B.S.ABDUR RAHMAN UNIVERSITY
SCHOOL OF COMPUTER AND INFORMATION SCIENCES
DEPARTMENT OF COMPUTER APPLICATIONS

M.Phil., Computer Science (FULL TIME)
(1 Year Duration)

CURRICULUM

Semester I

Theory Code No.	Course Title	L	T	P	C
MPC 101	Mathematical Foundations of Computer Science	**3**	**1**	**0**	**4**
MPC 102	Research Methodology and Trends in Computer Science	**3**	**1**	**0**	**4**
	ELECTIVE	**3**	**0**	**0**	**3**
	Semester II				
MPC 201	Dissertation				**10**

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SYLLABUS

SEMESTER I

MPC 101 - MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

L	T	P	C
3	1	0	4

UNIT-I **9**

Mathematical logic : Statements and notation, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implementation, Normal torms.
Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT-II **9**

Set Theory: Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram, Functions: Inverse Function Comports of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application. **Algebraic structure:** Algebraic systems Examples and general properties, Semi groups and monads, groups sub groups' homomorphism, Isomorphism.

UNIT-III **9**

Elementary Combinatorics: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of inclusion-Exclusion.
Recurrence Relation: Generating Functions, Function of sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating funds. Characteristics roots solution of inhomogeneous Recurrence Relation.

UNIT-IV **9**

Graph theory: Representation of Graph, DFS,BFS, Spanning Trees, planer Graphs.

UNIT-V **9**

Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs Multi graphs and Euler circuits, Hamiltonian graphs, Chromatics Numbers.

Total Hours 45

Text Books:

1. Discrete and Combionational Mathematics – An Applied Introduction-5th edition- Ralph. P.Grimadi. Pearson Education
2. Discrete Mathematical Structures with applications to computer science Trembly J.P.& Manohar.P.TMH

Reference:

1. Discrete Mathematical Structures, Bernard Kolman, Roberty C. Busby, Sharn Cutter Ross, Pearson education/PHI.
2. Mathematical Foundations of computer science Dr D.S.Chandrashekheraiaha Prism books Pvt Ltd.
3. Discrete Mathematics, Lovasz, Springer.
4. Discrete Mathematics for Computer science, Garry Haggard and others Thomson
5. Discrete Mathematics for Computer Scientists & Mathematicians, J.L.Mott, A.Kandel, T.P.Baker Prentice Hall.

MPC 102 - Research Methodology and Trends in Computer Science

L	T	P	C
3	1	0	4

UNIT – I : Research Methods **9**

Meaning of Research – Objectives of Research – Motivation in Research – Types of Research – Research Approaches – Significance of Research – research Methods versus Methodology – Research and Scientific Method – Importance of Knowing How Research is done – Research Process – Criteria of good Research – Necessity of Defining the Problem – Technique involved in Defining the Problem – Meaning of Research Design – Need for Research Design – Features of a Good Design – Important Concepts Relating to Research Design – Different Research Design – Data Analysis : Sensitivity Analysis with Data Tables, Goalseek, Scenario Manager, Optimisation with EXCEL Solver, Summarising Data with Histograms and Descriptive Statistics, Pivot Tables, Summarising Data with database statistical functions, using correlation, Multiple Regression, ANOVA, Using Resampling to Analyse Data : - Significance of Report Writing – Different Steps in writing Report – Layout of the Research Report – Types of Reports – Oral Presentation – Mechanics of Writing a research Report – Precautions for Writing Research Reports.

UNIT – II : Algorithms and Analysis **9**

Elementary data Structures, Greedy method: Knapsack problem – job sequencing with deadlines – optimal merge patterns, Dynamic Programming: Multistage graphs Optimal binary search trees – 0/1 knapsack – Reliability design – The traveling salesperson problem – Flow shop scheduling, Basic search and traversal techniques: The techniques – Code Optimization – Biconnected components and depth – first search. Backtracking: The 8 – Queens problem – Sum of subsets – Hamiltonian cycles – Knapsack problem.

UNIT III : Object Oriented Methodology **9**

Identifying subjects:Definitions-How to determine the subjects-examples.Defining attributes:Definitions-How to determine attributes-instance connectionsexamples. Defining services:message connections-specifying services final class and object specifications-examples. Design Process – Design Axioms – Designing Classes . Object Oriented Methodology: Rumbaugh, Booch, Jacobson, Shaler/Mellor, Coad/Yardon – Patterns – Frame Works – The Unified Approach – UML

UNIT IV: CLIENT/SERVERTECHNOLOGY & ADAPTIVE WEB TECHNOLOGY **9**

Distributed Objects and components – From Distributed Objects to components – 3 Tier Client Server, Object Style – CORBA – Distributed Objects, CORBA style – OMG's object management architecture – CORBA 2.0 – CORBA Object Services – CORBA common facilities – CORBA business objects.

J2EE: Overview – Multi – tier Architecture – The Enterprise Application – Clients – Sessions management – Web Tier –ELB Tier – J2EE Web Services. NET Framework – Common

Language Runtime – Base Class Libraries – Interoperability – Networking – Remitting - Security. Building Web applications – web Services. Overview of XML.

UNIT V: Grid Computing **9**

Introduction: Early Grid Activities, Current grid activities, Overview of grid business area, Grid Infrastructure and its relationship with other distributed architectures. Open grid service architecture (OGSA), Data management services, Overview of Globus
GT3 Toolkit.
Grid applications: Schedulers, Resource broker, load balancing, grid portals.

TOTAL HOURS 45

REFERENCE BOOKS :

Unit I

1. C. R. Kothari – Research Methodology Methods and Techniques – Wishwa Prakashan Publishers – Second Edition.
2. Wayne L. Winston, Microsoft Excel Data Analysis and Business Modeling Microsoft Press, 2004, ISBN : 0735619018
3. Dr. Rajammal, P. Devadas – A Handbook on Methodology of Research – Sri Ramakrishna Mission Vidyalaya College of Rural Higher Education.

Unit II

1. Alfre V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data structures and Algorithms”, Addison – Weisly Publishing Company, 1987.
2. Ellis Harowitz and Sartaj Sahini, “Computer Algorithms”, Galgotier Publications (P) Ltd., 1993.

Unit III

1. Ali Bahrami, Object Oriented System Development, Mc Graw Hill International Edition
2. Peter Coad and Edward Yourdon, “Object Oriented Analysis”, 2nd Edition, Prentice Hall, 1991.
3. Robert Lafore, “Object Oriented Programming and C++”, Galgotia 1991.

Unit IV

1. Robert Orfali, Dan Harkey, Jerry Edwards, “The Essential Client/Server Survival Guide”, Galgotia Publications.
2. Jim Keogh, “The Complete Reference J2EE”, Tata McGraw-Hill Edition, 2002.
3. James McGovern et al., “J2EE 1.4 Bible”, Wiley Publishing Inc., 2003.
4. Visual Studio .NET Walkthroughs – Microsoft Manual.
5. www.msdn.microsoft.com/netframework

Unit V

1. Joshy Joseph, Craig Fellenstein, “Grid Computing”, IBM Press, 2004
2. Fran Berman, Anthony J.G Hey, Geoffrey Fox, “Grid computing: Making the global infrastructure a reality”, Wiley, ISBN: 0470853190 (www.grid2002.org)
3. www.gridbus.org, www. Globus.org, www.gridcomputing.com, www.gridforum.org, www.grid.org

LIST OF ELECTIVES

1. MPY 01 - EMBEDDED SYSTEM
2. MPY 02 - GRID COMPUTING
3. MPY 03 - ADVANCED JAVA FOR WEB TECHNOLOGIES
4. MPY 04 - ADVANCED NETWORKING AND NETWORK PROGRAMMING
5. MPY 05 - ARTIFICIAL INTELLIGENCE
6. MPY 06 - ARTIFICIAL NEURAL NETWORKS
7. MPY 07 - DATA MINING AND DATA WAREHOUSING
8. MPY 08 - DESIGN OF FAULT TOLERANT SYSTEMS
9. MPY 09 - DIGITAL DATA COMMUNICATIONS
10. MPY 10 - DISTRIBUTED DATABASES
11. MPY 11 - DISTRIBUTED OPERATING SYSTEMS
12. MPY 12 - LANGUAGE PROCESSORS
13. MPY 13 - OBJECT ORIENTED ANALYSIS AND DESIGN USING UML
14. MPY 14 - DIGITAL IMAGE ANALYSIS AND MACHINE VISION
15. MPY 15 - ADVANCED COMPUTER ARCHITECTURE
16. MPY 16 - ADVANCED DATABASES
17. MPY 17 - ADVANCED OPERTAING SYSTEMS
18. MPY 18 - INTERNET PROTOCOLS
19. MPY 19 - NETWORK SECURITY
20. MPY 20 - NEURAL NETWORKS AND FUZZY SYSTEMS

MPY01 - EMBEDDED SYSTEMS

L	T	P	C
3	0	0	3

UNIT 1 INTRODUCTION TO EMBEDDED SYSTEMS **8**

Definition and Classification – Overview of Processors and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits

UNIT II DEVICES AND BUSES FOR DEVICES NETWORK **8**

I/O Devices - Device I/O Types and Examples – Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Devices - '12C', 'USB', 'CAN' and advanced I/O Serial high speed buses- ISA, PCI, PCI-X, cPCI and advanced buses.

UNIT III EMBEDDED PROGRAMMING **9**

Programming in assembly language (ALP) vs. High Level Language - C Program Elements, Macros and functions -Use of Pointers - NULL Pointers - Use of Function Calls – Multiple function calls in a Cyclic Order in the Main Function Pointers – Function Queues and Interrupt Service Routines Queues Pointers – Concepts of EMBEDDED PROGRAMMING in C++ - Objected Oriented Programming – Embedded Programming in C++, 'C' Program compilers – Cross compiler – Optimization of memory codes.

UNIT IV REAL TIME OPERATING SYSTEMS – PART - 1 **10**

OS Services – Interrupt Routines Handling, Task scheduling models - Handling of task scheduling and latency and deadlines as performance metrics - Inter Process Communication And Synchronisation – Shared data problem – Use of Semaphore(s) – Priority Inversion Problem and Deadlock Situations – Inter Process Communications using Signals – Semaphore Flag or mutex as Resource key – Message Queues – Mailboxes – Pipes – Virtual (Logical) Sockets – RPCs.

UNIT V REAL TIME OPERATING SYSTEMS – PART - 2 **10**

Study of RTOS, VxWorks - Basic Features - Task Management Library at the System - Library Header File - VxWorks System Functions and System Tasks - Inter Process (Task) Communication Functions - Case Study of Coding for Sending Application Layer Byte Streams on a TCP/IP Network Using RTOS Vxworks

TOTAL HOURS **45**

TEXT BOOK:

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw Hill, First reprint 2003

REFERENCES

1. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.

MPY02 - GRID COMPUTING

L	T	P	C
3	0	0	3

UNIT I INTRODUCTION **8**

Grid Computing values and risks – History of Grid computing – Grid computing model and protocols – overview of types of Grids.

UNIT II TYPES OF GRIDS **8**

Desktop Grids : Background – Definition – Challenges – Technology – Suitability – Grid server and practical uses; Clusters and Cluster Grids; HPC Grids; Scientific in sight – application and Architecture – HPC application development environment and HPC Grids; Data Grids; Alternatives to Data Grid – Data Grid architecture.

UNIT III ARCHITECTURE AND MANAGEMENT **9**

The open Grid services Architecture – Analogy – Evolution – Overview – Building on the OGSA platform – implementing OGSA based Grids – Creating and Managing services – Services and the Grid – Service Discovery – Tools and Toolkits – Universal Description Discovery and Integration (UDDI)

UNIT IV NATIVE PROGRAMMING AND SOFTWARE APPLICATIONS **10**

Desktop supercomputing – parallel computing – parallel programming paradigms – problems of current parallel programming paradigms – Desktop supercomputing programming paradigms – parallelizing existing applications – Grid enabling software applications – Needs of the Grid users – methods of Grid deployment – Requirements for Grid enabling software – Grid enabling software applications.

UNIT V APPLICATIONS,SERVICES AND ENVIRONMENTS **10**

Application integration – application classification – Grid requirements – Integrating Applications with Middleware platforms – Grid enabling Network services – managing Grid environments – Managing Grids – Management reporting – Monitoring – Data catalogs and replica management – portals – Different application areas of Grid computing.

TOTAL HOURS **45**

TEXT BOOKS

1.Ahmar Abbas, " Grid Computing , A Practical Guide to Technology and Applications", Firewall media , 2004.

REFERENCE BOOK

1. Joshy Joseph , Craig Fellenstein , "Grid Computing", Pearson Education , 2004. Foster , "Grid Blue print foe new computing".

MPY03 - ADVANCED JAVA FOR WEB TECHNOLOGIES

L	T	P	C
3	0	0	3

UNIT – I **9**

Review of HTML 4 – Common tags – HTML Tables and formatting internal linking – Complex HTML forms.

Introduction to Scripting Languages – Java Scripts – Control structures – functions arrays & objects - DHTML – CSS – event model – filters & transitions.

UNIT – II **9**

Review of Applets, Class, Event Handling, AWT Programming.

Introduction to Swing: Japplet, Handling Swing Controls like Icons – Buttons –Text Boxes – Combo Boxes – Tabbed Pains – Scroll Pains – Trees – Tables, Differences between AWT Controls & Swing Controls, Developing a Home pageusing Applets & Swing. Malti Threading and RMI.

UNIT – III **9**

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK, Introspection, Using Bound properties, Bean Info Interface, Constrained properties, persistence, Customizers, Java Beans API

Introduction to Servelets: Life Cycle of a Servelet, JSDK, The Servelet API, The javax servelet Package, Reading Servelet parameters, Reading Initialization Parameters, The javax servelet HTTP package, Handling, Http Request & responses, Using Cookies – Sessions Tracking, Security Issues.

UNIT – IV **9**

Introduction to JSP: The Problem with Servelets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC.

Setting Up the JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat.

JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Using an Expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Passing Control and Data between Pages – Sharing Session and Application Data Memory Usage Considerations.

UNIT – V **9**

Database Access, Database Programming using JDBC, Studying Javax sql* package. Accessing a Database form a JSP Page, Application – Specific Database Actions Deploying JAVA Beans in a JSP Page.

TOTAL HOURS 45

References:

1. Internet and World Wide Web – How to program by Dietel, and Nieto Pearson Education Asia. (Chapters: 3,4,8,9,10,11,12-18).

2.The Complete Reference Java 2 third Edition by Patrick Naughton and Herbert Schildt. (Chapters: 19,20,,21,22,25,27).

3. Java Server Pages by Hans Bergstan. (Chapters: 1-9).

MPY04 - ADVANCED NETWORKING AND NETWORK PROGRAMMING

L	T	P	C
3	0	0	3

UNIT – I **8**

Network Tools and Techniques: Protocol layering, system design, multiple access, switching, scheduling, naming, addressing, routing, error control; flow control, traffic management – data link layer protocols.

UNIT – II **9**

Internet: concept, history, network layer, transport protocol UDP, TCP, Ipv4, Ipv6, Local Area Networks: topologies , access techniques, LAN, 802.11G wireless LANs.

UNIT – III **9**

Application layer: DNS, Email, WWW, multimedia. Socket introduction, TCP sockets, TCP client server, socket options, UDP sockets Name and address conversion, IPv4 / Ipv6 interoperability - Socket programming.

UNIT – IV **9**

Routing sockets, broadcasting, multicasting, threads, IP options, raw sockets.

UNIT –V **10**

Interprocess communication, posix IPC, system V IPC, Pipes, FIFO, Posix message queen, system V semaphore, RPC in Sun systems. Unix programming using IPe.

TOTAL HOURS **45**

References:

1. Computer Networks, A.S. Tanenbaum, PHI, 4th ed, ISBN 81-7808-785-5
2. Computer Networking A top down approach featuring the Internet, J.F.Kurose, K.W Rose, Pearson, ISBN 81-7808-247-0.
3. An Engineering Approach to Computer Networks, S.Keshav, Addison Wesley, ISBN 981-235-986-9.
4. Local Area Networks, G.E. Keiser, McGrew Hill, ISBN 0-07-033561-3.
5. UNIX network programming, Vol I (Networking APIs: Sockets and XTI), W.Richord Stevens, PHI, ISBN 81-203-2061-1.
6. UNIX network Programming, Vol II, (Interprocess Communication) Richards Slenens, PHI, ISBN 81-203-2062-X.

MPY05 - ARTIFICIAL INTELLIGENCE

L	T	P	C
3	0	0	3

UNIT – I **9**

ARIFICIAL INTELLIGENCE:
Definition, Study of AI Technique, problem & Problem spaces, Heuristic search problem characteristics.

SEARCH METHODS
Breadth – first search, Depth – first search, Generate & Test Hill climbing, Best - first search, problem reduction, constraint satisfaction, means-ends analysis.

UNIT – II **9**

BASIC PROBLEM SOLVING METHODS:
Forward versus Backward reasoning, Problem Trees, Graphs, Matching, Game playing, minimax algorithms, Aphabeta Heuristics.

UNIT – III **9**

KNOWLEDGE REPRESENTAION USING PREDICATE LOGIC:
Prepositional Logic, Representing simple facts in logic Resolution Unification
question Answering. Introduction to prolog and LISP.

STRUCTURED KNOWLEDGE REPRESENTAION:
Declarative representation semantic nets, Frames scripts procedural representation

UNIT – IV **9**

NATURAL LANGUAGE UNDERSTANDING:
Introduction Syntactic Analysis Augmented transition networks semantic Analysis Semantic Grammars

COMPUTER VISION:
Perception processing representation and recognition of scents, understating as constraint satisfaction Determining to constrains, Waltz Algorithms.

UNIT – V **9**

EXPERT SYSTEMS:
Representing and using domain knowledge, Expert System Shells, Explanation knowledge acquisition, Case Studies.

TOTAL HOURS **45**

References:
1. ELAINE RICH : Artificial Intelligence.
2. ELEAINE RICH & KNIGHT : Artificial Intelligence MGH,1985
3. Nilsson : Principles of AI.
4. D.A.WATERMAN : Expert Systems.

MPY06 - ARTIFICIAL NEURAL NETWORKS

L	T	P	C
3	0	0	3

UNIT – I **8**

INTRODUCTION: History of Neural Networks, Structure and functions of biological and artificial neuron, Neural network architectures, learning methods, evaluation of neural networks. .

UNIT – II **9**

SUPERVISED LEARNING - I: McCulloch – Pitts neuron model, perception learning, Delta learning, Windrow – Hoff learning rules, linear seperability, Adeline modification.
SUPERVISED LEARNING –II Multi layer networks: Architectures, Madalines,
Back propagation algorithm, importance of learning parameter and momentum term,
radial basis functions, polynomial networks.

UNIT – III **9**

UNSUPERVISED LEARNING : Winner – Take – all learning, out star learning, learning vector quantizers, Counter propagation networks, Kohonen self – organizing networks, Grossberg layer, adaptive resonance theory, Hamming net.

UNIT – IV **9**

ASSOCIATIVE MEMORIES : Hebbian learning rule, continuos and discrete Hopfield networks, recurrent and associative memory, Boltzman machines, Bi-directional associative memory

UNIT – V **10**

APPLICATIONS OF NEURAL NETWORKS : Optimization, Travelling Salesman problem, solving simultaneous linear equations, application in pattern recognition and image processing.

TOTAL HOURS **45**

TEXT BOOKS

1. J.M. Zurada : Introduction to Artificial Neural Systems, Jaico Publishers.
2. Kishan Mehrotra , Chelkuri. K. Mohan, Sanjay Ranka : Elements of Artificial Neural Networks, Penram International
3. B.Yagnanarayana : Artificial Neural Networks, PHI, New Delhi.
4. Waserman : Neural Computing - Theory & Practice.

MPY07 - DATA MINING AND DATA WAREHOUSING

L	T	P	C
3	0	0	3

UNIT – I **9**

Introduction: Fundamentals of data mining, Data mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

UNIT – II **9**

Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.
Data Mining Primitives, Languages, and System Architectures: Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems.

UNIT – III **9**

Concepts Description: Characterization and Comparison: Data Generation and Summarization – Bases characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.
Mining Association Rules in Large Databases: Association Rule Mining, Mining single-dimensional Boolean association rules from transactional databases, Mining Multilevel Association Rules from Transaction Databases, Mining multidimensional Association Rules from Relational Databases and Data Warehouses, From Association mining to correlation Analysis, Constraint – Bases Association Mining.

UNIT – IV **9**

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree : Induction, Bayesian Classification, Classification by Backpropagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction Classifier Accuracy.

UNIT – V **9**

Cluster Analysis Introduction: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density – Based Methods, Grid – Based Methods, Model – Based Clustering Methods, outlier analysis.
Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time – Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

TOTAL HOURS **45**

Reference:

1. Data Mining - Concepts and Techniques - JIAWEIHAN & MICHELINE KAMBER Morgan Kaufamann publishers.

2. Data Ming Techniques – ARJUN K PUJARI, Universities Press.
3. Data Warehousing in the Real world SAM ANAHORY & DENNIS MURRA Y. Pearson Edn Asia.

MPY08 - DESIGN OF FAULT TOLERANT SYSTEMS

L	T	P	C
3	0	0	3

UNIT – I **8**

Basic Concepts : Reliability Concept, Failures and faults, Reliability and failure rate, Relation Between reliability & mean time between failure, maintainability & Availability Reliability of Series and parallel Systems.

Test Generation : Fault diagnosis of digital Systems, Test generations for combinational logic circuits – conventional methods, Random testing, transition count testing and signature analysis.

UNIT – II **9**

Fault Tolerant Design – I : Basic concepts – static, dynamic, hybrid, and self – purging redundancy, Sift – out Modular redundancy (SMR) ,triple modular redundancy, 5MR reconfiguration, use of error correcting codes.

Fault Tolerant Design – II : Time redundancy, software redundancy, fail – soft operation, examples of practical fault tolerant systems, introduction to fault tolerant design of VLSI chips.

UNIT – III **9**

Self Checking Circuits : Design of totally self checking checkers , checkers using m out of n codes, Berger codes and low cost residue code, self – checking sequential machines, partially self – checking circuits.

Fail safe Design : Strongly fault secure circuits, fail – safe design of sequential circuits using partition theory and Berger codes, totally self – checking PLA design.

UNIT – IV **9**

Design for testable combination logic circuits : Basic concepts of testability, controllability and observability. The Read – Muller expansion technique, level ORAND- OR design, use of control and syndrome – testable design.

UNIT – V **9**

Testable Design of sequential Circuits : The scan – path technique, level – sensitive scan design (LSSD) and random Accers scan technique, built – in – test, built – in – test of VLSI chips, design for autonomous self – test, design in testability into logic boards.

TOTAL HOURS **45**

References:

1. Parag K.Lala : Fault Tolerant & Fault Testable Hardware design, (PHI) 1985.
2. Parag K LaLA : Digital Systems design using PLD's (PHI) 1990.
3. N.N. Biswas : Logoc Design Theory (PHI) 1990.

MPY09 - DIGITAL DATA COMMUNICATIONS

L	T	P	C
3	0	0	3

UNIT – I **9**

Digital Modulation Techniques: FSK, MSK, BPSK, QPSK, 8PSK, 16PSK, 6QAM, 16QAM, DPSK Methods. Bandwidth efficiency. Carrier recovery, Clock recovery –PCM-Quantization.

UNIT – II **9**

Data communication methods: Data communication circuit, point to point, multi point configurations and topologies, transmission models, 2-wire and 4-wire operations, codes, error detection methods, error correction methods, character synchronization, LCU, UART, USRT, RS-232 Interface, terminal types, simple, sophisticated, intelligent, scroll-mode, page-mode and frame-mode, modems, multistream and intelligent modems, modem operation on 2-wire line, dial-up line and 4-wire line.

UNIT – III **9**

Data communication protocols: Asynchronous protocols, synchronous protocols, Bisync protocol, SDLC, HDLC, Circuit switching techniques, circuit switching, message switching and packet switching, CCITT X.1 public network transmission modes, virtual circuit and datagram techniques.

Line protocols: Basic mode, half-duplex point-to-point protocol, half-duplex multi-point protocol, full-duplex protocols, polling, roll call and hub polling, HDLC data transfer.

UNIT – IV **9**

Digital multiplexing: TDM, T1 carrier system, CCITT-TDM carrier system, CODEC, COMBO chips, digital hierarchy, line encoding, frame synchronization, Multiplexers, statistical multiplexer, concentrator, front-end communication processor, Digital PBX, Long haul communication with FDM, hybrid data.

UNIT – V **9**

Optical fiber communication: Introduction, comparison, fiber-optic communication system, iber types, light propagation configurations, interface, losses in fiber cable, light sources, light detectors.

TOTAL HOURS 45

REFERENCES:

1. W.TOMASI : Advanced Electronic Communications systems, (PHI (Ch.1,2,3,5,partly 6,10.)
2. T. Housely, Data Communications and Teleprocessing Systems,(PHI (Ch.4,6,7,9-11,14,15,17-19).

MPY10 - DISTRIBUTED DATABASES

L	T	P	C
3	0	0	3

UNIT – I **9**

Features of distributed databases, features of Centralized databases, level of distributed transparency - Reference Architecture, types of Data Fragmentation, distribution Transparency, Access primitives, Integrity constraints.

UNIT – II **9**

Distributed Database design – A frame work, the design of database fragmentation, the allocation of fragments.
Translation of global queries into fragment queries, query optimization.

UNIT – III **9**

Distributed Transaction Management – A framework, transaction atomicity, 2- phase commit.
Concurrency control**:** foundations, distributed deadlocks, timestamps.

UNIT – IV **9**

Reliability: Basic concepts, commit protocols, consistent view of Network, Detection and Resolution of Inconsistencies, check points and cold restart.

UNIT – V **9**

Commercial Systems: Tranclem's ENCOMPASS Distributed database systems, IBM's Inter system communication, feature of distributed ingress and Oracle.
Heterogeneous databases: General problems – brief study of multibase.

TOTAL HOURS 45

Reference:

1. Distributed Database systems Principles and Systems, Ceri s. Pelagatti. G, Mc Graw Hill.

MPY11 - DISTRIBUTED OPERATING SYSTEMS

L	T	P	C
3	0	0	3

UNIT I **8**

Introduction to distributed system: goals of distributed system, hardware and software concepts, design issues.

Communication in distributed systems: Layered protocols, ATM networks, the clientserver model, remote procedure call and group communication.

UNIT II **9**

Synchronization in distributed systems: Clock Synchronization, mutual exclusion, Election Algorithms, the Bully algorithm, a ring algorithm, atomic tractions, dead lock in distributed systems, distributed dead lock prevention, and distributed dead lock detection.

UNIT III **9**

Processes and processors in distributed systems: Threads, system, models, Processor allocation, scheduling in distributed system, fault tolerance and real time distributed systems.

UNIT IV **10**

Distributed file systems: Distributed file systems design, distributed file system implementation, trends in distributed file systems.

Distributed shared memory: What is shared memory, consistency model, page based distributed shared memory, shared variable, distributed shared memory, object based DSM.

UNIT V **9**

Case study MACH: Introduction to MACH, process management, in MACH, Memory management in MACH, communication in MACH, UNIX emulation in MACH.

Case study DCE: Introduction to DCE threads, RPC's, Time service, directory service, security service, distributed file system.

TOTAL HOURS **45**

References:

1. Distributed operating system: Principles and Paradigms – A.S.Tanebaum and Marten Vanstein.

2. Operating systems – internal and design principles, 4th Ed., - W.Stallings.

MPY12 - LANGUAGE PROCESSORS

L	T	P	C
3	0	0	3

UNIT – I **9**

Lexical Analysis, scanning process, regular grammars and regular expressions, state transition diagrams, minimization of number of states, scanning algorithm, LEX program.
Top down parsing, parse tree representation, brute force approach, recursive descent parsing, predicted parsers, LL (1) grammars.

UNIT – II **9**

Bottom up parsing, operator precedence, grammar and corresponding parsing algorithm, simple precedence grammars, precedence functions, LR grammars, LR parsers, LALR(1) parsers, YACC program.

UNIT – III **9**

Syntax – directed definitions, construction of syntax trees, Bottom – up evaluation of S – attributed definitions, L – attributed definitions, Top – down translation, Bottom – up evaluation of inherited attributes, Type systems, specification of a simple type checker, Equivalence of type expressions, Type conversions, Overloading of functions and operators, polymorphic functions.

UNIT – IV **9**

Symbol tables – data in symbol tables, symbol table organization hashing, tree structured; symbol table organization for block structured languages, representation PASCAL datatypes in symbol table storage allocation storage for arrays, strings, records etc. Run time storage Organization.
Semantic Analysis and code generation, Intermediate forms of source programs polish notation, N tuples, abstract syntax trees, transformation from infix to internal forms, semantic stacks, attributed translation grammars.

UNIT – V **9**

Code Optimization folding, redundant sub expression elimination, loop optimization unrolling, frequency reduction, strength reduction, global optimization using flow graph analysis.
Object code generation problems in object code generation, register allocation algorithms, object modules.

TOTAL HOURS **45**

References

1. The theory and practice of compiler writing, J. P. Tremblay & P. G. Sorenson, MC Graw 1985.

2. Principles of Compiler Design, A. V. Aho & J. D. Ullman, Addison Wesley/ Narosa 1985.

MPY13 - OBJECT ORIENTED ANALYSIS AND DESIGN USING UML

L	T	P	C
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UNIT – I **9**

Introduction to UML: The meaning of Object-Orientation, object identity, encapsulation, information hiding, polymorphism, genericity, importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture.

Basic structural Modeling: Classes, relationships, common mechanisms, diagrams, Advanced structural modeling: advanced relationships, interfaces, types & roles, packages, instances.

UNIT – II **9**

Class & object diagrams: Terms, concepts, examples, modeling techniques, class & Object diagrams.
Collaboration diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration diagrams, iterated messages, use of self in messages.

UNIT – III **9**

Sequence diagrams: Terms, concepts, differences between collaboration and sequence diagrams, depicting synchronous messages with/without priority call back mechanism broadcast message.

UNIT – IV **9**

Behavioral Modeling: Interactions, use cases, use case diagrams, activity diagrams.
Advanced Behavioral Modeling: Events and signals, state machines, processes & threads, time and space, state chart diagrams.

UNIT – V **9**

Architectural Modeling: Terms, concepts, examples, modeling techniques for component diagrams and deployment diagrams.

TOTAL HOURS **45**

References:

1. The Unified Modeling Language User Guide, Grady Booch, James Rambaugh, Ivar Jacobson , Pearson Education. ISBN : 81-7808-169-5.
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Addison Wesley, 2000. ISBN : 981-4053-83-X.

MPY14 - DIGITAL IMAGE ANALYSIS AND MACHINE VISION

L	T	P	C
3	0	0	3

UNIT – I **9**

Digitized Image and its properties: Basic concepts, Image Functions, the dirac distribution and convolution, the Fourier transform, Images as a Stochastic process, Images as linear systems.
Image Digitization: Sampling, Quantization, Colour Images.

UNIT – II **9**

Digital Image Properties: Metric and topological properties of Digital Images, Histograms, Visual perception of the Image, Image quality, Noise in Images.
Data Structures for Image Analysis: Levels of Image Data representation, traditional Image Data Structures- Matrices, Chains, Topological Data Structures, Relational Structures.

UNIT-III **9**

Image Pre-processing: Pixel brightness transfomation – Position dependent brightness correction, Gray scale transformation. Geometric Transformations -- Pixel co-ordinate transformation, Brightness interpolation. Local Pre-processing – Image smoothing, Edge-detectors, Zero crossings of the second deritives, scale in Image processing, canny edge detection, parametric edge models, edges in multi spectral images, other local pre-processing operators, adaptive neighborhood preprocessing.
Image Restoration: Degradations that are easy to restore, Inverse Filteration, Weiner Filteration.

UNIT – IV **9**

Segmentation: Thresholding – Threshold detection methods, optimal thresholding, multi-spectral thresholding, thresholding in hierarchical data structures.
Edge Based Segmentation: Edge image thresholding, Edge relaxation, border tracing, border detection as graph searching, border detection as dynamic programming, Hough transformation, border detection using border location information, region construction from borders.
Region Based Segmentation: Region merging, region splitting, splitting and merging, Watershed segmentation, region growing post processing.

UNIT – V **9**

Shape Representation and Description: Region identification, Computer Based representation and description – Chain codes, simple geometric border representation, Fourier transforms of boundaries, boundary description using segment sequences, B-Spline representation, other contour based shape description approaches, Shape Invariants.
Region Based Shape representation and description: Simple scalar region descriptors, moments, convex hull, graph representation based on region skeleton, region decomposition, region neighborhood graphs, Shape classes.

TOTAL HOURS 45

References:

1. Image Processing, Analysis and Machine Vision – Milan Sonka, Vaclav
2. Hlavac, Roger Boyle, Second Edition – Vikas Publishing House.
3. Digital Image Processing And Analysis – Chanda & Majumder

MPY15 - ADVANCED COMPUTER ARCHITECTURE

L	T	P	C
3	0	0	3

UNIT – I **8**

Overview: Register and bus organized computers and instruction execution. Output and Input memory and control Organisation. Hard – Wired and Micro programmed control.

UNIT – II **9**

Processor Organisation: General Structure of CPU-registers, Stacks, ALU and Control units, Instruction types, Formats Sets and Addressing modes. Basic mathematical operations, Fixed- point addition, subtraction, multiplication and division.

Implementation of fixed-point operations and ALU design F.P. operations and their implementation. H.W. fast addition multiplication and division. Principles of array and pipeline processors.

UNIT – III **9**

Design of Controller: Principles of instruction decoding and implementation, Hardwired and micro instruction based control units. Horizontal and Vertical classes of micro instructions, Nano-program control. Identifying micro instructions, minimizing micro instruction, encoding control instructions, timing cycles and clock generations.

Organisation of micro-program based control unit. Concepts of RISC and comparison with CISC processors.

UNIT – IV **10**

Memory Organization: Types of memories – serial, random and semi-random access, core semiconductor and bubble memories, memory device characteristic density, speed, access time, costs, destructive, non destructive read out, static memories, dynamic memories and memory refresh. Word length and size of memory hierarchy, memory references, address mapping, relocation mechanism, concepts of memory compaction, principles of virtual memory, segmentation and paging. Interleaved memories and principles of address interleaving. Associative memories word organized associative memory, masking. Hardware protection features in multiprogrammed systems.

UNIT – V **9**

System Organization : Communication : Introduction, Bus control, computer Networks. Input-Output systems : programmed I/O, DMA, Interrupt control, I/O processors. Operating Systems: Introduction, concurrency control, system management. Parallel processing: Introduction – types of parallel processors, performance considerations, pipelined, vector and multiprocessor systems.

TOTAL HOURS 45

References:

1. John.P.Hayes computer architecture & Organisation, McGrawHill, Publisher.
2. M.Morris Mano, Computer System Architecture, Prentice Hall of India.
3. Tanenbaum, Computer Organization & Architecture, Prentic Hall of India.
4. Rafiqquzzman – clandra, Modern Computer Architecture.
5. William Stalings, “Computer Organization & Architecture”, Addison Wesley.
6. Vincent P. Hevling, “Computer Organization & Architecture”, Addison Wesley.
7. Hwang, K & F.A. Briggs, “ Computer Architecture and Parallel Processing”, Mhill.
8. Patterson D.A & J.L. Hennessy, “ Computer Architecture” A Quantative Approach “Morgan Kanfmann Publishers.

MPY16 - ADVANCED DATABASES

L	T	P	C
3	0	0	3

UNIT I **9**

Introduction: Distrubuted Data Processing, Distributed Databases System, promises of DDBS, Problem areas.

Overview of Relational DBMS: Relational Databases Concepts, Normalization, Integrity rules, Relational data languages.

UNIT II **9**

Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.

Distrubuted Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

UNIT III **9**

Query Processing and Decomposition: Query processing Objectives, Characterization of query processors, layers of query of query processing, query decomposition, Localization of distributed data.

Distributed query Optimization: Query optimization, centralized query optimization, Distributed query optimization algorithms.

UNIT IV **9**

Transaction Management: Definition, properties of transaction, types of transactions. Distributed concurrency control. Serialization, concurrency control Mechanism & Algorithms. Time stamped and Optimistic concurrency control Algorithms, Dead lock Management.

Distributed DBMS Reliability: Reliability concepts and Measures, fault-tolerance in Distributed systems, failures in Distributed DBMS, local & Distributed Reliability Protocols, site failures and Network partitioning.

Parallel Database Systems: Database Series, Parallel Architecture, Parallel DBMS Techniques, Parallel exception problems, Parallel Execution for Hierarchical architecture.

UNIT V **9**

Distributed object Database Management Systems: Fundamental object concepts and Models, Object Distributed Design, Architectural Issues, Object Management, Distributed Object storage, Object query Processing.

Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparing ODDBMS and ORDBMS.

TOTAL HOURS 45

References:

1. M.Texter OZSU and Patuck Valduries Principles of Distributed Database Systems, Pearson Additions, 2001.
Syllabi for Pre.PhD/Pre M.Phil/ Pre MS. W.e.f. 2005-2006 Batch
2. Stefan Cari and Willipse Peiagatti Distributed Databases, McGraw Hill.
3. Heary P Korth, A.Silberchatz and Sudershan : Database System Concepts, MGH
4. Raghuramakrishnan and Johhanes Geheke: Database Management Systems, MGH.

MPY17 - ADVANCED OPERTING SYSTEMS

L	T	P	C
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UNIT- I **8**

Introduction to Operating Systems, Type of operating systems.

UNIT –II **9**

UNIX –I :Overview of UNIX system, Structure, file systems, type of file, ordinary & Special files, file permissions, Introduction to shell.
UNIX – II :UNIX basic commands & command arguments, Standard input / output
Input / output redirection, filters and editors.

UNIT – III **9**

UNIX SYSTEMS CALLS : System calls related file structures, input / output process creation & termination.

INTERPROCESS COMMUNICATION IN UNIX : Introduction, file and record locking, Client – Server example, pipes, FIFOs, Streams & Messages, Name Speces, Systems V IPC,Message queues,Semaphores, Shared Memory, Sockets & TLI Socket and IPC Programming.

UNIT – IV **10**

INTRODUCTION TO NETWORKS AND NETWORK PROGRAMMING IN UNIX : Network Primer, TCP/IP – Internet Protocols, Socket Programming – Introduction & overview, UNIX domain protocols, Socket Addresses, Elementary Socket system calls, Simple examples – Client-Server Programming.

UNIT – V **9**

LINUX: Introduction to LINUX System, editors and utilities, type of shells.
LINUX OPERATIONS: Shell operations, file structure, file management, Operations.

TOTAL HOURS **45**

References:

1. The design of the UNIX Operating Systems – Maurice J.Bach (PHI)
2. The UNIX Programming Environment (PHI) – Kernighan & Pike.
3. UNIX Network Programming - W.Richard Stevens (PHI) – 1998.
4. The Complete reference LINUX – Richard Peterson (TMH)
5. UNIX User Guide – Ritchie & Yates.

MPY18 - INTERNET PROTOCOLS

L	T	P	C
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UNIT – I **8**

Introduction

Internet administration and standards. The OSI model and TCP/IP protocol, TCP/IP Versions.

UNIT– II **8**

Internet Protocol – Part 1.

IP addressing, different classes, subnetting, supernetting, delivery and routing of IP packets, IP design, ARP and RARP.

Internet Protocol – Part2.

Internet control message protocol, message format, error reporting and query, ICMP design, Internet group message protocol and its design, user datagram protocol, operation and design.

UNIT – III **9**

Transmission Control Protocol.

TCP services, flow control, error control, connection, congestion control, TCP design and operation, routing protocol, RIP, OSPF and BGP.

BOOTP and DHCP, DNS name space, distribution of name space, DNS resolution, types of records, Telnet and remote login.

UNIT– IV **10**

File Transfer Protocol, connection, communication and command processing, TFTP, simple mail transfer protocol, addresses, mail delivery, multipurpose Internet mail extensions. Post office protocol.

UNIT – V **10**

Simple Network Management Protocol, Hypertext Transfer Protocol, Next Generation IP Protocols, IPv6 and ICMPv6.

TOTAL HOURS **45**

References:

1. TCP/IP Protocol Suite – By Behrouz A. Porouzan, TMH, ed.-2000.

2. Internet Working with TCP/IP Vol.I: Principles, Protocols and Architecture – by Douglas E. Comes. (PHI)-1997.

MPY19 - NETWORK SECURITY

L	T	P	C
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UNIT I **9**

Introduction to Network Security At tacks, services, Security. A model of Inter network Security, Steganography, One time PADS.

Basic and ESOTERIC Cryptographic Protocols Key Exchange, Authentication, Formal Analysis of Authentication and key Exchange Protocols, Multiple & Public Key Cryptography, Secret Splitting & Sharing Secure elections, Secure multiparty Communication, Digital Cash.

UNIT II **9**

Crypto Graphic Algorithms (Block Cipher) RC2, GOST, CAST, BLOW FISH, SAFEER, RC5, NEWDES, CRAB, Theory of Block Cipher design. 4. Key Management, Key lengths, Generating Keys, Transferring, Verification, Updating, Storing, Backup, Compromised, Lifetime of, Destroying Keys, Public key Management..

UNIT III **9**

Digital Signature Algorithms, Digital Signature, DSA, DSA variants, Gost, Discrete Lagorithm, One – Schnorr – Shamir digital Signatures, Esign, Cellular Automata.

UNIT IV **9**

Electronic Mail & IO Security good Privacy, SIMIME, IP Security Architecture, Authentication Header, Encapsulating Security, Pay load Key Management Issues.

UNIT V **9**

Web Security Web Security requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

Intruders, Viruses, Worms and Firewalls Intruders, Viruses and Related Threads, Firewall Design Principles, Trusted Systems.

TOTAL HOURS 45

References:

1. Applied Crypto Graphy – Bruce SCHNEIER Johnwiley & Sonc Inc – Second Ed.
2. Cryptography and Network Security William Stallings Prentice Hall

MPY20 - NEURAL NETWORKS AND FUZZY SYSTEMS

L	T	P	C
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UNIT I

Introduction and fundamentals of Artificial Neural Networks, Biological prototype, Artificial neuron, Single layer artificial, neural networks, multiplayer artificial neural networks, training of artificial neural networks.

Perceptions: Perceptron Representation, perceptron learning, perceptron Training algorithm. Back propagation: Introduction to back propagations and Back propagation training algorithm, counter propagation networks.

UNIT II

Kohonen self-organizing networks: Introduction, the Kohonen algorithm, weight training, Grossberg layer, Training the Grossberg Layer.

Hopfiled Networks: Introduction, The Hopfiled model, Hopfiled network algorithm, Boltzmann's machine applications of Hopfiled Networks, Associative Memories, Bi-directional Associative Memories.

UNIT III

Adaptive Resonance Theory: Architecture of Adaptive Resonance Theory, Algorithm, Applicability of Artificial neural Networks to pattern Recognition and Image Processing, Dimensionality of neural Networks for pattern Recognition.

From classical (CRISP) sets to fuzzy sets: Crisp sets, fuzzy sets types and basic concepts. Characteristics and significance of paradigm shift. Fuzzy sets Vs Crisp Sets: Additional properties of α-cuts, representation of fuzzy sets, operations on fuzzy sets: types, fuzzy complements, fuzzy intersections, unions, combinations, aggregations.

UNIT IV

Fuzzy arithmetic: fuzzy numbers, linguistic variables, arithmetic operations on intervals, fuzzy numbers, and lattice of fuzzy numbers, equations. Fuzzy Relations: Crisp Vs Fuzzy relations, binary fuzzy relations, fuzzy Equivalence, compatibility, ordering relations, fuzzy morphisms, Sup-i, inf-ωi compositions of fuzzy relations. Fuzzy relation equations: problem partitioning, solution method, basing on Sup-i, inf-ωi compositions.

UNIT V

Possibility theory**:** fuzzy measures, evidence theory, fuzzy sets and possibility theory, possibility Vs probability theory, Fuzzy logic: Multivalued logics, propositions, quantifiers, linguistic hedges, inferences. Uncertainty based information, Fuzzy systems: fuzzy controllers, fuzzy systems and neural networks, fuzzy neural networks, fuzzy automata, dynamic systems.

References:

1. Neural computing: Theory and practice – Waserman
2. Sets and Fuzzy logic theory and applications—George J. Klir/Bo Yuan
3. An introduction to Neural Computing – I. Alexander and Helen Mart – William Jackson.

SEMESTER II

MPC 201 DISSERTATION

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