AFFILIATED INSTITUTIONS

ANNA UNIVERSITY, CHENNAI

REGULATIONS – 2009

M.TECH (MAIN FRAME TECHNOLOGY)

I to VI SEMESTERS (PART-TIME) CURRICULUM AND SYLLABUS

SEMESTER – I

COURSE CODE NO	COURSE TITLE	L	T	P	C
THEORY					
MA9327	Optimization Techniques	3	1	0	4
MT9311	Fundamentals of Mainframe Technology	3	0	0	3
MT9312	Data Structures and Algorithms	3	0	0	3
	TOTAL	**9**	**1**	**0**	**10**

SEMESTER – II

COURSE CODE NO	COURSE TITLE	L	T	P	C
THEORY					
MT9321	Software Engineering Methodologies	3	1	0	4
MT9322	Mainframe Networking	3	0	2	4
MT9323	Object Oriented System Design	3	1	0	4
	TOTAL	**9**	**2**	**2**	**12**

SEMESTER – III

COURSE CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
MT9313	Computer Communication Networks	3	0	0	3
MT9314	COBOL Programming	3	1	0	4
MT9315	Advanced Database Technology	3	1	0	4
PRACTICALS					
MT9316	Data Structures Lab	0	0	3	2
	TOTAL	**9**	**2**	**3**	**13**

SEMESTER IV

COURSE CODE	COURSE TITLE	L	T	P	C
CS9222	Advanced Operating Systems	3	0	0	3
MT9324	Mainframe File System	3	0	0	3
	Elective - I	3	0	0	3
PRACTICAL					
MT9325	Operating Systems Lab	0	0	3	2
	TOTAL	**9**	**0**	**3**	**11**

SEMESTER V

COURSE CODE	COURSE TITLE	L	T	P	C
THEORY					
	Elective – II	3	0	0	3
	Elective – III	3	0	0	3
	Elective – IV	3	0	0	3
MT9331	Technical Seminar	0	0	2	2
MT9332	Project work (Phase – I)	0	0	12	6
	TOTAL	**9**	**0**	**14**	**17**

SEMESTER VI

COURSE CODE	COURSE TITLE	L	T	P	C
THEORY					
MT9341	Project work (Phase – II)	0	0	24	12
	TOTAL	**0**	**0**	**24**	**12**

ELECTIVE SUBJECTS:

COURSE CODE	COURSE TITLE	L	T	P	C
THEORY					
MT9351	Software Project Management	3	0	0	3
MT9352	Mobile Networking	3	0	0	3
NE9263	Distributed Computing	3	0	0	3
MT9353	Grid Computing	3	0	0	3
MT9354	Pervasive Computing	3	0	0	3
MT9355	Soft Computing	3	0	0	3
MT9356	Bioinformatics	3	0	0	3
CS9264	Data warehousing and Data mining	3	0	0	3
MT9357	DB2 Internals	3	0	0	3
MT9358	Practical ISPF & JCL	3	0	0	3
MT9359	z/OS Internals	3	0	0	3
MT9360	Customer Information Control System	3	0	0	3

MA9327   **OPTIMIZATION TECHNIQUES**   **L T P C**
                                                                   3 1 0 4

UNIT I   **LINEAR PROGRAMMING**   **12**
Linear Programming: Graphical method, Simplex method, Revised simplex method, Duality in Linear Programming (LP), Sensitivity analysis, other algorithms for solving problems, Transportation, assignment and other applications.

UNIT II   **NON LINEAR PROGRAMMING**   **12**
Non Linear Programming: Unconstrained optimization techniques, Direct search methods, Descent methods, constrained optimization.

UNIT III   **INTEGER PROGRAMMING**   **12**
Formulation of Integer Programming problems, Gomory's cutting plane methods, Branch and Bound Techniques.

UNIT IV   **DYNAMIC PROGRAMMING**   **12**
Characteristics of Dynamic Programming, Bellman's principle of optimality, Concepts of dynamic programming, tabular method of solution, Calculus method of solution.

UNIT V   **PERT/CPM**   **12**
Network Construction-computation of earliest start time, latest start time, Total, free and independent float time-Crashing-Computation of optimistic, most likely Pessimistic and expected time-Resource analysis in Network scheduling.

                                           L – 45 T – 15 TOTAL – 60 PERIODS

REFERNCES:
1. Taha, H.A., "Operations Research: An Introduction", Pearson Education, New Delhi, 2002.
2. S.S. Rao, "Engineering Optimization: Theory and practice", New Age International, New Delhi, 2000.
3. Trivedi K.S., "Probability and Statistics with Reliability , Queuing and Computer Applications", Prentice Hall, New Delhi, 2003.

MT9311   **FUNDAMENTALS OF MAINFRAME TECHNOLOGY**   **L T P C**
                                                                     3 0 0 3

UNIT I   **NEW MAINFRAME**   **9**
Mainframe concepts-an evolving architecture- mainframe computer users- factors contributing to mainframe use – mainframe workloads.

UNIT II   **CAPACITY**   **9**
Capacity – elements of a system required for capacity – few server Vs Many server – service level agreement – managing the system to the SLA – architecture, running work and capacity – several servers on one physical machine – parallel sysplex and its measurements.

UNIT III   SCALABILITY, INTEGRITY AND SECURITY   9

Introduction to scalability – scalability concepts – scalability implementation on IBM system – integrity – security – introduction to availability – Inhibitors to availability - redundancy – z/OS elements for availability – Disaster recovery.

UNIT IV   ACCESSING LARGE AMOUNT OF DATA   9

Introduction – channel subsystem – control unit- DASD CKD architecture and DASD subsystem – multiple allegiance/Parallel Access volumes – database and data sharing – Data placement and management .

UNIT V   SYSTEM MANAGEMENT AND AUTONOMIC COMPUTING   9

Introduction – system data – configuration management – operating management – performance management – problem management – introduction to autonomic computing – self healing – self protecting – self optimizing.

L – 45 TOTAL : 45 PERIODS

REFERENCES:

1. Mike Ebbers,Frank Byrne, Pilar Gonzalez Adrados,Rodney Martin and Jon Veilleux "Redbook – Introduction to Mainframe - Large Scale Commercial Computing". First Edition December 2006, IBM Corp.
2. Lydia Parziale, Edi Lopes Alves, Klaus Egeler, Clive Jordan" Introduction to the New Mainframe: z/VM Basics", November 26, 2007, IBM Redbooks.

MT9312   DATA STRUCTURES AND ALGORTHIMS   L T P C
**   3 0 0 3**

UNIT I   INTRODUCTION   8

Basic concepts of OOPs – Templates – Fundamentals of Analysis of Algorithm Efficiency – ADT - List (Singly, Doubly and Circular) Implementation - Array, Pointer

UNIT II   BASIC DATA STRUCTURES   9

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   SEARCHING AND SORTING   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

UNIT V   ALGORITHM DESIGN TECHNIQUES   9

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

                                                        L – 45 TOTAL – 45 PERIODS

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, 2002.
2. A. Levitin, "Introduction to The Design and Analysis of Algorithms ", 2nd edition, Addison Wesley, 2007 (chapter 2)
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
5. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education, 2002.

MT9321   SOFTWARE ENGINEERING METHODOLOGIES   L T P C
                                                                3 1 0 4

UNIT I   PROCESS AND PROJECT MANAGEMENT   9

Software Process models – process iteration – process activities – rational unified process – computer aided software engineering. Management activities – project planning – project scheduling – risk management.

UNIT II   REQUIREMENT ANALYSIS   9

Functional and Non – functional requirements – user requirements - system requirements – interface specifications – software requirements document. Requirements engineering processes – feasibility studies – elicitation and analysis – validations – management - System Models – Context – Behavioural – Data – Object – Structured

UNIT III   SOFTWARE DESIGN   9

Architectural Design – Distributed Systems Architectures – Application Architectures – Object Oriented Design – Real-time Software Design.

UNIT IV   SOFTWARE TESTING   9

Software testing fundamentals – Test Case Design – White Box - Basis Path Testing – Control Structure Testing – Block Box – Testing for Specialized environments, Architectures and Applications Software Testing Strategies – Approach – issues – testing – unit – integration – validation – system – art of debugging

UNIT V   SOFTWARE QUALITY ASSURANCE   9

Software Quality Concepts – Quality Assurance – Software Technical Reviews – Formal Approach To Software Quality Assurance - Reliability – Quality Standards – Software Quality Assurance Plan – Software Maintenance - Software Configuration Management – configuration item – process – objects in the software configuration – version control – change control – configuration audit – status reporting – SCM Standards – Case study : Martha Stockton Greengage (MSG) foundations.

L - 45 T-15 TOTAL - 60 PERIODS

REFERENCES:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach", Sixth Edition, McGraw Hill, 2005
2. Sommerville, Software Engineering, V Edition: Addison Wesley, 1996.

MT9322   **MAINFRAME NETWORKING**   **L T P C**
                                                                              3 0 2 4

UNIT I   INTRODUCTION   9

Mainframes and networks - Network layers and protocols review – Hardware connectivity on the mainframe - Sample configuration

UNIT II   TCP/IP   9

TCP/IP implementation on the mainframe - The heart of the matter- The TCP/IP profile - The FTP server – The telnet daemon - TCP/IP in a sysplex - The z/OS sysplex - Dynamic cross-system coupling - Sysplex distributor - Routing in a sysplex.

UNIT III   SNA and SNA/IP   9

The evolution of SNA - Subarea networking-SNA nodes-Subareas and domains - VTAM subarea definitions -APPN node types-Control point (CP-CP) sessions - APPN databases - APPN network topology - High performance routing (HPR)- Connection networks - SNA/IP implementation.

UNIT IV   NETWORKING OPERATIONS   9
Operational tasks- Network startup - z/OS network administrator tasks - Managing VTAM - Managing TCP/IP - Controlling TCP/IP applications -Documenting the network environment

UNIT V   SECURITY AND PROBLEM DETERMINATION   9
The context of security -   Elements of security - TCP/IP security - Industry standard security features - TN3270 security - SNA security- Network problems - Tools and diagnostic aids - TCP/IP problem determination - Communications Storage Manager (CSM) -Performance and tuning

L - 45 T-15 TOTAL : 60 PERIODS

REFERENCES:

1. Mike Ebbers,Christopher Hastings,Matt Nuttall,Micky Reichenberg, "Redbook – Mainframe Security", August 2006,V1.R7 of z/OS,IBM Corp
2. Lydia Parziale, Edi Lopes Alves, Klaus Egeler, Clive Jordan" Introduction to the New Mainframe: z/VM Basics", November 26, 2007, IBM Redbooks.

MT9323   OBJECT ORIENTED SYSTEM DESIGN   L T P C
**   3 1 0 4**

UNIT I   SYSTEM ANALYSIS AND OBJECT MODELING   12
Overview of System Analysis- Structured System Analysis vs. Object Oriented Analysis-Examples. Objects & Classes- Links and Associations- Object model- Evolution of object models- Applications- Object classifications – Generalization – Aggregation- Abstract Classes- Metadata-Candidate keys-Constraints.

UNIT II   FOUNDATION OF OBJECT ORIENTED COMPUTING   8
Major foundations: Inheritance – Polymorphism – Overriding – Overloading Minor foundations: Typing - Concurrency – Persistence Object Oriented Language Vs. Object Based Language

UNIT III   UML & USE CASE MODELING   10
Introduction to UML- Need for UML- Diagrams for Analysis & Design- Extended UML - Use Cases in UML: Describing - Testing – Realizing.

UNIT IV   UML BEHAVIOR MODELING   10
Static - Class diagram- Object diagram. Dynamic State Transition Diagrams-Interaction Diagrams- Module Diagrams- Process Diagrams.

UNIT V   CASE STUDY   5
Cruise Control System - Automatic Teller Machine – Library Management System – Inventory Control System.

L - 45 T-15 TOTAL – 60 PERIODS

REFERENCES:

1. Rumbaugh J, Blaha M, Premerlani W, Eddy F and Lorensen W., "Object Oriented Modeling and Design", PHI/ Pearson Education, New Delhi, 2004.
2. Ali Bahrami, " Object Oriented System Development", Tata McGraw Hill, New Delhi, 1999.
3. Grady Booch, " Object Oriented Analysis and Design with Applications", Pearson Education, Singapore, 2000.

MT9313	COMPUTER COMMUNICATION NETWORKS	L T P C
		3 0 0 3

UNIT I INTRODUCTION 9

Networking basics - LANs and WANs - Network hardware components, Server-based networks - Peer-to-peer networks - Server-based vs. peer-to-peer networks - Specialized servers - Combination networks - Network packets – Addressing packets – Multiplexing - Protocols - The OSI reference model – Internet Protocol Stack

UNIT II DATA LINK CONTROL 9

Asynchronous and Synchronous transmission - MAC protocol; Controlled & contention-based - IEEE 802.11 LANs – IEEE 802.11a,802.11g - System architecture, protocol architecture– physical layer, Media Access Control – MAC management – Data Transmission Module wrap-up LAN architecture - Error Detection and Correction Techniques – CRC and Linear Block Codes – Transmission Protocols – Retransmission techniques -Token ring – FDDI

UNIT III NETWORK PROTOCOLS 9

IP Layers and functions - Congestion control - X.25 - Internetworking concepts and X.25 architectural models – Naming addressing and routing using IP - Unreliable connectionless delivery - Datagram's - Routing IP datagram's - ICMP.

UNIT IV INTERNETWORKING 9

LAN Addresses and ARP - Bridges, and Switches – Hubs – Routers – Brouters – gateways and Repeaters - Choice for Implementation - File Transfer: FTP - Electronic Mail in the Internet - DNS - Socket Programming with UDP -Building a Simple Web Server

UNIT V NETWORK MANAGEMENT 9

The dial-in end-user - the direct connection user - the Internet Service Provider - the global Internet - emerging technologies over the Internet: IPv6 and ATM for a multimedia network - desktop conferencing and collaboration - mobile Internet - high-quality audio - Push Technologies

L – 45 TOTAL – 45 PERIODS

REFERENCES:

1. Fitzgerald and Dennis, "Business Data Communications and Networking", John Wiley and Sons, New Delhi, 2004
2. William Stallings, "Data and Computer Communications", Prentice Hall, New Delhi, 2005

MT9314   **COBOL PROGRAMMING**   **L T P C**
                                                                            3 1 0 4

UNIT I   INTRODUCTION   9
Structure of a COBOL Program- Coding Format for COBOL Programs- Character Set,
COBOL words- Data Names and Identifiers- Literal, Figurative Constants- Continuation
of lines and notations-divisions and its sections-IDENTIFICATION, ENVIRONMENT,
DATA, PROCEDURE.

UNIT II   USING I/O FACILITIES   9
Basic verbs- Conditional and sequential verbs- writing complete programs-Introduction-
Sample program- program testing and style- Types of Clause- Elementary and Group
Moves- CORRESPONDING Options.

UNIT III   IMPROVING THE PROGRAMS   9
Table Handling- PERFORM - indexed Table and Indexing-SET Verb- SEARCH Verb-
OCCURS DEPENDING Clause- Structured programming - Current Trends -Objectives -
methodologies-basic structures-combinations- Weakness of COBOL in Structured
Programming.

UNIT IV   USING INTERFACES TO OTHER PRODUCTS   9
Sequential Files-file description-fixed length records- variable length records-
Statements for Sequential Files- I-O CONTROLS- Sorting and Merging.

UNIT V   SPECIALIZED PROGRAMMING TASKS   9
Introduction to JCL, Statements, Format of Statements, Procedure and Symbols,
COBOL using JCL.

                                 L – 45 T – 15 TOTAL : 60 PERIODS

REFERENCES:

1. Roy M.K., and Dastidar Ghosh D., COBOL Programming, Tata McGraw Hill.
2. E. Balagurusamy, COBOL Programming –A Self Study Text, MACMILLAN
1999
3. *"VS COBOL II Application Programming Language"*
4." z/OS V1R10.0 MVS JCL Reference", Thirteenth Edition, September 2008, IBM Corp

5. "z/OS V1R6.0-V1R10.0 MVS JCL User's Guide", Fifth Edition, September 2004, IBM
Corp.

MT9315   **ADVANCED DATABASE TECHNOLOGY**   **L T P C**
                                                                     3 1 0 4

UNIT I   INTRODUCTION   9
Review of the formal relational data model - Database architecture, Components of
database management system – DDL, DML. Database Security and Database recovery,
Creating SQL Databases and Tables, Defining tables and views, Specifying integrity
constraints, Selecting Data, Queries – stored procedures and functions - triggers and
active databases

UNIT II   DATABASE DESIGN ISSUES   9
ER Model - Normalization - Security - Integrity - Consistency - Database Tuning --
Optimization and Research Issues – Design of active databases - spatio-temporal
databases - multi-media databases

UNIT III   TRANSACTION PROCESSING   9
Introduction – Properties of transaction – Serializability – Concurrency control – Locking
mechanisms – two-phase comMMF protocol – dead locks – Database recovery

UNIT IV   DISTRIBUTED DATABASES   9
Architecture- Design considerations-Interoperability Query processing - semi-joins -
query optimization - Concurrency control – transactions and Heterogeneity issues –
schema translation and schema integration

UNIT V   OBJECT ORIENTED DATABASES   9
Object-oriented data models - Object Identity and its implementation – Supporting object
modeling in database systems--Database programming and querying in object-oriented
databases - ODMG standard, including ODL, OQL – Comparing RDBMS with
OODBMS

L – 45 T – 15 TOTAL : 60 PERIODS

REFERENCES:

1. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", Tata
    Mc- Graw Hill, New Delhi, 2004
2.   Barry, Eaglestone and Mick, Ridley, "Object Databases: An Introduction", Tata
    Mc-Graw Hill, New Delhi., 1998.
 3. Mario Piattini, Oscar Diaz, "Advanced database Technology and Design",   Artech
    House Publishers, Massachusetts, 2000.
4 . Ozsu M. T. & Valduriez P., "Principles of Distributed Database Systems". , Prentice
    Hall, New Delhi, 1999.

MT9316   DATA STRUCTURES LAB   L T P C
**   0 0 3 2**

1. Implementation of List (Single, Double, Circular)

2. Implementation of Stack

3. Implementation of Queue.

4. Implementation of Searching Techniques (any Three)

5. Implementation of Sorting Techniques (any Three)

6. Implementation of Hash table

7. Implementation of Heaps

8. Implementation of AVL Rotations

9. Implementation of Prim's Algorithm.

10. Implementation of Breadth First Search Techniques.

11. Implementation of Depth First Search Techniques.

12. Implementation of Dijkstra's Algorithm.

13. Implementation of Kruskal's Algorithm.

TOTAL : 45 PERIODS

CS9222   **ADVANCED OPERATING SYSTEMS**   **L T P C**
                                                             3 0 0 3

UNIT I   INTRODUCTION   7

Main frame Systems, Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time systems – Hand held Systems, Operating Systems Structures: System Components – Operating System Services - System calls - System Programs – System Design and Implementation - CPU scheduling: Basic Concepts – Scheduling Algorithms.

UNIT II   PROCESS MANAGEMENT   11

Process Concepts - Process Scheduling - Operation on Process - Co-Operating process - Inter Process Communication - Threads: Multithreading Models - Process Synchronization: The Critical Section Problem – Synchronization Hardware - Semaphores – classical problem of Synchronization – Monitors - Deadlock: Deadlock Characterization - Methods for handling Deadlocks - Deadlock Prevention – Deadlock Avoidance - Deadlock Detection – Recovery from Deadlock.

UNIT III   MEMORY MANAGEMENT   9

Background – Swapping - Contiguous Memory Allocation - Paging - Segmentation – Segmentation with paging - Virtual Memory: Demand paging - Page Replacement - Thrashing. Buddy Systems – Storage Compaction

UNIT IV   FILE SYSTEMS   9

File Concepts - Access methods - Directory Structure - File Protection - File System Implementation: File System Structure and Implementation – Directory Implementation – Allocation methods Free Space Management – Recovery - Disk Structure – Disk Scheduling.

UNIT V   DISTRIBUTED OPERATING SYSTEM   9

Design issues in distributed operating system-Distributed file systems - Naming and Transparency-Remote File Access-Stateful versus Stateless service – Distributed Coordination- Event Ordering-Mutual Exclusion- Atomicity- Concurrency Control-Deadlock Handling-Election Algorithms-Case Study-Linux.

L – 45 TOTAL : 45 PERIODS

REFERENCES:

1. Silberschatz, Galvin, Gagne " Operating System Concepts" Sixth Edition, 2003
2. Pradeep K.Sinha, "Distributed OS concepts and Design", IEEE computer Society Press, PHI 1998.
3. Andrew S. Tanenbaum , "Modern Operating Systems", PHI , 2nd Edition 2001
4. Achut S. Godbole and Kahate Atul , "Operating Systems & Systems Programming ", Tata Mcgraw Hill, 2003.
5. Charles Crowley, " Operating systems: A Design Oriented Approach", Tata McGraw Hill, 1999.

MT9324	MAINFRAME FILE SYSTEM	L T P C
		3 0 0 3

UNIT I   UNDERSTANDING THE DFSMS ENVIRONMENT   9
DFSMS Elements - DFSMSdfp - DFSMSdss - DFSMShsm   Monitoring Your Policies -   Using Storage Devices - Managing Data Storage -   Backing Up and Recovering Data - Managing Your Data with Copy Services -   Managing Removable Media

UNIT II   DATA SETS WITH DATA STORAGE AND MANAGEMENT   9
 System-Managed Data Sets - Distributed File Manager - Access Methods - Direct Access Storage Device (DASD) Volumes -   Magnetic Tape Volumes -   Data Management Macros -   Data Set Processing-Allocating Data Sets.

UNIT III   BASICS OF VSAM   9
Introduction to VSAM- Major parts of VSAM- Terminologies and concepts-Dataset Organization- Key sequenced dataset- Entry sequenced dataset- Relative Record dataset- Variable Record Dataset- Linear Dataset

UNIT IV   RESOURCE SHARING AMONG VSAM DATASETS   9
Provisions of a Resource Spool- Building a resource spool BLDVRP- Using Hiperspace Buffers with LSR- Deciding the Size of a Virtual Resource Pool- Displaying Information about an Unopened Data Set- Displaying Statistics about a Buffer Pool- Connecting a Data Set to a Resource Pool: OPEN- Deleting a Resource Pool Using the DLVRP Macro

UNIT V   BPAM   (9)
Specifying and Initializing Data Control Blocks - Accessing Records - Sharing Non-VSAM Data Sets -   Direct Data Sets (BDAM) Processing Sequential Data Sets - Processing a Partitioned Data Set (PDS) .
.

L – 45 TOTAL : 45 PERIODS

REFERENCES:

1. "z/OS V1R10.0 DFSMS Introduction", Fourth Edition, September 2008, IBM Corp.

2. "z/OS V1R10.0 DFSMS Using Data Sets", Ninth Edition, September 2008, IBM Corp.

3 Dave Lovelace, Rama Ayyar, Alvaro Sala,Valeria Sokal, "VSAM Demystified "

V1.R4 of z/OS, September 2003, IBM Corp.

MT9325   **OPERATING SYSTEMS LAB**   **L T P C**
                                                         0 0 3 2

Implementation of the following CPU scheduling algorithms

      i) FCFS   ii) Round Robin   iii)   SJF

1. Implementation of the mutual exclusion problem using Dekker's Algorithm

2. Implementation of IPC Problem (Producer – consumer / Reader – writer problem) using semaphores.

3. Implementation of Best-fit, First-fit algorithms for memory management

4. Implementation of memory allocation with pages.

5. Implementation of FIFO page replacement algorithms

6. Implementation of LRU page replacement algorithms

7. Implementation of the creation of Shared Memory segment

8. Implementation of File Locking

9. Implementation of Banker's Algorithm

TOTAL: 45 PERIODS

MT9351   **SOFTWARE PROJECT MANAGEMENT**   **L T P C**
                                                            3 0 0 3

UNIT I   SOFTWARE PROCESS   **7**
Process Maturity – Capability Maturity Model (CMM) – Variations in CMM - Productivity improvement process

UNIT II   PEOPLE MANAGEMENT   **6**
Organization structure – Difficulties in people management - Effective team building – Role of Project manager - Team structures – Comparison of different team structures

UNIT III   SOFTWARE METRICS   7
Role of metrics in software development - Project metrics – Process metrics – Data gathering - Analysis of Data for measuring correctness, integrity, reliability and maintainability of Software products

UNIT IV   PROJECT MANAGEMENT AND SHEDULING   13
Project initiation – Feasibility study - Planning – Estimation - Resource allocation-Scheduling - Critical path – Tracking - Timeline chart – Earned value chart

UNIT V   RISK MANAGEMENT AND SCM   12
Risk analysis and management – Types of Risk involved - RMM plan-SCM-Baselines-Software configuration items-The SCM process-Version control-Change control-Configuration audit-SCM standards

L – 45 TOTAL – 45 PERIODS

REFERENCES:

1. Roger S Pressman, " Software Engineering, A Practitioner's Approach" McGraw Hill Edition, Fifth Edition, New Delhi, 2001.
2. Watts Humphrey, " Managing the Software Process ", Pearson Education, New Delhi, 2000.
3. Pankaj Jalote, "Software Project Management in practice", Pearson Education, New Delhi, 2002.
4. Watts Humphrey, "Introduction to the Team Software Process", Perason Education, NewDelhi, 2002

MT9352	MOBILE NETWORKING	L T P C
		3 0 0 3

UNIT I   ISSUES IN THE DESIGN OF A MOBILE COMMUNICATION
SYSTEM   7
Analog cellular communication: Architecture-Network elements-Radio Transmission – Logical channels-Messages.

UNIT II   NETWORK OPERATIONS AND CELLULAR CONCEPTS   12
Mobility management-authentication-Radio resources management –status- Frequency Reuse-Reuse distance-cluster size- channel assignment strategies-handoff strategies-co-channel interference-system capacity trunking and grade of service.

UNIT III   ADVERTISEMENT AND REGISTRATION   10
Agent Solicitation and Discovery mechanism-router discovery protocol-Agent Advertisement-Agent Operation-Agent Discovery-Registration Overview-Authentication Overview-Registration Request, Reply and Extensions-Mobile Node Registration Procedures-Foreign Agent Registration Actions-Home agent Processing-Security and Patent Issues.

UNIT IV   DATAGRAMS AND ROUTE OPTIMIZATION   6

Tunneling Overview and terminology-Encapsulations-Routing Failures-Tunnel Management-Decapsulation -Unicast, Broadcast and Multicast Datagram Routing-Mobile Routers-Route Optimization-Message Format-Extensions-Mobile Key Requests.

UNIT V   IP VERSION 6 AND DHCP   10

Mobility Support in IP Version 6-Bindings-Movement Detection-home Agent Discovery-Smooth hand-off-Renumbering- DHCP-Client/Server Protocol-Option Handling-portability and Mobility-Dual Mode Operation-Home address–Multi homing-Administration and Security. WAP protocol.

L – 45 TOTAL – 45 PERIODS

REFERENCES:

1. Charles E Perkins, "Mobile IP: Design Principles and Practices", Addison Wesley, 1998.
2. James D Solomon, "Mobile IP", Prentice Hall Inc., 1998.
3. David J. Goodman," Wireless Personal Communication systems", Addison Wesley Wireless Communication Series, 1999.

NE9263   DISTRIBUTED COMPUTING   L T P C
**   3 0 0 3**

UNIT I   INTRODUCTION   5

Definition - System models- Design issues of distributed operating systems – Distributed Computing environment

UNIT II   COMMUNICATION   9

Message Passing: Features and Issues –Synchronization-Buffering – Process addressing – Failure handling- Remote Procedure Call: Model – Implementation –Stub generation –RPC messages-Marshaling –Server management-Call semantics

UNIT III   SYNCHRONIZATION AND TRANSACTIONS   11

Clock synchronization -physical clocks- logical clocks- Election algorithms- Mutual exclusion – Deadlocks-Transaction- Transaction model- Classification – Implementation – Concurrency control

UNIT IV   PROCESS AND RESOURCE MANAGEMENT   10

Process migration: Features – Mechanism –Threads: Models, Issues, Implementation. Resource management- Features-Task assignment approach–Load Balancing approach–Load sharing approach

UNIT V   NAME SERVICES   10

Names, Identifiers and Addresses- Name resolution- Name space implementation- Domain Name System- Name Caches-Security. Case study: Amoeba- Mach.

L – 45 TOTAL – 45 PERIODS

REFERENCES:

1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", PHI / Prentice Hall of India, New Delhi, 2005.
2. George Coulouris, Jean Dollimore, "Distributed Systems Concept and Design", Pearson Education, New Delhi, 2005.
3. Andrew S.Tanenbaum, Marteen van stern "Distributed Systems Principles and Paradigms", PHI / Pearson Education,New Delhi, 2005.

MT9353	GRID COMPUTING	L T P C
		3 0 0 3

UNIT I   INTRODUCTION   8

The Grid – History - The Evolution of the Grid – omparison with P2P, Cluster and Internet Computing – Grid Computing Model – Types of Grids – Grid Application Characteristics – Business value of Grid Computing

UNIT II   THE ANATOMY OF THE GRID   7

The concept of virtual organizations – Grid architecture – Grid architecture and relationship to other Distributed Technologies – computational and data Grids, semantic grids

UNIT III   THE OPEN GRID SERVICES ARCHITECTURE   10

Analogy for OGSA – Evolution of OGSA – OGSA overview – Building on the OGSA Platform – Implementing OGSA – based Grids

UNIT IV   THE OPEN GRID SERVICES INFRASTRUCTURE   10

Technical details of OSGI specification, service data concepts, Naming and Change Management Recommendations – OGSA basic services

UNIT V   APPLICATION CASE STUDY   10

Study of Globus Toolkit Architecture – Services offered by Globus Toolkit – Deployment Global Grid architecture - Grid Computing Adoption in Research and Industry – GlobeXplorer – NRC-CBR biogid – White Rose Grid – Grids in life sciences Molecular Modeling for Drug Design, Resource management and scheduling, Setting up Grid, , and application execution

L – 45 TOTAL : 45 PERIODS

REFERENCES:

1. Ahmar Abbas, "Grid Computing: Practical Guide to Technology and Applications", Delmar Thomson Learning, USA, 2004.
2. Ian Foster, Carl Kesselman, "The Grid2: Blueprint for a New Computing Infrastructure". Morgan Kaufman, New Delhi, 2004
3. Joshy Joseph, Craig Fallenstein, "Grid Computing", Pearson Education, New Delhi, 2004.
4. Fran Bermn, Geoffrey Fox, Anthony Hey J.G., "Grid Computing: Making the Global Infrastructure a Reality", Wiley, USA, 2003.

MT9354   **PERVASIVE COMPUTING**   **L T P C**
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UNIT I   PERVASIVE COMPUTING APPLICATION   **9**
Pervasive Computing devices and Interfaces – Device technology trends, Connecting issues and protocols, pervasive computing principles

UNIT II   PERVASIVE COMPUTING AND WEB BASED APPLICATIONS   **9**
XML and its role in Pervasive Computing - Wireless Application Protocol (WAP) Architecture and Security – Wireless Mark-Up language (WML)

UNIT III   MIDDLEWARE COMPONENTS   **10**
Programming consumer devices, Smart card programming, messaging components, Database components

UNIT IV   PDA IN PERVASIVE COMPUTING   **8**
Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics   -   PDA   Based   Access   Architecture

UNIT V   USER INTERFACE ISSUES IN PERVASIVE COMPUTING   **9**
Architecture - Smart Card- based Authentication Mechanisms - Wearable computing Architecture

L – 45 TOTAL – 45 PERIODS

REFERENCES:

1. Uwe Hansman, Lothat Merk, Martin S Nicklous, Thomas Stober, "Pervasive Computing - Handbook", Springer- Verlag, New Delhi, 2003
2. Uwe Hansman, Lothat Merk, Martin S Nicklous, Thomas Stober, "Principles of Mobile Computing", Springer- Verlag, New Delhi, 2003.
3. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec, Klaus Rindtorff, "Pervasive Computing Technology and Architecture of Mobile Internet Applications", Addison Wesley, New Delhi, 2002.

MT9355   **SOFT COMPUTING**   **L T P C**
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UNIT I   FEED FORWARD NETWORKS AND SUPERVISED LEARNING   4
Fundamentals – Biological Neural Network – Artificial neuron – Activation function – Learning rules – Perceptron Networks – Adaline – Madaline – Back propagation Networks – Learning factors – Linear Separability.

UNIT II   SINGLE LAYER FEEDBACK NETWORKS AND
**   UNSUPERVISED LEARNING   6**
Hopfield Network - Discrete Hopfield networks – Associative memories – Recurrent auto association memory – Bi-directional Associative memory– Boltzman machine. Hamming networks – Self-Organizing feature maps – Adaptive Resonance Theory network– Counter propagation network–Radial basis function networks

UNIT III   FUZZY SETS AND RELATIONS   11
Crisp set – Vagueness – Basic set theoretic operations for fuzzy sets – Types – Operations – Properties – Crisp versus fuzzy relation – Fuzzy relation – Cardinality operations, Properties – Fuzzy Cartesian product and composition – Non interactive fuzzy sets – Tolerance and Equivalence Relations – Fuzzy ordering relations – Fuzzy Morphism – Composition of fuzzy relations.

UNIT IV   FUZZY TO CRISP CONVERSION AND APPLICATIONS   10
Lambda cuts for fuzzy sets and relations – Definition – Methods. Applications of neural Networks: Pattern Recognition – Image compression – Communication – control Systems – Fuzzy Pattern Recognition – Fuzzy Image Processing – Fuzzy Logic controllers   .

UNIT V   GENETIC ALGORITHMS   6
Introduction – Terminologies – Genetic operators – Selection, Cross-over and mutation – fitness function – a simple genetic algorithm – Applications.

L – 45 TOTAL – 45 PERIODS

REFERENCES:

1.   Simon Haykins, "Neural Networks: A Comprehensive Foundation" Pearson Education India / Prentice Hall of India, 2003.
2.   Laurene V.Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms and Applications" Pearson Education India, 2004.
3.   Timothy J Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill International Edition, 2003.
4.   Zimmermann H.J., "Fuzzy Set Theory and its Applications", Allied Publishers, 1996.
5.   David E.Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Pearson Education Asia Pvt. Ltd., , 2000.
6.   Sivanandam S N, Sumathi S and Deepa S N, " Neural Networks using MATLAB", Tata McGraw Hill, 2005.

MT9356   **BIOINFORMATICS**   **L T P C**
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UNIT I   INTRODUCTION   7

The Central Dogma – Killer Application – Parallel Universes – Watson's Definition – Top Down Vs Bottom Up Approach – Information Flow – Conversance – Communications.

UNIT II   DATABASE AND NETWORKS   9

Definition – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks: Communication Models – Transmission Technology – Protocols – Bandwidth – Topology – Contents – Security – Ownership – Implementation.

UNIT III   SEARCH ENGINES AND DATA VISUALIZATION   10

Search Process – Technologies – Searching And Information Theory – Computational Methods – Knowledge Management – Sequence Visualizations – Structure Visualizations – User Interfaces – Animation Vs Simulation

UNIT IV   STATISTICS, DATA MINING AND PATTERN MATCHING   11

Statistical Concepts – Micro Arrays – Imperfect Data – Basics – Quantifying – Randomness – Data Analysis – Tools Selection – Alignment – Clustering – Classification – Data Mining Methods – Technology – Infrastructure Pattern Recognition – Discovery – Machine Learning – Text Mining – Pattern Matching Fundamentals – Dot Matrix Analysis – Substitution Matrix – Dynamic Programming – Word Method – Bayesian Method – Multiple Sequence Alignment Tools.

UNIT V   MODELING SIMULATION AND COLLABORATION   8

Drug Discovery Fundamentals – Protein Structure – System Biology Tools – Collaboration And Communication – Standards – Issues – Case Study.

L – 45 TOTAL – 45 PERIODS

REFERENCES:

1. Bryan Bergeron, "Bio Informatics Computing", Prentice Hall, 2003.
2. T.K. Affward, D.J. Parry SMMFh, "Introduction to Bio Informatics", Pearson Education, 2001.
3. Pierre Baldi, Soren Brunak, "Bio Informatics – The Machine Learning Approach", 2nd Edition, First East West Press, 2003

CS9264   **DATA WAREHOUSING AND DATA MINING**   **L T P C**
                                                                                3 0 0 3

UNIT I   INTRODUCTION   5

Definition of Data Mining - Data Mining Vs Query Tools – Machine Learning –Taxonomy of Data Mining Tasks – Steps in Data Mining Process – Overview of Data Mining techniques.

UNIT II   DATA WAREHOUSING   10
Definition – Multidimensional Data Model – Data Cube – Dimension Modeling – OLAP Operations – Warehouse Schema – Data Warehouse Architecture – Data Mart – Meta Data – Types of Meta Data – Data Warehouse Backend Process – Development Life Cycle

UNIT III   DATA PRE-PROCESSING AND CHARACTERIZATION   10
Data Cleaning – Data Integration and Transformation – Data Reduction – Discretization and Concept Hierarchy Generation – PriMMFives – Data Mining Query Language – Generalization – Summarization – Analytical Characterization and Comparison - Association Rule Mining - Multi Dimensional data from Transactional Database

UNIT IV   CLASSIFICATION AND ASSOCIATION   10
Classification – Decision Tree Induction – Bayesian Classification – Prediction – Back Propagation – Cluster Analysis – Hierarchical Method – Density Based Method – Grid Based Method – Outlier Analysis - Basic Association Algorithms – Parallel and Distributed Algorithms – Advanced Association rule algorithms

UNIT V   ADVANCED TOPICS   10
Web Mining – Web Content Mining – Structure and Usage Mining – Spatial Mining – Spatial Data Overview – Generalization and Specialization – Spatial Rules and Classification Algorithms – Spatial Clustering Algorithms – Temporal Mining

L – 45 TOTAL – 45 PERIODS

REFERENCES:
1. Margaret Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, New Delhi, 2005.
2. Jaiwei Han, Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufman Amsterdam, 2004.
3. Paulraj Ponnaiah, "Data Warehousing Fundamentals", Wiley Publishers, Singapore, 2001.

MT9357   **DB2 INTERNALS**   **L T P C**
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UNIT I   DB2 CONCEPTS   9
Overview of SQL concepts – language elements – functions – queries – statements SQL control statements native SQL procedures – liMMFs in DB2 – characteristics of SQL in DB2 for z/OS – SQLCA – SQLDA – DB2 catalog tables.

UNIT II   DESIGNING A DATABASE AND ITS SECURITY   9
Database objects and relationships – implementing and altering database design – DB2 security – managing access through authorization IDs or roles – managing access through RACF – managing access through trusted contexts and data definition control – protecting data through encryption and RACF and auditing access to DB2.

UNIT III   OPERATION AND RECOVERY   9

DB2 basic operational concepts – starting and stopping DB2 – subMMMFing work by DB2 – scheduling administrative tasks – monitoring and controlling DB2 and its connection – managing the log and the bootstrap data set – recovering from different DB2 for z/OS problems – reading log records.

UNIT IV   WRITING EXIT ROUTINES   9

Connection routines and sign on routines – access control authorization exit routine – edit routines – validation routines – date and time routines – general guidelines for writing exit routines – stored procedures for administration

UNIT V   APPLICATION PROGRAM ON DB2   9

Setting the BD2I defaults – processing SQL statements – compiling and link editing an application – binding and rebinding application – loading and running – testing and debugging an application program on DB2.

L – 45 TOTAL – 45 PERIODS

REFERENCES:

1. "DB2 V9R1 for z/OS SQL Reference", Fourth edition, February 2008, IBM Corp.

2. "DB2 V9R1 for z/OS Administration Guide", Third edition, February 2008, IBM Corp.

3. "DB2 V9R1 for z/OS Application Programming and SQL Guide", Second edition, October 2007, IBM Corp.

MT9358	PRACTICAL ISPF &JCL	L T P C
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UNIT I   OVERVIEW OF ISPF   9

ISPF components – functions – supported data types – running a sample ISPF session – ISPF user interface – Entering commands in ISPF – running in GUI mode – Splitting the screen horizontally or vertically.

UNIT II   PERSONAL DATA SET LISTS AND LIBRARY   9

Personal data set lists – naming ISPF libaries and data sets – library concatenation – list and log data sets – ISPF system commands – function keys – run an MVS.

UNIT III   PRIMARY OPTION MENU (POM)   9

Primary Option Menu panel – status area on the Primary Option Menu – settings – View – Edit – Utilities – Foreground – Batch – Command – Dialog test.

UNIT IV   INTRODUCTION TO JCL   9

Introduction – Job control statements – job control tasks – Entering Jobs Identification – execution – job Input control – communication – protection – resource control – processing jobs processing control – performance control.

UNIT V   DATA SET RESOURCES AND SYSOUT DATA SET RESOURCE   9
Data set resource Identification – description - protection – allocation – processing control – end processing – sysout resource Identification – description – protection – performance control – End processing – Destination control - output formatting – output liMMFing – USERDATA OUTPUT JCL keyword.

L – 45 TOTAL : 45 PERIODS

REFERENCES:

1. "z/OS V1R10.0 ISPF User's Guide Vol I", Ninth Edition, September 2008, IBM Corp.

2. "z/OS V1R10.0 ISPF User's Guide Vol II", Ninth Edition, September 2008 IBM Corp.

3. "z/OS V1R10.0 MVS JCL Reference", Thirteenth Edition, September 2008, IBM Corp.

4. "z/OS V1R6.0-V1R10.0 MVS JCL User's Guide", Fifth Edition, September 2004, IBM Corp.

MT9359   **Z/OS INTERNALS**   **L T P C**
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UNIT I   INTRODUCTION TO Z/OS AND MAINFRAME ENVIRONMENT   9
Introduction to new mainframe – introduction to mainframe hardware systems – current design – processing units – clustering – parallel sysplex – typical mainframe systems – continuous availability of mainframes.

UNIT II   Z/OS AND INTERACTIVE FACILITIES   9
Overview of z/OS – virtual storage and other mainframe concepts – workload management – supervising the execution of work – middleware of z/OS – TSO – ISPF – z/OS UNIX interactive interfaces.

UNIT III   DESIGNING AND DEVELOPING APPLICATIONS   9
Application designers and programmers – application development life cycle – developing an application on the mainframe – overview of programming languages – using COBOL – using PL/I – using java – z/OS Language Environment – source , object and load modules – compiling program on z/OS – creating load modules for executable programs.

UNIT IV   ONLINE WORKLOADS FOR Z/OS   9
Online processing – transaction systems – CICS – IMS – structure of IMS database system – database management systems – database designed – DB2.

UNIT V   SYSTEM PROGRAMMING   9
Role of system programmer – customizing the system – managing system performance – configuring I/O devices – a process of change control – Initializing the system.

L – 45 TOTAL – 45 PERIODS

REFERENCES:
1. Mike Ebbers, Wayne O'Brien, Bill Ogden "Introduction to the New Mainframe: z/OS Basics" July 2006,IBM Corp
2. Lydia Parziale, Edi Lopes Alves, Klaus Egeler, Clive Jordan" Introduction to the New Mainframe: z/VM Basics", November 26, 2007, IBM Redbooks.

MT9360 **CUSTOMER INFORMATION CONTROL SYSTEM** **L T P C**
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UNIT I **WRITING CICS APPLICATIONS** **9**
Introduction to CICS – language environment – Dynamic Link Library - programming in COBOL – translation and compilation process – Program installation roadmap – Installing map sets and partition sets – CEBR.

UNIT II **CICS APPLICATION PROGRAMMING TECHNIQUES** **9**
Application design: multithreading – storing data within a transaction - design and performance: Virtual storage – operation control - Sharing data across transactions: Common Work Area – COMMAREAs - CICS intercommunication.

UNIT III **CICS FACILITIES FOR APPLICATIONS** **9**
Understanding file control: VSAM data sets – identifying VSAM records – Locking of VSAM records - BDAM data sets – file control operations: CICS command to read records – CICS command to Update records – CICS commands to delete records – Interval control – Task control.

UNIT IV **STORAGE AND CONTROL FACILITIES** **9**
CICS storage control – CICS storage protection – transaction isolation – transient data control – terminal control commands – temporary storage control - named counter servers.

UNIT V **BASIC MAPPING SUPPORT (BMS)** **9**
Basic Mapping Support – creating the map – sending BMS mapped output – Using the SEND MAP command – receiving mapped data – BMS logical messages – cumulative output – message routing.

L – 45 TOTAL – 45 PERIODS

REFERENCES:

1. CICS Transaction Server for z/OS V2R2 CICS DB2 Guide

2. CICS Transaction Server for z/OS V3R2 CICS Application Programming Guide
3. CICS Transaction Server for z/OS V3R2 CICS Application Programming Reference