



**M.E. COMPUTER SCIENCE AND ENGINEERING  
(THREE YEAR PART TIME)  
CURRICULUM 2008**

**SEMESTER I**

<b>Code No.</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
QCS101	Theory of Computation	3	1	0	4
QCS102	Advanced Data Structures and Algorithms	3	1	0	4
QCSE**	Elective I	3	0	0	3
QCS104	Advanced Data Structures and Algorithms Lab	0	0	4	2
		<b>9</b>	<b>2</b>	<b>4</b>	<b>13</b>

**Total Hours:15**

**Total Credits:13**

**SEMESTER II**

<b>Code No.</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
QCS201	Advanced Computer Architecture	4	0	0	4
QCS202	Advanced Operating System	4	0	0	4
QCSE**	Elective II	3	0	0	3
QCS204	Advanced Operating System Lab	0	0	4	2
		<b>11</b>	<b>0</b>	<b>4</b>	<b>13</b>

**Total Hours:15**

**Total Credits:13**



### SEMESTER III

Code No.	Course Title	L	T	P	Credits
QCS301	Advanced Database System	4	0	0	4
QCS302	Combinatorics and Graph Theory	3	1	0	4
QCSE**	Elective III	3	0	0	3
QCS304	Advanced Database System Lab	0	0	4	2
		<b>10</b>	<b>1</b>	<b>4</b>	<b>13</b>

**Total Hours: 15**

**Total Credits:13**

### SEMESTER IV

Code No.	Course Title	L	T	P	Credits
QCS401	Software Engineering	4	0	0	4
QCS402	Network Protocols	4	0	0	4
QCSE**	Elective IV	3	0	0	3
QCS404	CASE Tools Lab	0	0	4	2
		<b>11</b>	<b>0</b>	<b>4</b>	<b>13</b>

**Total Hours:15**

**Total Credits:13**

### SEMESTER V

Code No.	Course Title	L	T	P	Credits
QCS501	Project Work	-	-	-	<b>12</b>

### SEMESTER VI

Code No.	Course Title	L	T	P	Credits
QCS501	Project Work	-	-	-	<b>12</b>

**Over all Credits: 76**

## LIST OF ELECTIVES

### SEMESTER I & II

<b>**Elective Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>RESEARCH</b>					
51	Bio informatics	3	0	0	3
52	Image Processing	3	0	0	3
53	Artificial Intelligence	3	0	0	3
54	Fuzzy Logic and Neural Networks	3	0	0	3
<b>NETWORKS</b>					
55	Adhoc Networks	3	0	0	3
56	Network Security	3	0	0	3
57	Network Management	3	0	0	3
<b>DATABASE</b>					
58	Data Warehousing and Data Mining	3	0	0	3
59	Object Oriented System Analysis And Design	3	0	0	3
60	SAP	3	0	0	3
<b>SOFTWARE ENGINEERING</b>					
61	Software Project Management	3	0	0	3
62	Software Reuse	3	0	0	3
63	Software Design	3	0	0	3
64	Software Testing	3	0	0	3
65	Software Documentation	3	0	0	3

### SEMESTER III & IV

<b>**Elective Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>RESEARCH</b>					
66	Robotics	3	0	0	3
67	Nano Technology	3	0	0	3
68	Agent Technology	3	0	0	3
69	Embedded Systems	3	0	0	3
<b>NETWORKS</b>					
70	Cryptography and its Applications	3	0	0	3
71	Next Generation IP Networks	3	0	0	3
72	Wireless Networks	3	0	0	3
<b>DATABASE</b>					
73	Web mining	3	0	0	3
74	Component Based Technology	3	0	0	3
75	Knowledge based Decision Support systems	3	0	0	3
<b>SOFTWARE ENGINEERING</b>					
76	Software Quality Assurance	3	0	0	3
77	Object Oriented Reuse	3	0	0	3
78	Software Agents	3	0	0	3
79	Software Re-Engineering	3	0	0	3
80	Software Reliability and Metrics	3	0	0	3

## **QCS101 - THEORY OF COMPUTATION**

**3 1 0 4**

### **UNIT- I FINITE AUTOMATA AND REGULAR LANGUAGES 9**

Finite Automata and Regular languages - Regular expressions and Regular languages –non determinism and Kleenes theorem, Equivalence of DFA and NFA, Finite Automation with e-moves, equivalence of regular expression and NFA with e-moves – pumping lemma for regular sets.

### **UNIT- II CONTEXT FREE LANGUAGES 9**

Context free languages, Derivation and languages, Relationship between derivation and derivation trees, Simplification of context free grammars – Normal forms for context free grammars, CNF, and GNF.

### **UNIT- III PUSH DOWN AUTOMATA 9**

Acceptance by PDA, Pushdown automata and Context free languages, Pumping lemma for CFL, deterministic Context free languages and Deterministic pushdown automata.

### **UNIT- IV TURING MACHINE 9**

Context sensitive languages and LBA, Turing machine (Definition and examples), Computable languages and functions, Church Turing hypothesis, Universal Turing machine, P and NP problems, NP-complete.

### **UNIT- V UNSOLVABLE PROBLEMS 9**

Unsolvable problems - Rice Theorem - Post's correspondence Problem, Recursive and recursively enumerable languages.

**L:45; T:15; TOTAL:60**

#### **REFERENCES:**

1. Hopcroft and Ullman, Introduction to Automata, Languages and Computation, Narosa Publishers, 2006
2. A.M.Natarajan, A. Tamilarasi & P.Balasubramani, " Theory of Computation" New age International publishers, 2002
3. John.C.Martin, Introduction to languages and the Theory of Computation, 2<sup>nd</sup> Edition, McGraw Hill, 1997

**QCS102 - ADVANCED DATA STRUCTURES AND ALGORITHMS 3 1 0 4**

**UNIT- I INTRODUCTION 8**

Algorithm Analysis – Efficiency of Algorithm -ADT - List (Singly, Doubly and Circular) Implementation – Array and Pointer.

**UNIT- II BASIC DATA STRUCTURES 11**

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

**UNIT- III ADVANCED DATA STRUCTURES 10**

Set – Implementation – Basic operations on set – Priority Queue – Implementation - Graphs – Directed Graphs – Shortest Path Problem - Undirected Graph - Spanning Trees – Graph Traversals

**UNIT- IV MEMORY MANAGEMENT 7**

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 SEARCHING, SORTING AND DESIGN TECHNIQUES 9**

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, Polyphase Sorting - Design Techniques - Divide and Conquer - Dynamic Programming - Greedy Algorithm – Backtracking - Local Search Algorithms

**L: 45; T: 15; TOTAL: 60**

**REFERENCES:**

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson Education, 2002.
2. Aho, Hopcroft, Ullman, “Data Structures and Algorithms”, Pearson Education, 2002.
3. Horowitz, Sahni, Rajasekaran, “Computer Algorithms”, Galgotia, 2000
4. Tanenbaum A.S., Langram Y, Augestien M.J., ”Data Structures using C & C++”, Prentice Hall of India, 2002

**QCS104**    **ADVANCED DATA STRUCTURES AND  
ALGORITHMS LABORATORY**

**0 0 4 2**

1. Implementation linked list .
2. Implementation of Multistack in a Single Array.
3. Implementation of Circular Queue.
4. Implementation of Binary Search trees and Delete an element.
5. Implementation of Hash table.
6. Implementation of Heaps.
7. Implementation of AVL Rotations.
8. Implementation of Breadth First Search & Depth First Search  
Techniques.
9. Implementation of Prim's & Kruskal's Algorithm.
10. Implementation of Dijkstra's Algorithm.
11. Implementation of Searching Techniques
12. Implementation of Sorting Techniques



## **QCS202 - ADVANCED OPERATING SYSTEM**

**4 0 0 4**

### **UNIT- I**

**9**

Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks – communication primitives. Theoretical Foundations - inherent limitations of a distributed system – lamp ports logical clocks – vector clocks – casual ordering of messages – global state – cuts of a distributed computation – termination detection. Distributed Mutual Exclusion – introduction – the classification of mutual exclusion and associated algorithms – a comparative performance analysis.

### **UNIT- II**

**9**

Distributed Deadlock Detection - Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms - hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture – mechanism for building distributed file systems – design issues – log structured file systems.

### **UNIT- III**

**9**

Distributed shared memory-Architecture– algorithms for implementing DSM – memory coherence and protocols – design issues. Distributed Scheduling – introduction – issues in load distributing – components of a load distributing algorithm – stability – load distributing algorithm – performance comparison – selecting a suitable load sharing algorithm – requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction– basic concepts – classification of failures – backward and forward error recovery, backward error recovery- recovery in concurrent systems – consistent set of check points – synchronous and asynchronous check pointing and recovery – check pointing for distributed database systems- recovery in replicated distributed databases

### **UNIT- IV**

**9**

Protection and security -preliminaries, the access matrix model and its implementations.-safety in matrix model- advanced models of protection. Data security – cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard- public key cryptography – multiple encryption – authentication in distributed systems.

Multiprocessor operating systems - basic multiprocessor system architectures – inter connection networks for multiprocessor systems – caching – hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling.

Database Operating systems :Introduction- requirements of a database operating system Concurrency control : theoretical aspects – introduction, database systems – a concurrency control model of database systems- the problem of concurrency control – serializability theory- distributed database systems, concurrency control algorithms – introduction, basic synchronization primitives, lock based algorithms- timestamp based algorithms, optimistic algorithms – concurrency control algorithms, data replication.

**L: 60; TOTAL:60**

#### **REFERENCES:**

1. Mukesh Singhal, Niranjana G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2006
2. Andrew S.Tanenbaum, "Modern operating system", 2<sup>nd</sup> Edition, PHI, 2007
3. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
4. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2006

**LABORATORY**

1. Implement the following CPU Scheduling Algorithms.  
i) FCFS    ii) Round Robin    iii) Shortest Job First.
2. Implement the Mutual Exclusion Problem Using Dekker's Algorithm.
3. Implement Inter Process Communication Problem (Producer-Consumer / Reader- Writer Problem) Using Semaphores.
4. Implement Best fit, First Fit Algorithm for Memory Management.
5. Implement Memory Allocation with Pages.
6. Implement FIFO page Replacement Algorithm.
7. Implement LRU page Replacement Algorithm.
8. Implement the creation of Shared memory Segment.
9. Implement File Locking.
10. Implement Banker's algorithm

**QCS301 - ADVANCED DATABASE SYSTEM 4 0 0 4**

**UNIT I DATABASE MANAGEMENT 12**

Relational Data Model – SQL - Database Design - Entity-Relationship Model – Relational Normalization – Embedded SQL – Dynamic SQL – JDBC – ODBC.

**UNIT II ADVANCED DATABASES 12**

Object Databases - Conceptual Object Data Model – XML and Web Data – XML Schema – Distributed Data bases – OLAP and Data Mining – ROLAP and MOLAP

**UNIT III QUERY AND TRANSACTION PROCESSING 12**

Query Processing Basics – Heuristic Optimization – Cost, Size Estimation - Models of Transactions – Architecture – Transaction Processing in a Centralized and Distributed System – TP Monitor.

**UNIT IV IMPLEMENTING AND ISOLATION 12**

Schedules – Concurrency Control – Objects and Semantic Commutativity – Locking – Crash, Abort and Media Failure – Recovery – Atomic Termination – Distributed Deadlock – Global Serialization – Replicated Databases – Distributed Transactions in Real World

**UNIT V DATABASE DESIGN ISSUES 12**

Security – Encryption – Digital Signatures – Authorization – Authenticated RPC - Integrity - Consistency - Database Tuning - Optimization and Research Issues.

**L: 60; TOTAL: 60**

**REFERENCES:**

1. Abraham Silberschatz, Henry. F. Korth, S.Sudharsan, Database System Concepts, 5<sup>th</sup> Edition., Tata McGraw Hill, 2006
2. R. Elmasri and S.B. Navathe, Fundamentals of Database Systems, 3<sup>rd</sup> Edition, Addison Wesley, 2004
3. Philip M. Lewis, Arthur Bernstein, Michael Kifer, “Databases and Transaction Processing:An Application-Oriented Approach”, Addison-Wesley, 2002
4. Raghu Ramakrishnan & Johannes Gehrke, “Database Management Systems”, III Edition, TMH, 2003

**QCS302 - COMBINATORICS AND GRAPH THEORY 3 1 0 4**

**UNIT- I COMBINATORICS 9**

Basics of counting – Counting arguments – Pigeon hole principle – Permutations and Combinations – Recursion and Recurrence relation – Generating function.

**UNIT- II MODELLING COMPUTATION AND LANGUAGES 9**

Finite State machines – Deterministic and Non – Deterministic Finite state machines – Turing machines – Formal Languages – Classes of Grammar – Type 0 – Context Sensitive – Context Free – Regular Grammars - Ambiguity.

**UNIT- III INTRODUCTION – GRAPHS AND TREES 9**

Introduction of graphs, paths cycles and trails, vertex degrees and counting – directed graphs – Trees and Distance: Basic properties, spanning trees and enumeration, optimization and Trees.

**UNIT- IV MATCHING CONNECTIVITY AND FLOW 9**

Matching and Covers Algorithms and Applications. Matching in General Graphs – Connectivity and Paths: Cuts and Connectivity,  $k$  – connected Graphs – Network flow problems.

**UNIT- V COLOURING 9**

Vertex coloring and upper bounds – Structure of  $K$  – Chromatic graphs, Enumerative aspects

**L:45; T:15; TOTAL: 60**

**REFERENCES:**

1. R. J. Wilson “ Introduction to Graph theory” , 4<sup>th</sup> Edition, Pearson Education 2003.
2. Discrete Mathematics and Its Applications by Kenneth H. Rosen, 5<sup>th</sup> Edition TMH, 2003.
3. J. P. Tremblay and R. Manohar, “ Discrete Mathematical Structures with applications to Computer Science”, TMH, 1997
4. Narsingh Deo, “ Graph Theory with Application to Engineering and Computer Science, PHI , New Delhi, 1998.

**QCS304- ADVANCED DATABASE SYSTEM  
LABORATORY**

**0 0 4 2**

1. Study of all SQL commands
2. Implement the concept of Normalization
3. Database design using E-R Model
4. Embedded SQL
5. High level language extension with Cursors
6. High level language extension with Triggers
7. Procedures and Functions
8. Implement the inventory control system with a reorder level
9. Develop a package for a bank to maintain its customer details
10. Develop a package for the payroll of a company

**QCS401 - SOFTWARE ENGINEERING 4 0 0 4**

**UNIT- I INTRODUCTION 12**

Software Engineering Process paradigms - Project management - Process and Project Metrics – software estimation - Empirical estimation models - planning - Risk analysis - Software project scheduling.

**UNIT- II REQUIREMENTS ANALYSIS 12**

Prototyping - Specification - Analysis modeling

**UNIT- III SOFTWARE DESIGN 12**

Software design - Abstraction - Modularity - Software Architecture - Effective modular design – Cohesion and Coupling - Architectural design and Procedural design - Data flow oriented design.

**UNIT- IV USER INTERFACE DESIGN AND REAL TIME SYSTEMS 12**

User interface design - Human factors - Human computer interaction - Human - Computer Interface design - Interface design - Interface standards. Programming languages and coding - Language classes – Code documentation - Code efficiency - Software Configuration Management.

**UNIT -V SOFTWARE QUALITY AND TESTING 12**

Software Quality Assurance - Quality metrics - Software Reliability - Software quality and reliability. SEI CMM, PSP and Six Sigma, Software testing - Path testing – Control Structures testing - Black Box testing - Integration, Validation and system testing - Software Maintenance - Reverse Engineering and Re-engineering, Clean room technique, CASE tools-projects management, tools - analysis and design tools - programming tools - integration and testing tool - Case studies.

**L:60; TOTAL: 60**

**REFERENCES:**

1. Roger Pressman.S., Software Engineering : A Practitioner's Approach, 5th Edition, McGraw Hill, 2001 .
2. I. Sommerville, Software Engineering, V edition: Addison Wesley, 2004.
3. Pfleeger, Software Engineering, Prentice Hall, 2000.
4. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli Fundamentals of Software Engineering, Prentice Hall of India 2002

**QCS402 - NETWORK PROTOCOLS** **4 0 0 4**

**UNIT- I INTRODUCTION TO INTERNETWORKING 12**

Internetworking Concepts – Architectural Model – Routing – Internet Addressing – Address Resolution Protocol (ARP) – Reverse Address Resolutions Protocol (RARP) – Bootstrapping – BOOTP – DHCP.

**UNIT- II INTERNET PROTOCOL 12**

Routing Table and Routing Algorithms – Fragmentation and Reassembling – Error Processing (ICMP) – Multicast Processing (IGMP).

**UNIT- III IPv6 12**

IP Security Protocol – IPV6 Protocol Basics – Addressing – Multicast – Anycast – ICMPV6 Routing – QOS – Auto configuration

**UNIT- IV TRANSMISSION CONTROL PROTOCOL 12**

Data Structures Input Processing – Finite State Machine Implementation – Output Processing – Timer Management – Flow Control and Adaptive Retransmission – Urgent Data Processing.

**UNIT -V NETWORK MANAGEMENT PROTOCOLS 12**

Simple Network Management Protocols (SNMP) v1, SNMP v2, SNMP v3 and Remote Monitoring (RMON).

**L:60; TOTAL: 60**

**REFERENCES:**

1. Douglas E Comer “Internetworking with TCP/IP principles protocol and architectures”, 4<sup>th</sup> edition Volume 1, Pearson Education, 2003.
2. Adrian Farrel, “The Internet and Its Protocols – A Comparative Approach” Morgan Kaufmann, April 2004.
3. Mani Subramanian, " Network Management Principles and practice ", Pearson Education, 2006.
4. W.Richard Stevens “TCP/IP Illustrated, The Protocols. Volume I” ,Pearson Education India 2005.

## **QCS404- CASE TOOLS LABORATORY**

**0 0 4 2**

Solving Sample Problems using CASE tools for Problem Analysis and Project Planning, Design, Software Development in forward and reverse engineering methodologies, debugging, Testing and Maintenance



**QCSE52**                      **IMAGE PROCESSING**                      **3 0 0 3**

**UNIT I**   **DIGITAL IMAGE FUNDAMENTALS**                      **9**

Elements of digital image processing systems, Elements of visual perception, psycho visual model, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals -RGB,HSI models, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries.

**UNIT II**   **IMAGE TRANSFORMS**                      **9**

1D DFT, 2D transforms – DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Wavelet Transform.

**UNIT III**   **IMAGE ENHANCEMENT AND RESTORATION**                      **9**

Histogram modification and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic and Yp mean filters, Homomorphic filtering, Color image enhancement. Image Restoration – degradation model, Unconstrained and Constrained restoration, Inverse filtering – removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations – spatial transformations, Gray-Level interpolation.

**UNIT IV**   **IMAGE SEGMENTATION AND RECOGNITION**                      **9**

Edge detection. Image segmentation by region growing, region splitting and merging, edge linking.. Image Recognition – Patterns and pattern classes, Matching by minimum distance classifier, Matching by correlation, Back Propagation Neural Network, Neural Network applications in Image Processing.

**UNIT V**   **IMAGE COMPRESSION**                      **9**

Need for data compression, Huffman,. Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Block Truncation Coding. Transform Coding – DCT and Wavelet. JPEG ,MPEG. Standards, Concepts of Context based Compression.

**Total: 45 Hours**

## REFERENCES:

1. Rafael C. Gonzalez, Richard E.Woods, 'Digital Image Processing', Pearson Education, Inc., Second Edition, 2004.
2. Anil K. Jain, 'Fundamentals of Digital Image Processing', Prentice Hall of India, 2002.
3. David Salomon : Data Compression – The Complete Reference, Springer Verlag New York Inc., 2<sup>nd</sup> Edition, 2001
4. Rafael C. Gonzalez, Richard E.Woods, Steven Eddins, ' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.
5. William K.Pratt, ' Digital Image Processing', John Wiley, NewYork, 2002.
6. Milman Sonka, Vaclav Hlavac, Roger Boyle, 'Image Processing, Analysis, and Machine Vision', Brooks/Cole, Vikas Publishing House, II ed., 1999.
7. Sid Ahmed, M.A., 'Image Processing Theory, Algorithms and Architectures', McGrawHill, 1995.

**QCSE53**

**ARTIFICIAL INTELLIGENCE**

**3 0 0 3**

**UNIT I INTRODUCTION**

**8**

Intelligent Agents – Agents and environments - Good behavior – The nature of environments – structure of agents - Problem Solving - problem solving agents – example problems – searching for solutions – uniformed search strategies - avoiding repeated states – searching with partial information.

**UNIT II SEARCHING TECHNIQUES**

**10**

Informed search and exploration – Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments - Constraint satisfaction problems (CSP) – Backtracking search and Local search for CSP – Structure of problems - Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – games that include an element of chance.

**UNIT III KNOWLEDGE REPRESENTATION**

**10**

First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation - Ontological Engineering - Categories and objects – Actions - Simulation and events - Mental events and mental objects

**UNIT IV LEARNING**

**9**

Learning from observations - forms of learning - Inductive learning - Learning decision trees - Ensemble learning - Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming - EM algorithm - Instance based learning - Reinforcement learning – Passive reinforcement learning - Active reinforcement learning - Generalization in reinforcement learning.

**UNIT V APPLICATIONS**

**8**

Communication – Communication as action – Formal grammar for a fragment of English – Syntactic analysis – Augmented grammars – Semantic interpretation – Ambiguity and disambiguation.

**TOTAL : 45**

**TEXT BOOK**

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, 2nd Edition, Pearson Education / Prentice Hall of India, 2004.

## REFERENCES

1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2<sup>nd</sup> Edition, Tata McGraw-Hill, 2003.
3. George F. Luger, "Artificial Intelligence-Structures And Strategies For Complex Problem Solving", Pearson Education / PHI, 2002.

## **QCSE54 FUZZY LOGIC AND NEURAL NETWORKS 3 0 0 3**

### **UNIT I INTRODUCTION**

Introduction to Fuzzy Logic: Fuzzy sets - Properties of Fuzzy sets, operations on Fuzzy sets. Extension of Fuzzy set concepts, Fuzzy relations: Cardinality of Fuzzy relations. Linguistic approximation, Fuzzy statements. Fuzzy rule base. Canonical rule formation, Decomposition of compound rules.

### **UNIT II FUZZY LOGIC CONTROLLER**

Functional diagram. Membership functions : Triangular, Trapezoidal-scale motors. Fuzzification membership value assignments using intuition knowledge base.

Defuzzification: Max-Membership principle - Centroid method - weighted average method - rule base. Choice of variable - derivation of rules, Fuzzy databases, Case studies

### **UNIT III ARCHITECTURE**

Motivation for the development of neural networks-Artificial neural networks-Biological neural networks- Application –Typical architectures-Setting weights-Common activation functions –McCulloch pitts neuron: Architecture, algorithm, applications-Simple neural networks for pattern classification :Architecture, biases and thresholds, linear separability, data representation –Hebb bet : Algorithm and application –architecture, algorithm and application of perception-perceptron :learning rule convergence theorem-delta rule.

### **UNIT IV MODELLING**

Back Propagation net : Standard back propagation –Architecture-Algorithm-Derivation of learning rules-Number of hidden layers –Learning rules –Number of hidden layers-Learning factors-Applications. Hopfield, continuous nets, Boltzmann machine.

### **UNIT V NEURAL NETWORKS**

Neural networks based on competition; fixed weight competitive nets –Kohonen self organizing map and applications –Adaptive resonance theory :Basic architecture and operation-Architecture, algorithm applications and analysis and analysis of ART1 and ART2.

Application of neural networks and fuzzy logic to computer science.

**Total : 45**

## TEXT BOOKS

1. Fundamentals of neural networks-Lawrene Fausett Prentice,1994
2. An Introduction to fuzzy control,D.Drianov,H.Hellendoorn,and Reinfrank Narosa Publishing Co.,NewDelhi,1996.

## REFERENCES

1. Fuzzy Logic with Engineering Applications ,Timothy J.Rose,McGraw-Hill, Newyork,1996.
2. Fuzzy sets,uncertainty ands information G.J.Klir and T.A Folger- Prentice Hall,1994
3. Introductin to Artificial Neural Systems,J.M.Zurada,Jaico Publishing House,Delhi,1994
4. Understanding Neural Networks and Fuzzy logic-Basic concepts and Applications,Stamatios V,Kartalopoulos,IEEE Press,Newyork,1996.
5. Neural Networks,Simon Haykin,MacMillan College Publishing Co.,Newyork,1994.
6. Neural Fuzzy Systems,Chin-Teng Lin and C.S.George Lee, Prentice
7. Hall,1996

**UNIT I INTRODUCTION 9**

Introduction-Fundamentals of Wireless Communication Technology - The Electromagnetic Spectrum - Radio Propagation Mechanisms - Characteristics of the Wireless Channel - IEEE 802.11a,b Standard – Origin Of Ad hoc: Packet Radio Networks - Technical Challenges - Architecture of PRNETs - Components of Packet Radios – Ad hoc Wireless Networks -What Is an Ad Hoc Network? Heterogeneity in Mobile Devices - Wireless Sensor Networks - Traffic Profiles - Types of Ad hoc Mobile Communications - Types of Mobile Host Movements - Challenges Facing Ad Hoc Mobile Networks-Ad hoc wireless Internet

**UNIT II AD HOC ROUTING PROTOCOLS 9**

Introduction - Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks - Classifications of Routing Protocols -Table-Driven Routing Protocols - Destination Sequenced Distance Vector (DSDV) - Wireless Routing Protocol (WRP) - Cluster Switch Gateway Routing (CSGR) - Source-Initiated On-Demand Approaches - Ad Hoc On-Demand Distance Vector Routing (AODV) - Dynamic Source Routing (DSR) -Temporally Ordered Routing Algorithm (TORA) - Signal Stability Routing (SSR) -Location-Aided Routing (LAR) - Power-Aware Routing (PAR) - Zone Routing Protocol (ZRP)

**UNIT III MULTICASTROUTING IN AD HOC NETWORKS 9**

Introduction - Issues in Designing a Multicast Routing Protocol - Operation of Multicast Routing Protocols - An Architecture Reference Model for Multicast Routing Protocols -Classifications of Multicast Routing Protocols - Tree-Based Multicast Routing Protocols- Mesh-Based Multicast Routing Protocols - Summary of Tree-and Mesh-Based Protocols - Energy-Efficient Multicasting - Multicasting with Quality of Service Guarantees - Application-Dependent Multicast Routing - Comparisons of Multicast Routing Protocols

**UNIT IV TRANSPORT LAYER, SECURITY PROTOCOLS 9**

Introduction - Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks - Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks -Classification of Transport Layer Solutions - TCP Over Ad Hoc Wireless Networks -Other Transport Layer Protocols for Ad Hoc Wireless Networks - Security in Ad Hoc Wireless Networks - Network Security Requirements - Issues and Challenges in Security Provisioning - Network Security Attacks - Key Management - Secure Routing in Ad Hoc Wireless Networks

Introduction - Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks -Classifications of QoS Solutions - MAC Layer Solutions - Network Layer Solutions - QoS Frameworks for Ad Hoc Wireless Networks Energy Management in Ad Hoc Wireless Networks –Introduction - Need for Energy Management in Ad Hoc Wireless Networks - Classification of Energy Management Schemes - Battery Management Schemes - Transmission Power Management Schemes - System Power Management Schemes

**REFERENCES:**

1. C. Siva Ram Murthy and B.S. Manoj “Ad Hoc Wireless Networks: Architectures and Protocols”, Prentice Hall PTR,2004
2. C.K. Toh, Ad Hoc Mobile Wireless Networks: Protocols and Systems, Prentice Hall PTR ,2001
3. Charles E. Perkins, Ad Hoc Networking, Addison Wesley, 2000

<b>QCSE56</b>	<b>NETWORK SECURITY</b>	<b>3 0 0 3</b>
<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9</b>
	Attacks - Services - Mechanisms - Conventional Encryption - Classical And Modern Techniques – Encryption Algorithms - Confidentiality.	
<b>UNIT II</b>	<b>PUBLIC KEY ENCRYPTION</b>	<b>9</b>
	RSA - Elliptic Curve Cryptography - Number Theory Concepts	
<b>UNIT III</b>	<b>MESSAGE AUTHENTICATION</b>	<b>9</b>
	Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols.	
<b>UNIT IV</b>	<b>NETWORK SECURITY PRACTICE</b>	<b>9</b>
	Authentication, Applications - Electronic Mail Security - IP Security - Web Security.	
<b>UNIT V</b>	<b>SYSTEM SECURITY</b>	<b>9</b>
	Intruders – Viruses – Worms – Firewalls Design Principles – Trusted Systems.	
		<b>TOTAL : 45</b>

### REFERENCES

1. Stallings, Cryptography & Network Security - Principles & Practice, Prentice Hall, 3<sup>rd</sup> Edition 2002.
2. Bruce, Schneier, Applied Cryptography, 2nd Edition, Toha Wiley & Sons, 1996.
3. Man Young Rhee, "Internet Security", Wiley, 2003.
4. Pfleeger & Pfleeger, "Security in Computing", Pearson Education, 3<sup>rd</sup> Edition, 2003.

**QCSE57 NETWORK MANAGEMENT 3 0 0 3**

**UNIT I FUNDAMENTALS OF COMPUTER NETWORK TECHNOLOGY 9**

Network Topology, LAN, Network node components- hubs, Bridges, Routers, Gateways, Switches, WAN, SDN Transmission Technology, Communications protocols and standards

**UNIT II OSI NETWORK MANAGEMENT 9**

OSI Network management model-Organizational model-Information model, communication model. Abstract Syntax Notation - Encoding structure, Macros Functional model CMIP/CMIS

**UNIT III INTERNET MANAGEMENT(SNMP) 9**

SNMP-Organizational model-System Overview, The information model, communication model-Functional model, SNMP proxy server, Management information , protocol remote monitoring

**UNIT IV BROADBAND NETWORK MANAGEMENT 9**

Broadband networks and services, TM Technology-VP, VC, ATM Packet, Intergrated service, ATMLAN emulation, Virtual Lan. ATM Network Management-ATM Network reference model, Intergrated local management Interface. TM Management Information base, Role of SNMD and ILMI in ATM Management, M1, M2, M3, M4 Interface. ATM Digital Exchange Interface Management

**UNIT V NETWORK MANAGEMENT APPLICATIONS 9**

Configuration management, Fault management, performance management, Event Corelation Techniques security Management, Accounting management, Report Management, Policy Based Management Service Level Management

**Total : 45**

**REFERENCES:**

1. Mani Subramanian, " Network Management Principles and practice ", Addison Wesley New York, 2000.
2. Salah Aaidarous, Thomas Plevayk, " Telecommunications Network Management Technologies and Implementations ", eastern Economy Edition IEEE press, New Delhi, 1998.
3. Lakshmi G. Raman, " Fundamentals of Telecommunication Network Management ", Eastern Economy Edition IEEE Press, New Delhi, 1999.

**QCSE58 DATA WAREHOUSING AND DATA MINING 3 0 0 3**

**UNIT I INTRODUCTION 9**

Relation To Statistics, Databases- Data Mining Functionalities-Steps In Data Mining Process-Architecture Of A Typical Data Mining Systems- Classification Of Data Mining Systems - Overview Of Data Mining Techniques.

**UNIT II DATA PREPROCESSING AND ASSOCIATION RULES 9**

Data Preprocessing-Data Cleaning, Integration, Transformation, Reduction, Discretization Concept Hierarchies-Concept Description: Data Generalization And Summarization Based Characterization- Mining Association Rules In Large Databases.

**UNIT III PREDICTIVE MODELING 9**

Classification And Prediction: Issues Regarding Classification And Prediction- Classification By Decision Tree Induction-Bayesian Classification-Other Classification Methods-Prediction-Clusters Analysis: Types Of Data In Cluster Analysis- Categorization Of Major Clustering Methods: Partitioning Methods – Hierarchical Methods

**UNIT IV DATA WAREHOUSING 9**

Data Warehousing Components -Multi Dimensional Data Model- Data Warehouse Architecture-Data Warehouse Implementation- -Mapping The Data Warehouse To Multiprocessor Architecture- OLAP.-Need- Categorization Of OLAP Tools.

**UNIT V APPLICATIONS 9**

Applications of Data Mining-Social Impacts Of Data Mining-Tools-An Introduction To DB Miner-Case Studies-Mining WWW-Mining Text Database-Mining Spatial Databases.

**Total No of Periods: 45**

**REFERENCES:**

1. Jiawei Han, Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publishers, 2002.
2. Alex Berson, Stephen J. Smith, "Data Warehousing, Data Mining, & OLAP", Tata Mcgraw- Hill, 2004.
3. Usama M.Fayyad, Gregory Piatetsky - Shapiro, Padhrai Smyth And Ramasamy Uthurusamy, "Advances In Knowledge Discovery And Data Mining", The M.I.T Press, 1996.
4. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", John Wiley & Sons Inc., 1998.
5. Sean Kelly, "Data Warehousing In Action", John Wiley & Sons Inc., 1997.

**QCSE59 OBJECT ORIENTED SYSTEM ANALYSIS AND DESIGN 3 0 0 3**

**UNIT I OBJECT ORIENTED DESIGN FUNDAMENTALS 9**

The Object Model-Classes and Objects-Complexity-Classifications-Notation-Process-Pragmatics-Object types-Object State-OOSD life cycle.

**UNIT II OBJECT ORIENTED ANALYSIS 9**

Overview of Object analysis-Shaller/Mellor,Coad/Yourdon,Rumbaugh,Booch-Object Analysis Classification-Noun Phrase approach-Common class patterns approach-Use-Case Driven approach-classes, Responsibilities, and Collaborators.

**UNIT III OBJECT ORIENTED DESIGN METHODS 9**

UML-Class diagram-Use-Case diagram-Dynamic Modeling-Extensibility-Comparison with other design methods.

**UNIT IV OBJECT ORIENTED DEVELOPMENT 9**

OO Design process and Axioms-Designing Classes-Access Layer-View Layer-Testing

**UNIT V CASE STUIES IN OBJECT ORIENTED DEVELOPMENT 9**

**Total 45**

**TEXTBOOKS**

1. Ali Bahrami," Object Oriented Systems Development",McGraw Hill Internaional Edition.1999.
2. Craig Larman," Applying UML and patterns ",Addison Wesley, 2000.

**REFERNCES**

1. Booch Grady, "Object Oriented Analysis and Design", Addison Wesley, 5<sup>th</sup> Edition, 1997
2. "The Unified Modeling Language User Guide",Grady Booch,James Rumbaugh,IVAR Jacobson.Addison-Wesley Longman,1999.
3. Fowler,"Analysis Patterns",Addison Wesley,1996.
4. Shlaer, S., Mellor, S.; 'Object Lifecycles: Modeling the World in States'; Prentice Hall; 1992
5. Coad, P., Yourdon, E.; 'Object-Oriented Analysis'; Yourdon Press, Prentice Hall, New Jersey; 1990
6. Graham, I; 'Object Oriented Methods'; Addison-Wesley; 1993









**QCSE65                      SOFTWARE DOCUMENTATION                      3 0 0 3**

**UNIT I                      INTRODUCTION                      9**

Need for Software Documentation - Understanding task orientation - Analyzing users - Writing user scenarios - User informational needs - Document goals - User work motivations - User analysis checklist - Constructing a task list - Categorization - Writing steps as actions - Task analysis.

**UNIT II                      DOCUMENTATION PLANNING                      9**

Planning and writing documents - Task list and Schedule - Guidelines - Documentation process - Documentation plan - Document review form - Review plan - Schedule - Checklist.

**UNIT III                      DOCUMENTATION TESTING                      9**

Usability tests - Advantages of field testing - Editing and fine tuning - Problems - Designing for task orientation - Page showing elements of document design - Screen showing elements for online help design - Solutions to the design problem for printed and online documentation.

**UNIT IV                      DOCUMENTATION LAYOUTS                      9**

Laying out pages and screens - Elements of page and screen design - Designing type - Effective writing style - Using graphical that support decision making - Functions of graphics - Type and elements of graphics.

**UNIT V                      DOCUMENTATION GUIDELINES                      9**

Writing to guide - Procedures - Guidelines - Writing to support - Reference - Structural - reference entry - Checklist - Designing index - User oriented index - Case studies.

**Total - 45**

**TEXT BOOK :**

Thomas T. Barker , "Writing s/w documentation - a task oriented approach", Allyn & Bacon Series of Technical Communication , 1998.

**REFERENCE:**

Edmond H.Weiss, How To Write Usable User Documentation: Second Edition, Oryx Press; 2nd edition 1991.