming (Client-Server Model)
8. Simulation of Reliable Data Transfer over UDP
9. Network Performance Analysis using Wireshark (Packet Capture & Analysis)
10. Implementation of IP Addressing and Subnetting
11. Simulation of ARP and RARP Protocols
12. Study of VLANs and Inter-VLAN Routing using Packet Tracer or GNS3
13. Implementation of Routing Table Updates and Packet Forwarding

MAHAKAUSHAL UNIVERSITY JABALPUR

Web Technology and E Commerce

UNIT I **Marks:14**

Introduction to building blocks of electronic commerce: Internet and networking. Technologies. IP addressing, ARP, RARP, BOOTP, DHCP, ICMP, DNS, TFT P, TELNET.

UNIT II **Marks:14**

Static and dynamic web p ages, tiers, plug -ins, frames and forms. Exposure to Markup languages, HTML, DHTML, VRML, SGML, XML etc. CGI, Applets & Serve-lets, JSP & JAVA Beans, active X control, ASP cookies creating and reading cookies, semantic web, semantic web service ontology Comparative case study of Microsoft and JAVA technologies, web server scalability,. Distributed objects, object request brokers, component technology, Web services, Web application architectures, Browsers, Search engines.

UNIT III **Marks:14**

Electronic Commerce and physical Commerce, Different type of e-commerce, e-commerce scenarios, advantages of e-commerce. Business models: Feature of B2B e-commerce, Business models, Integration. E-Services: category of e-services, Web- enabled services, Matchmaking services, information - selling on the web.

UNIT IV **Marks:14**

Internet payment system: Characteristics of p a y m e n t system, 4 C pa y m e n t s methods, SET Protocol for credit card payment, E-cash, E-check, Micro payment system, Overview of smart card, overview of Mondex. E-Governance: E-Governance architecture, Public p r i v a t e partnership, Readiness, Security, Cyber Crime and Law, IT Act

UNIT V **Marks:14**

Advanced technologies for e-commerce: Introduction to mobile agents. WAP: the enabling technology : The WAP model, WAP Architecture, Benefit of WAP to e-commerce. Web Security, Encryption Schemes, Secure Web documents, Digital signatures and firewalls.

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Reference Books:

1. Web Technology, Acyut Godbole, Atul Kahate, TMH
2. Henry Chan, Raymond Lee, Tharam Dillon , E-Comm erce Fundamental Publication
3. Minoli & Minli, Web Commerce Technology Hand

MAHAKAUSHAL UNIVERSITY JABALPUR

Information Theory, Coding and Cryptography

UNIT I **Marks:14**

Information Theory, Probability and Channel: Introduction, Information Measures, Review probability theory, Random variables, Processes, Mutual Information, Entropy, Uncertainty, Shannon's theorem , redundancy, Huffman Coding, Discrete random Variable. Gaussian random variables, Bounds on tail probabilities.

UNIT II **Marks:14**

Stochastic Processes: Statistical independence, Bernoulli Process, Poisson Process, Renewal Process, Random Incidence, Markov Modulated Bernoulli Process, Irreducible Finite Chains with Aperiodic States, Discrete-Time Birth-Death Processes, Markov property, Finite Markov Chains, Continuous time Markov chain, Hidden Markov Model.

UNIT III **Marks:14**

Error Control Coding: Channel Coding: Linear Block Codes: Introduction, Matrix description, Decoding, Equivalent codes, Parity check matrix, Syndrome decoding, Perfect codes Hamming Codes ,Optimal linear codes ,.Maxim um distance separable (MDS) codes. Cyclic Codes: Introduction, generation, Polynomials, division algorithm, Matrix description of cyclic codes, burst error correction, Fire Codes, Golay Codes, and CRC Codes. BCH Codes: Introduction, Primitive elements, Minim al polynomials, Generator Polynomials in term s of Minimal Polynomials, Decoding of BCH codes.

UNIT IV **Marks:14**

Coding for Secure Communications: Review of Cryptography, Introduction, Encryption techniques and algorithm s, DES, IDEA, RC Ciphers, RSA Algorithm ,Diffi-Hellman, PGP, Chaos Functions, Cryptanalysis, Perfect security, Unicity distance, Diffusion and confusion, McEliece Cryptosystem

UNIT V **Marks:14**

Advance Coding Techniques: Reed-Solomon codes, space time codes, concatenated codes, turbo coding and LDP codes (In details), Nested Codes, block (in Details), convolution channel coding: Introduction, Linear convolution codes, Transfer function representation & distance properties, Decoding convolution codes(Soft-decision MLSE, Hard-decision MLSE),T he Viterbi algorithm f or MLSE, Performance of convolution code decoders, Soft & Hard decision decoding performance, Viterbi algorithm implementation issues: RSSE, trellis truncation, cost normalization, Sequential decoding: Stack, Fano, feedback decision decoding, Techniques for constructing m ore complex convolution codes with both soft and hard decoding.

References:

1. Rajan Bose "Information Theory, Coding and Cryptography", TMH, 2002.
2. Kishor S. Trivedi "Probability and Statistics with Reliability, Queuing and Computer Science Applications", Wiley India, Second Edition.
3. J.C.Moreira, P.G. Farrell "Essentials of Error-Control Coding", W illey Student Edition
4. San Ling and Chaoping "Coding T heory: A first Course", Cam bridge University Press, 2004.
5. G A Jones J M Jones, "Information and Coding Theory", Springer Verlag, 2004.
6. Cole, "Network Security", Bible, Wiley INDIA, Second Addition

MAHAKAUSHAL UNIVERSITY JABALPUR

ADVANCED CONCEPTS IN DATABASE

UNIT I **Marks:14**

DBMS Concept Introduction, Data Model, Entity & Attributes, Relationship, E-R Model, relational Data Model, Domain Tuples, Attributes, Key, Schema, Integrity Constraints, Relational Algebra & Relational Calculus, Normalization & Normal Form .

UNIT II **Marks:14**

Query Processing and Optimization Introduction, Query Processing, Syntax analyzer, Query Decomposition: - Query Analysis, Query Normalization, Semantic Analyzer, Query Simplifier, Query Restructuring. Query Optimization, Cost Estimation in Query Optimization, Structure of Query Evaluation Plans, Pipelining and Materialization.

UNIT III **Marks:14**

Distributed Databases Introduction, Architecture of Distributed Databases, Distributed Database System Design, Distributed Query Processing, Concurrency Control in Distributed Databases, Recovery Control in Distributed Databases. Web Databases, Multimedia Databases, Spatial Databases, Clustering-based Disaster-proof Databases, and Mobile Databases.

UNIT IV **Marks:14**

Object-Oriented Databases Introduction, Concept of Object Oriented Database, Object Oriented Data Model (OODM), Object-Oriented DBMS (OODBMS), Object Data Management Group and Object- Oriented Languages. Object-Relational DBMS, ORDBMS Design, ORDBMS Query Language.

UNIT V **Marks:14**

Design of Data Warehouse, Dimension and Measures, Data Marts and Distributed Data Marts, Conceptual Modeling of Data Warehouses:-Star Schema, Snowflake Schema, Fact Constellations. Multidimensional Data Model & Aggregates. Data Mining : Data, Information and Knowledge Discovery, Data Mining Functionalities, Data Mining System categorization and its Issues. Data Processing, Data Reduction, Data Mining Statistics. Data Mining Techniques.

References:

1. C. J. Date: An Introduction to Database System s , Addison-Wesley
2. Avi Silberschatz, Henry F. Korth ,S. Sudarshan ,Data Base System Concepts, TMH
3. Patrick O'Neil & Elizabeth O'Neil, Database Principles, Programming and Performance,
4. Morgan Kaufmann Hardcourt India
5. Gillenson, Fundamental of Data Base Managem ent Sytem, W illey India
6. Ceri & Pelagatti, Distributed Databases Principles & System ,TMH
7. Paulraj Ponniah, Data W are Housing Fundamental, Willey India.

SYSTEM PROGRAMMING

UNIT I **Marks:14**

Overview of language processors, Elements of assembly level programming, Design of assembler , Macro definition, Design of Macro preprocessor , Relocating and linking concepts, Design of linker , Programming Environments .

UNIT II **Marks:14**

Aspects of Compilation, overview of the various phases of compiler , Scanning, Syntax error handling , Symbol table conceptual design , Intermediate Code conceptual Design , Intermediate code interfaces, Dynamic storage allocation techniques , Dynamic Programming code generation Algorithm, Principal sources of optimization, Approaches to compiler development. Register allocation techniques. Concurrent station and vectors action of programs

UNIT III **Marks:14**

Motivation and overview, Structure of a Parallelizing compiler. Parallelism detection: data dependence, direction vectors, loop carried and loop independent dependences. Compilation for Distributed Machines Data partitioning, instruction scheduling, register allocation, machine optimization. Dynamic compilation. Introduction to code optimization. Classical theory of data flow analysis. Bi-directional data flows. Unified algorithms for data flow analysis. Program representation for optimization – SSA form, etc. Efficient code generation for expressions. Code generators. Code generation for pipelined machines.

UNIT IV **Marks:14**

Design Issues in distributed operating system, Networking Issues, Communication Protocols, Message Passing, RPC in heterogeneous environment, Resource allocation, Algorithms for Distributed control. Distributed Deadlock detection, Mechanism for building Distributed File System, Distributed shared memory , Distributed scheduling .

UNIT IV **Marks:14**

Resource Security and protection: Access matrix Model, models of protection, Cryptography, Authentication, Multiprocessor System Architecture , Structure of multiprocessor operating systems ,Process synchronization, scheduling, Memory management, Fault tolerance. Case studies: UNIX Operating system, Amoeba, Andrew.

References:

1.Dhamdhere, Systems Programming and Operating systems, TMH
2. Keith Cooper , Engineering a Compiler , Elsevier Pub
3.Mak , Writing compilers and Interpreters , Wiley India
4.Singhal & Shivaratri , Advanced concepts in Operating Systems, TMH
5.Sinha , Distributed operating system ,

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Soft Computing

UNIT **Marks:14**

Introduction of soft computing, soft computing vs hard computing. Soft computing techniques. Computational Intelligence and applications, problem space and searching: Graph searching, different searching algorithm s like breadth first search, depth first search techniques, heuristic searching Techniques like Best first Search, A* algorithm , AO* Algorithms. Game Playing: Minim ax search procedure, adding alpha-beta cutoffs, additional refinements, Iterative deepening, Statistical Reasoning: Probability and Bayes theorem , Certainty f actors and Rules based system s, Bayesian Networks, Dumpster Shafer theorem

UNIT II **Marks:14**

Neural Network: Introduction, Biological neural network: Structure of a brain, Learning methodologies. Artificial Neural Network(ANN): Evloution of, Basic neuron modeling , Difference between ANN and hum an brain, characteristics, McCulloch-Pitts neuron models, Learning (Supervised & Unsupervised) and activation f unction, Architecture, Models, Hebbian learning , Single layer Perceptron, Perceptron learning, Windrow-Hoff/ Delta learning rule, winner take all , linear Separability, Multilayer Perceptron, Adaline, Madaline, different activation functions Back propagation net work, derivation of EBPA, momentum , limitation, Applications of Neural network.

UNIT III **Marks:14**

Unsupervised learning in Neural Network: Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Associative memory, hope field network and Bidirectional associative memory. Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Introduction to Support Vector machine, architecture and algorithm Introduction to Kohanan's Self organization map, architecture and algorithm s

UNIT IV **Marks:14**

Fuzzy systems: Introduction, Need, classical sets (crisp sets) and operations on classical sets Interval Arithmetic's ,Fuzzy set theory and operations, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference system ,fuzzy decision making & Applications of fuzzy logic, fuzzification and defuzzification. Fuzzy associative memory. Fuzzy Logic Theory, Modeling & Control System.

UNIT V **Marks:14**

Genetic algorithm : Introduction, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness f unction and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, GA optimization problem s, including JSPP (Job shop scheduling problem), TSP (Travelling salesman problem), Applications of GA, Differences & similarities between GA & other traditional methods. Evolutionary Computing: Concepts & Applications. Swarm Intelligence.

References:

1. S.N. Shivnandam , "Principle of soft computing", Wiley India.
2. David Poole, Alan Mackworth "Computational Intelligence: A logical Approach" Oxford.
3. Russell & Yuhui, "Computational Intelligence: Concepts to Implementations", Elsevier.
4. Eiben and Smith "Introduction to Evolutionary Computing" Springer
5. Janga Reddy Manne; "Swarm Intelligence and Evolutionary Computing"; Lap Lambert Academic

MAHAKAUSHAL UNIVERSITY, JABALPUR (M.P.)

System Programming Lab

1. Study of Assembly Language Programming (Basic Instructions, Loops, Conditional Statements)
2. Implementation of a Simple Assembler for a Given Instruction Set
3. Implementation of Pass-1 of a Two-Pass Assembler
4. Implementation of Pass-2 of a Two-Pass Assembler
5. Design and Implementation of a Macro Processor
6. Implementation of a Simple Linker and Loader
7. Study of Symbol Table Construction and Management
8. Implementation of a Simple Text Editor in C/C++
9. Study of Compiler Phases and Writing a Lexical Analyzer
10. Implementation of a Finite Automata for Lexical Analysis
11. Implementation of Syntax Analysis (Parsing) – Recursive Descent Parser

MAHAKAUSHAL UNIVERSITY, JABALPUR (M.P.)

Soft Computing Lab

1. Implementation of Fuzzy Sets and operations (Union, Intersection, Complement)
2. Design of Fuzzy Membership Functions for a given problem
3. Fuzzy Rule-based System: Mamdani and Sugeno Models
4. Defuzzification methods: Centroid, Bisector, Mean of Maximum
5. Implementation of Genetic Algorithm (GA) for function optimization
6. Solving TSP (Traveling Salesman Problem) using GA
7. Implementation of Genetic Programming for symbolic regression
8. Neural Network Basics: Perceptron Algorithm Implementation
9. Training Multi-Layer Perceptron (MLP) using Backpropagation
10. Function Approximation using Neural Networks
11. Pattern Recognition using Neural Networks
12. Implementation of Hopfield Network for associative memory
13. Implementation of Kohonen Self-Organizing Map (SOM)

MAHAKAUSHAL UNIVERSITY JABALPUR

Data Warehousing &Mining

UNIT- I **Marks :14**

Introduction : Data Mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining , DM Techniques, Mining problems, Issues and Challenges in DM, DM Application areas.

UNIT- II **Marks :14**

Association Rules & Clustering Techniques: Introduction, Various association algorithms like A Priori, Partition, Pincer search etc., Generalized association rules.

Clustering paradigms; Partitioning algorithms like K-Medioid, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms, STIRR, ROCK, CACTUS.

UNIT- III **Marks :14**

Other DM techniques & Web Mining: Application of Neural Network, AI, Fuzzy logic and Genetic algorithm, Decision tree in DM. Web Mining, Web content mining, Web structure Mining, Web Usage Mining.

UNIT- IV **Marks :14**

Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM Algorithms, Episode Discovery, Event prediction, Time series analysis. Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends.

UNIT- V **Marks:14**

Data Mining of Image and Video: A case study. Image and Video representation techniques, feature extraction, motion analysis, content based image and video retrieval, clustering and association paradigm, knowledge discovery.

Reference Books:

1. DataMining Techniques ; Arun K.Pujari ; University Press.
2. DataMining; Adriaans& Zantinge; Pearson education.
3. Mastering Data Mining; Berry Linoff;Wiley.
4. DataMining; Dunham; Pearson education.
5. Text Mining Applications, Konchandy, Cengage

MAHAKAUSHAL UNIVERSITY JABALPUR

Real Time Fault Tolerant Systems

UNIT- I **Marks :14**

Structure of Real Time System, Performance Measure for real time system, Task Assignments, Fault Tolerant Scheduling, Real Time Vs General purpose Data Bases, Data Bases for Hard Real Time System, Real Time Communication.

UNIT- II **Marks :14**

Fault Tolerance, Fault-Error-Failure. Redundancy, Error Detection, Damage Confinement, Error Recovery, Fault Treatment, Fault Prevention, anticipated and unanticipated Faults. Error models: General coding scheme Error detection techniques: Watchdog processors, Heartbeats, consistency and capability checking,

UNIT- III **Marks :14**

Fault tolerance: Coding technique-fault tolerant self checking and fail safe circuits-fault tolerance in combinatorial and sequential circuits- synchronous and asynchronous fail safe circuits. Software fault tolerance: Process pairs, robust data structures, N version programming, Recovery blocks, Replica consistency & reintegration, multithreaded programs Application:

UNIT- IV **Marks :14**

Experimental Evaluation: Modeling and simulation based, Fault injection based - Application: NFTAPE fault injector. Modeling for performance, dependability and perform ability: dependability-specific methods (fault trees, reliability block diagrams).

UNIT- V **Marks :14**

Practical Systems for Fault Tolerance: - Application: Ad-hoc wireless network - Application: NASA Remote Exploration & Experimentation System Architecture: Fault tolerant computers - general purpose commercial systems-fault tolerant multiprocessor and VLSI based communication architecture.

Reference Books:

1. K.K.Pradhan, "Fault Tolerant computing theory and techniques" volume III. Prentice Hall,1989.
2. Krishna, Real Time System, TMH
3. Anderson and Lee, "Fault Tolerant principles and practice" ,PHI 1989.
4. Siewert, Real Time Embeded System, Cengage Learning.
5. Rajiv Mall, Real Time System, Pearson Edu.
6. Parag K. Lala, "Fault Tolerant and Fault Testable, Hardware design" PHI 1985.
7. Shem , toy Levei , Ashok K.Agarwala , "Fault Tolerant System design", Tata McGraw

MAHAKAUSHAL UNIVERSITY JABALPUR

Network Security

UNIT- I **Marks :14**

Convention Encryption : Conventional Encryption Model , Stenography , Classical Encryption Techniques, Simplified DES , Block Cipher Principles , The Data Encryption Standard, The Strength of DES , Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of operation, Conventional Encryption algorithms.

UNIT- II **Marks :14**

Public Key Encryption And Hash Functions Public Key Cryptography , Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management, Diffie Hellman Key Exchange , Elliptic Curve Cryptography.

UNIT- III **Marks :14**

Message Authentication and Hash Functions Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions , Security of Hash Functions.

UNIT- IV **Marks :14**

Hash And Mac Algorithms MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA-I) , RIPEMD , HMAC Digital Signatures and Authentication Protocols Digital Signature, Authentication Protocols –Digital Signature Standard

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UNIT- V **Marks :14**

Authentication Applications, IP Security , Web Security Intruders, Viruses and Worms Intruders , Viruses and Related Threats Firewalls Firewall Design Principles, Trusted Systems

Reference Books:

1. William Stallings," Cryptography and Network Security", Second edition, PrenticeHall,
2. Atul Kahate, "Cryptography and Network Security," TMH
3. William Stallings,"Cryptography and Network Security",Third Edition, Pearson Ed
4. Introduction to network security,Krawetz,Cengage

MAHAKAUSHAL UNIVERSITY JABALPUR

Simulation and modeling

UNIT- I **Marks :14**

Introduction to modeling and simulation: Modeling and simulation methodology, system modeling, concept of simulation, continuous and discrete time simulation.

UNIT- II **Marks :14**

Basic concept of probability and random variables continuous and discrete random variables, distribution of random variables: discrete and continuous, Compartmental models: linear, nonlinear and stochastic models.

UNIT- III **Marks :14**

Introduction to Queuing Theory: Characteristics of queuing system, Poisson's formula, birth- death system, equilibrium of queuing system, analysis of M/M/1 queues. Application of queuing theory in computer system like operating systems, computer networks etc.

UNIT- IV **Marks :14**

System Dynamics modeling: Identification of problem situation, preparation of causal loop diagrams and flow diagrams, equation writing, level and rate relationship. Simulation of system dynamics model.

UNIT- V **Marks :14**

Verification and validation: Design of simulation experiments, validation of experimental models, testing and analysis. Simulation languages comparison and selection, study of Simulation sw - SIMULA, DYNAMO, STELLA, POWERSIM.

Reference Books :

1. GordenG., System simulation, PrinticeHall.
2. Payer T., Introduction to system simulation,McGrawHill.
3. Seila, Applied SimulationModeling, Cengage
4. Spriet, Computer Aided Modeling and Simulation,W.I.A.
5. Sushi!, System Dynamics,WileyEastern Ltd. 23
6. Shannon R.E., Systemsimulation, Prentice Hall

Seminar

you should actively participate by contributing to discussions, preparing beforehand by completing readings, and engaging with complex ideas. Be ready to present your work, ask clarifying questions, and build on the points made by others to gain a deeper understanding of the subject.

Dissertation Part- I

In the dissertation part-I you have to select a topic, write a research synopsis including a problem statement and objectives, and present it to a panel. The synopsis will introduce the research area, discuss the literature review, and outline the problem you plan to solve, along with the methodology you will use. This part concludes with a presentation, where your supervisor and a panel of faculty will evaluate your synopsis, which will be graded.

MAHAKAUSHAL UNIVERSITY, JABALPUR (M.P.)

Dissertation Part- II

The objectives of the course 'dissertation part-II' are

- To provide students with a comprehensive experience for applying the knowledge
- gained so far by studying various courses.
- To develop an inquiring aptitude and build confidence among students by working on
- solutions of small industrial problems.
- To give students an opportunity to do some thing creative and to assimilate real life
- work situation in institution.
- To adapt students for latest developments and to handle independently new situations.
- To develop good expressions power and presentation abilities in students.
- The focus of the Major Project is on preparing a working system or some design or
- understanding of a complex system using system analysis tools and submit it the same in the
- form of a write-up i.e. detail project report. The student should select some real life problems
- for their project and maintain proper documentation of different stages of project such as need
- analysis, market analysis, concept evaluation, requirement specification, objectives, work plan,
- analysis, design, implementation and test plan. Each student is required to prepare a project
- report and present the same at the final examination with a demonstration of the working
- system (if any).
- The faculty and student should work according to following schedule:
    - Each student undertakes substantial and individual project in an approved area of the
- subject and supervised by a member of staff.
    - The student must submit outline and action plan for the project execution (time schedule)
- and the same be approved by the concerned faculty.
    - At all the steps of the project, students must submit a written report of the same.