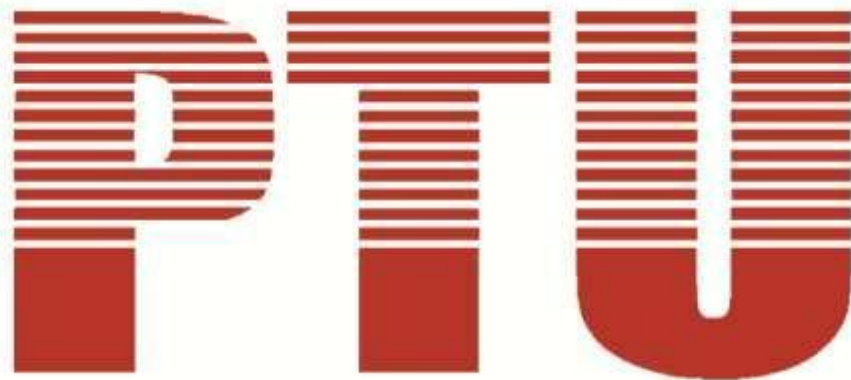


**Scheme & Syllabus of
Master of Computer Science
(M.Sc. CS)**

Batch 2013



By

Department of Academics

Punjab Technical University

Punjab Technical University
MSc (Computer Science) Batch 2013 onwards

First Semester

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
MSC-101	Mathematical Foundations of Computer Science	4	1	-	40	60	100	5
MSC-102	OOPS Using C++ & Java	4	1	-	40	60	100	5
MSC-103	Database Management System	4	1	-	40	60	100	5
MSC-104	Operating system	4	1	-	40	60	100	5
MSC-105	Technical Communication	3	1	-	40	60	100	4
MSC-106	Practical Lab based on MSC-102	-	-	4	60	40	100	2
MSC-107	Practical Lab based on MSC-103	-	-	4	60	40	100	2

Second Semester

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
MSC-201	Advanced Java Programming	4	1	-	40	60	100	5
MSC-202	Computer Organisation	4	1	-	40	60	100	5
MSC-203	Data Structures	4	1	-	40	60	100	5
MSC-204	Data Communication & Networks	4	1	-	40	60	100	5
MSC-205	Web Technologies	4	1	-	40	60	100	5
MSC-206	Practical Lab based on MSC-201 & MSC-203	-	-	4	60	40	100	2
MSC-207	Practical Lab based on MSC-205	-	-	4	60	40	100	2

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Third Semester

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
			T	P	Internal	External		
MSC-301	Optimization Techniques	4	1	-	40	60	100	5
MSC-302	Interactive Computer Graphics	4	1	-	40	60	100	5
MSC-303	Linux Administration	4	1	-	40	60	100	5
MSC-304	Data Mining & Warehousing	4	1	-	40	60	100	5
MSC-305	Software Engineering	4	1	-	40	60	100	5
MSC-306	Practical Lab based on MSC-302	-	-	4	60	40	100	2
MSC-307	Practical Lab based on MSC-303	-	-	4	60	40	100	2

Fourth Semester

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
			T	P	Internal	External		
MSC- 401	Design & Analysis of Algorithm	4	1	-	40	60	100	5
MSC- 402	Artificial Intelligence	4	1	-	40	60	100	5
MSC- 403	Enterprise Resource Planning	4	1	-	40	60	100	5
MSC- 404	Major Project	-	-	8	80	120	200	8
MSC- 405	Seminar	-	-	5	100	-	100	4

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First Semester

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MSC-101 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

SECTION-A

SET THEORY AND RELATIONS

Sets- Elements of a set, methods of describing a set, types of sets, Operations on sets-- union, intersection and difference of sets, Venn diagrams, statement problems, Associative Laws, Distributive laws, DeMorgan"s laws, duality, partitioning of a set.

Relation -Basic definition of relation and types of relations, graphs of relations, properties of relations, (domain, range, inverse and composite relations), Matrix representation of a relation.

SECTION-B

ALGEBRA OF LOGIC, MATHEMATICAL INDUCTION

Propositions and Logic operations, truth tables, arguments and validity of arguments, propositions generated by a set, equivalence and implication laws of logic, mathematical system and propositions over a universe, Quantifiers, Principle of Mathematical Induction.

SECTION-C

GRAPH THEORY

Various types of graphs- Simple and multi graphs, directed and undirected graphs, Eulerian and Hamiltonian graphs, Graph connectivity, graph traversals, graph optimizations, graph coloring, Trees, spanning trees.

SECTION-D

RECURSION AND RECURRENCE RELATIONS

Recursion, many faces of recursion, recurrence relations, some common recurrence relations, Introduction of a Matrix, its different kinds Matrix Operations: Addition, Subtraction, Multiplication and Inverse, Solving simultaneous equations using Gauss elimination, Gauss Jordan Methods, Matrix Inversion method.

References:

1. Alan Doerr, Applied Discrete Structures for Computer Science , Galgotia Publications.
2. Kolman and Busby —Discrete Mathematical structures for Computer Sciences PHI.
3. Discrete Mathematical Structure with application to Computer Science, Tremblay J.P. and Manohar R, McGraw Hill , 30th Reprint (2007)

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MSC-102 OOPS Using C++ & Java

Section- A

Oops concepts: - Basic Concepts of Object-Oriented Programming (Objects and Classes, Data abstraction and encapsulation, Inheritance, Polymorphism, Dynamic binding, Message communication), difference between procedure oriented and object oriented approach, Benefits of OOP's; Applications of OOP's, Object-Oriented languages.

Section- B

Object-oriented Methodology:- Object-Oriented analysis, Problem Statement, example of Analysis Process using Object, Overview of System Design, Object Design, object modelling, Object & Classes, Links & Associations, Generalization & Inheritance, Aggregation, Abstract Classes, example of an Object Model.

Section- C

Object oriented programming with C++:-difference between C and C++, Object Oriented terminology in C++(classes, objects, encapsulation, data hiding, inheritance, message passing, Inheritance). Constructors, Constructor overloading, Operator overloading, Function overloading, inline functions, Virtual functions, Types of inheritance, reusable classes, Abstract classes, difference between structure and classes.

Section- D

Object oriented programming with Java:- Introduction, Java Features (Compiled and interpreted, Platform independent and portable, Object-oriented, Robust and secure, Distributed, Simple, small and familiar, Multithreaded and interactive, High performance, Dynamic and extensible); How Java Differs from C and C++ (Java and C, Java and C++); Java and Internet, Simple Java Program (Class declaration, Opening brace, The main line, The output line), Implementing a Java Program (Creating the program, Compiling the program, Running the program, Machine neutral, Java Virtual Machine; Command Line Arguments, An application with Two Classes; Java Program Structure (Documentation section, Package statement, Import statements, Interface statements, Class definitions, Main method class) .

References:

1. "Object Oriented Modeling & Design" by James Rumbaugh, Michael Balaha (PHI, EEE).
2. Patrick Naughton & Herbert Schildt: The Complete Reference Java 2, Tata McGraw Hill Edition.
3. Balagurusamy: Programming in JAVA, BPB Publications, 2005.
4. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia Publications, 1994.
5. The C++ Programming Language, Bjarne Wesley Publications, 1994.

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MSC-103 DATABASE MANAGEMENT SYSTEMS

SECTION A

An overview of DBMS: Concept of File Processing Systems and database systems, Database Administrator and his responsibilities, Three level Architecture of Database System: the external level, conceptual level and the internal level, Mapping, Physical and Logical data independence.

SECTION B

Introduction to Data Models: Entity Relationship Model, Hierarchical, Network and Relational Model Comparison of Network, Hierarchical and Relational Model.

Conceptual Model: Entity Relationship Model, Importance of ERD, Symbols (Entity: Types of Entities, weak Entity, Composite Entity, Strong Entity, Attribute: Types of Attribute, Relationship: Type of relationship, Connectivity, Cardinality).

SECTION C

Relational data Model: Normalization and its various forms, De-Normalization, Functional Dependencies, Multi-valued Dependencies, Database Integrity: Domain, Entity, Referential Integrity Constraints. Relational algebra and calculus, Dependencies, functional dependency, multi-valued dependency and join,

SQL-Data Definition Language, Data Manipulation Language, Data Control Language

SECTION D

Database protection: Recovery, Concurrency Management, Database Security, Integrity and Control, Disaster Management Distributed databases: Structure of a distributed database, design of distributed databases.

References:

1. "An Introduction to Database System", Bipin C. Desai, Galgotia Publications.
2. "An Introduction to Data Base Systems", C.J. Date, Eighth Edition, Narosa Publications.
3. "Database System Concepts", Henry F. Korth, Fifth Edition, McGraw Hill.
4. " Database Management System", Anshuman Sharma

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MSC- 104 OPERATING SYSTEMS

SECTION A

Introduction: Application programs and system programs; functions of an operating system; classification of operating systems-Multi-user, multiprogramming, multiprocessing, time sharing, multi-threaded. Subsystems – Top Layer, Middle Layer, Bottom Layer, Bootstrapy.

Processes and Threads: Program vs. Process; Process context, address space, identification, transition, state & management. Thread management-benefits, synchronization issues; applications of threads.

SECTION B

CPU Management: Objectives, Pre-emptive vs. Non-pre-emptive, context switching, scheduling schemes; multi-processor scheduling, thread scheduling. Inter-process Communications: Introduction, message passing model, shared memory model.

SECTION C

Memory Management: Introduction, address binding, relocation, loading, linking, memory sharing and protection; Paging and segmentation; Virtual memory: basic concepts of demand paging, performance, page replacement. Thrashing. I/O Device Management: I/O devices and controllers, device drivers; disk storage, scheduling and management.

SECTION D

File Management: Basic concepts file operations, access methods, directory structures and management, remote file systems; file protection.

Protection & Security: Need, environments: software, hardware, unauthorized use, denial of services, access control and authentication. Application security, attacks, virus & anti-virus, firewall.

References:

1. Operating System Principles by Abraham Silberschatz and Peter Baer Galvin, Seventh Edition, Published by Wiley-India
2. Operating Systems by Sibsankar Haldar and Alex A. Aravind, Published by Pearson Education.
3. An Introduction to Operating Systems by Dietel H.M., Second Edition, Published by Addison.
4. Operating system by Milan Milenkovic, Second Edition
5. Operating system by Stalling, W., Sixth Edition,

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MSC-105 Technical Communication

Section- A

Introduction to Communication: Meaning, Process, Importance of Communication in Business, Types of Information, Formal and Informal Communication, Internal and External Communication, Communication Channels, Choosing the Means of Communication, Audience Analysis, Ethical Considerations for Business Communication, Media of Communication, Barriers of Communication, Approaches to Effective Communication, Essentials of Effective Business Communication (7Cs model).

Nonverbal – Features, Understanding of Body Language, Posture, Gestures. Influences on Communication: Social influences, Culture and Communication, Few Guidelines for Better Multicultural Communication, Business Etiquettes and Communication.

Section- B

Strategies to Improve Individuals Reading and Listening Skills- Developing Reading Skills: Identify The Purpose of Reading, Factors Effecting Reading, learning how to think and read, developing effective reading habits, reading tactics and strategies: training eye and training mind (SQ3R), Recognizing a broad range of thought patterns in reading selections, reading and interpreting visuals, making inferences, recognizing facts and opinions. Developing Listening Skills: importance, purpose of listening, art of listening, factors affecting listening, components of effective listening, process of listening, principles and barriers to listening, activities to improve listening.

Section- C

Types of Communication: Oral Communication: Advantages and Disadvantages, Conversation as Communication, Art of Public Speaking, Telephonic Conversations and Voice Mails, Group Communication through Committees, Preparing and Holding Meetings, other formal communication with public at large, seminar, symposia and conferences, Overcoming Stage fright, Ambiguity Avoidance.

Section- D

Written Communication: Advantages and Disadvantages, Covering letter, Need, Functions and Kinds, Layout of Letter Writing, Types of Letter Writing: Persuasive Letters, Request Letters, Sales Letters, Complaints and Adjustments; Departmental Communication: Meaning, Need and Types: Interview Letters, Promotion Letters, Resignation Letters, Newsletters, Circulars, Agenda, Notice, Office Memorandums, Office Orders, **Press Release Report Writing:** Structure, Types, Formats, Drafting of various types of reports

References:

1. Krizan, Buddy, Merrier, Effective Business Communication, Cengage Learning
2. Baugh, Frayer & Thomas, How to write first class Business Correspondence, Viva Books
3. Devaraj, Executive Communication, Tata McGraw Hill

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MSC-106 Software Lab-I (Based on MSC-102)

This laboratory course will mainly comprise of exercises on structured query language and other concepts of Database Management System. Hands on practice of SQL statements with different clauses available using Oracle 8i or higher version

MSC-107 Software Lab- II (Based on MSC-104)

This laboratory course will mainly comprise of exercises on the basic Object Oriented concepts of C++ and Java language. The main objective is to understand Basic Programming Constructs and the concepts of Object Oriented Programming and its Applications Practically.

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Second Semester

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MSC-201 ADVANCED JAVA TECHNOLOGIES

Section - A

Servlet overview – the Java web server – your first servlet – servlet chaining – server side includes- Session management – security – HTML forms – using JDBC in servlets – applet to servlet communication.

Section - B

Java Beans :The software component assembly model- The java beans development kit- developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool- JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.

Section - C

EJB: architecture, requirements, design and implementation

RMI – Overview – Developing applications with RMI:Declaring & Implementing remote interfaces-stubs & skeletons,Registering remote objects,writing RMI clients –Pushing data from RMI Servlet .

Section - D

JSP –Introduction JSP-Examining MVC and JSP -JSP scripting elements & directives-Working with variables scopes- Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Javamail- Components- Javamail API-Integrating into J2EE-Understanding Java Messaging Services-Transactions.

References:

1. J. McGovern,R. Adatia,Y. Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, New Delhi . Schildt, 2002
2. Java 2 Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi
3. K. Moss, 1999, Java Servlets, Second edition, Tata McGraw Hill, New Delhi.
4. D. R.Callaway,1999, Inside Servlets, Addison Wesley, Boston
5. Joseph O'Neil, 1998, Java Beans from the Ground Up, Tata McGraw Hill, New Delhi.

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MS – 202 Computer Organization

Section- A

Register Transfer Language and Micro operations: Register Transfer language. Register Transfer, Bus and memory transfers, Arithmetic Micro operations, Logic micro operations, Shift micro operations, and Arithmetic logic shift unit. Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description.

Section- B

Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit, Micro program Sequencer, Hard wired control Vs Micro programmed control,

Central Processing Unit Organization: General Register Organization, STACK organization. Instruction formats, Addressing modes. DATA Transfer and manipulation, Program control. Reduced Instruction set computer.

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Floating – point Arithmetic operations, BCD Adder.

Section- C

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP).

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Dependencies, Vector Processing.

Section- D

Memory Organisation: Memory Hierarchy, Main memory- RAM and ROM chips, Memory Address map, Auxiliary memory – Magnetic Disks, Magnetic Tapes, Associative Memory – Hardware Organization, Match Logic, Cache Memory – Associative mapping, Direct mapping, Set associative mapping, Writing into cache and cache initialization, Cache Coherence, Virtual memory – Address Space and Memory Space, Address mapping using pages, Associative Memory page table, Page Replacement.

Multi Processors: Characteristics or Multiprocessors, Interconnection Structures, Cache Coherence, Shared Memory Multiprocessors.

REFERENCES:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals of Computer Organization and Design, - Sivarama Dandamudi Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier

MSC-203 Data Structures

Section A

Introduction to Data Structure: Concept of data, problem analysis, data structures and data structure operations, notations, algorithmic complexity, Big-O Notation and time space trade off.

Overview of Arrays, Recursion, Pointers, Pointer Arithmetic, Array of pointers, Arrays in terms of pointers, Static and Dynamic Memory Management, Garbage Collection.

Stack: operations like push, pop and various applications like conversion from infix to postfix and prefix expressions, evaluation of postfix expression using stacks

Queues: operations like enqueue, dequeue on simple, circular and priority queues.

Section B

Linked Lists: operations like creations, insertion, deletion, retrieval and traversal on single, circular and doubly linked list.

Trees definitions and concepts: Root, Node, Leaf Node, Level, Degree, Height and Tree representation using Linked List and Array

Types of Trees: Binary trees, Binary search tree, Height balanced (AVL) tree, B- trees, B+ Tree.

Various Tree operations

Section C

Heap: Definition, Structure, Algorithms and applications Graph: definitions, concepts, representation, Types of Graphs

Graph operations: creation, insertion, deletion, traversals and searching (depthfirst, breadth-first) of various types of graphs and Dijkstra's algorithm for shortest distance calculation.

Section D

Searching: Concept and efficiency of linear and binary search algorithms.

Sorting: Concepts, Order, Stability, Efficiency of various algorithms (Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort)

Hashing: Definition, Implementation and applications

References:

1. Data Structures – A Pseudo code Approach with C++ - Gilberg and Forouzan by Cengage Hill
2. Schaum's Outline of Data Structures with C++ - Hubbard John. R by Tata McGraw
3. Data Structures Using C and C++ - Langsam, Augenstein, Tanenbaum by Pearson Education

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MSC-204 Data Communication & Networks

SECTION-A

Introduction to Data Communication: Components of Data Communication, Data Representation, Transmission Impairments, Switching, Modulation, Multiplexing.

Review of Network Hardware: LAN, MAN, WAN, Wireless networks, Internetworks.

Review of Network Software: Layer, Protocols, Interfaces and Services.

Review of Reference Models: OSI, TCP/IP and their comparison.

Physical Layer: Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (Radio, Microwave, Infrared).

SECTION-B

Data Link Layer

Services provided by DLL: FRAMING, ERROR CONTROL, FLOW CONTROL, MEDIUM ACCESS

Medium Access Sub layer: Channel Allocation, MAC protocols – ALOHA, CSMA protocols, Collision free protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison.

SECTION-C

Network Layer

Design Issues, Routing Algorithms (Shortest Path, Flooding, Distance Vector, Hierarchical, Broadcast, Multicast). Congestion Control Algorithms (Leaky bucket, Token bucket, Load shedding), Internetworking, IP Protocol, ARP, RARP.

Network Trouble Shooting: Using Ping, Traceroute, IPconfig, Netstat, nslookup

SECTION-D

Transport Layer

Addressing, Establishing and Releasing Connection, Flow Control, Buffering, Internet Transport Protocol (TCP and UDP).

Application Layer: Domain name system, E-mail, File transfer protocol, HTTP, HTTPS, World Wide Web.

References:

1. Tanenbaum, Andrew S., 2009: Computer Networks(4thEdition), PHI.
2. Forouzan, B. A., 2009: Data Communications and Networking, Fourth Edition, Tata McGrawHill.
3. Douglas E. Comer, 2004: Internetworking with TCP/IP (Vol.1, 4thEdition), CPE.
4. Stallings, William 2008: Data and Computer Communications(8thEdition), PHI.
5. Nance, Bary, 1997: Introduction to Networking, PHI, 4thEdition

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MSC-205 Web Technologies

Section-A

HTML Basics: - Introduction to HTML elements, Basic tags, Attributes, creating HTML page, formatting, HTML links, List types and its tags. Creating tables using HTML tags, adding pictures .HTML and page accessibility, colors & background. Use of Frames and Forms in web pages.

DHTML: - Introduction, use of DHTML and its elements Cascading Style sheets defining and using simple CSS. working with classes, using span tag, external style sheets, DIV etc. of font size

Section-B

Introduction to VBScript - Adding VBScript Code to an HTML Page - VB Script Basics - VBScript Data Types - VBScript Variables - VBScript Constants - VBScript Operators – mathematical- comparison-logical - Using Conditional Statements - Looping Through Code - VBScript Procedures – type casting variables - math functions – date functions – string functions –other functions - VBScript Coding Conventions - Dictionary Object in VBScript - Err Object

Section-C

Introduction to JavaScript – Advantages of JavaScript – JavaScript syntax - Data type –Variable - Array – Operator & Expression – Looping – control structures - Constructor Function – user defined function Dialog Box JavaScript document object model – Introduction – Object in HTML – Event Handling – Window object – Document object – Browser object – Form object – Navigator object – Screen object – Build in object – User defined object – Cookies.

Section-D

Introduction to XML, XML Fundamentals, Features of XML, Uses of XML, XML Document type Definitions, XML Namespace, XML Schema, Reading XML, XML and XHTML.

References:

1. I.Bayross, 2000, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI, BPB Publications.
2. A.Russell Jones, Mastering Active Server Pages 3, BPB Publications.
3. Hathleen Kalata, Internet Programming with VBScript and JavaScript, Thomson Learning
4. Mike McGrath, XML Harness the Power of XML in easy steps, Dreamtech Publications
5. T.A. Powell, 2002, Complete Reference HTML , TMH.
6. J.Jaworski, 1999, Mastering Javascript, BPB Publications.
7. Powell, Thomas; Schneider, Fritz, JavaScript: The Complete Reference, 2nd edition 2004, TMH
8. Step By Step XML –M .Young, PHI

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MSC-206 Practical Lab

This lab is based on MSC-201(Advanced Java Programming) & MSC-203(Data Structures).

MSC-207 Practical Lab

This lab is based on MSC-205(Web Technologies).

Third Semester

MSC-301 Optimization Techniques

SECTION-A

Introduction to Optimization Techniques, Origin & development of O.R., Nature & Characteristic, features of O.R., Models & Modeling in Operation Research.

Methodology of O.R. Linear Programming - Mathematical Model, Assumptions of Linear Programming, Graphical Method, Principles of Simplex method and its Applications, Two Phase & Big M- method, Revised simplex method, Duality, Dual simplex method- Primal Dual Relationship and sensitivity analysis.

SECTION-B

Linear Programming: Mathematical formation of linear programming problem, Special types of linear programming problems -Transportation and assignment problems, Unbalanced Assignment problems, Crew based assignment problems, Test for Optimality, Degeneracy in Transportation Problems, Unbalanced Transportation Problems.

SECTION-C

Definition of Probability, Sample Space, Algebra of Events, Addition and multiplication law of probability, Conditional Probability. Dynamic Programming-Features and applications of dynamic programming.

SECTION-D

Decision Theory, Integer Programming, Gomory Method and Branch & Bound Method.

References:

1. Kapoor, V.K.: Operation Research, Sultan Chand & Co., New Delhi.
2. Manmohan Gupta, P.K.: Operation Research, Sultan Chand & Co., New Delhi.
3. Pronsens, Richard: Theory and Problems of Operation Research, McGraw Hill, 1983.
4. Hillier, F.S. & Liberman, G.J., 1974: Introduction to Operations Research, 2nd Edn. Holden
5. Day Inc.London.
6. Tara, H.A., 1982: Operations Research, 3rd Edn., McMillan Publishing Company.
7. Beightler, C.S. & Phillips, D.T., 1979: Foundations of Optimisation, 2nd. Edn. Prentice-Hall.
8. Rao, S. S., 1978: Introduction to Optimization: Theory & Applications, Wiley Eastern.
9. Srinath, L.S.: Linear Programming, East-West, New Delhi.

MSC-302 Interactive Computer Graphics

SECTION-A

Elements of Computer Graphics: Introduction to computer graphics and its applications, graphics display devices, interactive control devices, output devices, display processors.

SECTION-B

2D Graphics: Line drawing using direct method, simple DDA, integer DDA, incremental method, and Bresenham's algorithm; Circle drawing using incremental method and Bresenham's algorithm, drawing arcs, sectors, etc.

Geometric Transformations: Translation, rotation, scaling, reflection and shear.

Viewing Transformations: Concept of windows & viewport, window-to-viewport mapping, clipping operations - point, text and line clipping algorithms (Cohen - Sutherland, mid-point subdivision, Cyrus - Beck), Sutherland - Hodgman polygon clipping algorithm.

SECTION-C

3D Graphics: Introduction to 3D graphics, Geometric Transformations: Translation, rotation, scaling and reflection. Projective Transformations: Parallel projections - orthographic, axonometric (isometric, diametric and trimetric), oblique projections; and perspective projections (one, two and three vanishing points).

Viewing Transformations: Viewing a 3D object, 3D clipping (extension of specified 2D algorithms to handle 3D objects).

SECTION-D

Hidden line surface Removal: back face removal, z-buffer algorithm, Painters (depth sort) algorithm, subdivision algorithms, scan line algorithms, scan line z buffer algorithm.

Rendering: Introduction, a simple illumination model, shading - Gouraud shading & Phong shading

References:

1. Zhigang Xiang, Roy Plastock, "Computer Graphics (Special Indian Edition) (Schaum's Outline Series)", Tata McGraw Hill, Second Edition
2. Author: Hearn and Baker, Title: Computer Graphics, Publishers: Pearson Education, Delhi Year of Publication: 2007
3. J.D. Foley, A.V. Dam, S.K. Feiner, J.F. Hughes, R.L. Phillips. "Introduction to Computer Graphics", Addison-Wesley Publishing company, N.Y.; Second Edition, 1994.
4. R.A. Plastock and G. Kalley, "Computer Graphics", Schaum Series McGraw Hill, 1986.

MSC-303 Linux Administration

SECTION-A

LINUX: Introduction, Features, Architecture. Installing LINUX, Partitions, LILO, Installing software packages. Updating with Gnome, Updating with KDE, Command line installing.

File Structure: LINUX files, File structure, File & Directory permission, Operations on a file.

SECTION-B

Administering Linux: Types of Users in Linux, Creating a user A/C, modifying a user A/C, Deleting a user A/C, Checking Disk Quotas, System Initialization, System start-up & shutdown, Installing & managing H/W devices.

Setting Up A LAN: Understanding LAN, Setting up Wireless LAN, Understanding IP address, Troubleshooting LAN.

SECTION-C

Setting Up Print Server: Choosing CUPS, Working with CUPS Pointing, Managing Pointing, Configuring Point Server.

Setting Up File Server: Setting up an NFS, SAMBA, Installing & Running of mail server.

Setting Up Web Server: Configuring the Apache Server, Starting & stopping the server, Monitoring Server Activities.

SECTION-D

Setting Up DHCP & NIS: Setting up DHCP Server, Setting up DHCP Client, Setting up Network Information Service.

Troubleshooting: Troubleshooting LINUX in GRUB mode.

References:

1. Linux Administration : A Beginner's Guide by Steve Shah , Wale Soyinka, ISBN 0072262591 (0-07- 226259-1), McGraw-Hill Education
2. Unix Shell Programming, Yashavant P. Kanetkar
3. UNIX Concepts and Applications by Sumitabha Das
4. Operating System Concepts 8 th edition, by Galvin
5. Christopher Negus: Redhat Linux (10) Bible, 2003.
6. Tim Parker: Linux Unleashed, 2006.
7. Charles Fisher: Linux Administration Tools, 2007.

MSC-304 Data Mining & Warehousing

SECTION-A

Data Warehousing: Concepts of Data Warehousing, The need for data warehousing, Operational & Informational Data Stores, Data Warehouse Characteristics, Data Warehouse role & Structure, The cost of warehousing data.

Introduction to OLAP & OLTP, Difference between OLAP & OLTP, OLAP Operations.

SECTION-B

Steps for Design and Construction of Data-Warehouses, Data Pre-Processing, Data Summarization, Data Cleaning, Data Transformation, Concept Hierarchy, Structure. Patterns & Models. Multidimensional Data Model, Schemas for Multidimensional Data (Star Schema, Snowflake Schema, Fact Constellation), Data Warehouse Architecture, Data Warehouse Design.

Data Warehouse Implementation: Efficient Computation of Data Cubes, Indexing OLAP Data, Efficient Processing of OLAP Queries, Metadata Repository, Data Warehouse Back-End Tools and Utilities.

SECTION-C

Data Mining: Introduction to Data Mining functionalities, mining different kind of data, Pattern/Context based Data Mining, Data Mining Techniques: Predictive Modeling, Database Segmentation, Link Analysis, and Deviation Detection. Data Mining Query Languages, Applications and Trends in Data Mining.

SECTION -D

Prediction: Introduction, prediction techniques. Introduction to Clustering, Classification of Various Clustering Algorithms, Major Clustering Methods.

References:

1. Data Mining: Concepts and Techniques By J.Han and M. Kamber Publisher Morgan Kaufmann
2. Modern Data Warehousing, Mining and Visualization By George M Marakas, Publisher Pearson
3. Data Warehousing, Data Mining, and OLAP, Alex Berson, First Edition, Tata McGraw Hill
4. Data Warehousing, Architecture & Implementation, Hawkin, Prentice Hall
5. Data Mining: Modelling Data for Marketing, Risk and Customer Relationship Mgmt, Rud,Olivia, Paperback Edition

MSC-305 Software Engineering

SECTION-A

Software Engineering: Meaning, Evolution and Principles of software engineering, Software Process: Software Process, Software Process Models- Waterfall, Spiral, and Prototyping. Requirement Analysis & Design: Analysis Principles, SRS.

SECTION-B

System Analysis: Principles of Structured Analysis, Requirement Analysis, DFD, Entity Relationship Diagram, Data Dictionary.

S/W Design: Objectives, Principles, Concepts, Design Methodologies: Data Design, Architecture Design, Procedural Design, Object –Oriented Concepts.

SECTION-C

Software Project Management: The Management Spectrum, Software Project Planning and its characteristics, Types of metrics, Effort Estimation- FP, LOC, FP vs. LOC, Schedule & Cost Estimation Models- Activity Networks- PERT/CPM, COCOMO-I, COCOMO-II. Risk Assessment and Risk Management.

Software Testing: Testing Fundamentals, Testing Principles, Test Cases, Testing Techniques-White Box & Black Box, Unit Testing, Integration Testing, System Testing, Verification and Validation Testing, Acceptance Testing.

SECTION-D

Software Quality Management: S/W Quality, Importance of S/W Quality, Quality Metrics, Introduction to Quality Standards and models, Change Control, Change Control Process.

Reengineering: Introduction to Reverse Engineering and Forward Engineering.

References:

1. R.S. Pressman, Software Engineering: A Practitioner's Approach (6th ed.), McGraw-Hill, 2006
2. P. Jalote, An Integrated Approach to Software Engineering (3rd ed.), Narosa Publishing House, 2005
3. K.K. Aggarwal and Y. Singh, Software Engineering (revised 2nd ed.), New Age International Publishers, 2006.
4. Sommerville, Ian, Software Engineering, Addison-Wesley Publishing Company, (2006) 8th ed.
5. Software Engineering by Ian Sommerville, Pearson Education.

MSC-306 Software Lab-I (Based on MSC-302)

Implement the Following Algorithms using C++:

Use of basic functions of graphic available in C++ like circle, put pixel, rectangle, arc, ellipse, floodfill, setcolor etc.

Use of basic primitive functions to show some animations.

Line Drawing Algorithm like Direct method, DDA and Bresenham's line algorithms.

Draw a circle using polynomial, trigonometry method and Bresenham's Algorithm.

Draw an ellipse using Bresenham's Algorithm.

To move a character along circle.

To show 2D Clipping and Windowing.

MSC-307 Software Lab-II (based on MSC-303)

Practicals based on MSc-303.

Fourth Semester

MSC-401 Design & Analysis of Algorithm

SECTION-A

Algorithm: Meaning, Concept, and specification, Performance Analysis (Time and space complexities), Asymptotic Notations.

Divide and Conquer Method: Binary Search, Quick Sort, and Selection Sort.

SECTION-B

Greedy Method: Knapsack Problem, Minimum Cost Spanning Trees (Prim's Algorithm, Kruskal's Algorithm) and Single-Source Shortest Path.

Dynamic Programming: General Single Method, Multistage Graphs, All Pairs Shortest Paths, Single-Source Shortest Paths, Optimal Binary Search Trees, 0/1 Knapsack and Travelling Salesman Problem.

SECTION-C

Backtracking: General Method, 8-Queens Problem, Graph Coloring and Hamiltonian Cycles.

Search and Traversal Technique: Techniques for Binary Trees, Techniques for Graphs.

SECTION-D

Algebraic Algorithms: General Method, Evaluation and Interpolation, Fast Fourier Transformation, Modular Arithmetic.

NP- Hard Problems: Basic Concepts, Nondeterministic Algorithms, Classes NP-Hard and NP- Complete, NP-Hard Graph Problems (CNDP, DHC, TSP and AOG).

References:

1. V. Aho, J.E. Hopcroft, J.D. Ullman, Design and Analysis of Algorithms, AddisonWesley, 1976.
2. Horowitz, S. Sahni, Fundamentals of Computer Algorithms, Galgotia Publishers, 1984.
3. K. Mehlhorn, Data Structures and Algorithms, Vols. 1 and 2, Springer Verlag, 1984.
4. Purdom, Jr. and C. A. Brown, The Analysis of Algorithms, Holt Rinehart and Winston, 1985.
5. Anany Levitin, Introduction to the Design & Analysis of Algorithms, Addison, Wesley, 2002.
6. Cormen T.H., Leiserson C.E., Rivest R.L., Introduction to Algorithms, PHI, 2000.

MSC-402 Artificial Intelligence

SECTION-A

Artificial Intelligence: Meaning and concept, Importance of AI, Evolution of AI, Criteria for Success.

Knowledge: Introduction and Importance of Knowledge, Knowledge based systems, Knowledge

Representation, First Order Predicate Logic (FOPL) , Syntax and Semantics of FOPL, Knowledge Organization and Manipulation.

SECTION-B

Problem Spaces & Search: Defining the Problem as a State Space Search, Issues In The Design Of Search Programs, Common AI Problems.

Natural Language Processing (NLP):Introduction, overview of linguistics, Grammars and Languages, Basic Parsing Techniques, syntactic Processing, Semantic Analysis, Natural Language Generation , Natural Language Systems.

SECTION-C

Pattern Recognition: Introduction, Recognition and Classification Process, Learning Classification patterns, recognizing and understanding speech.

Expert System: Introduction, Rule-Based Architectures, Nonproduction system architectures, Expert System Shells, Knowledge acquisition and Validation.

SECTION-D

Learning: Meaning, Role of Learning, Types of Learning, General Learning Model, Performance Measures.

Prolog: Introduction, Converting English to Prolog Facts and Rules, Goals, Prolog Terminology, Variables, Control Structures, Arithmetic operators, Matching, Backtracking, Lists, Input/output and Streams

References:

1. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice-
2. Hall India Private Limited, 2006.
3. Rich Knight, Artificial Intelligence, Tata McGraw Hill, 2007
4. P H. Winston, Artificial Intelligence, (3rd Edition), Addison Wesley, 2006.
5. E Charniak and D Mcdermott, Introduction to Artificial Intelligence, Addison Wesley, 2004
6. Charniak & M. Dermal, Introduction to AI , Addison Wesley, 1985.
7. A.J. Gongalez & D.D. Dankel, The Engineering of Knowledge based systems theory & practice, Prentice Hall, 1993.

MSC-403 Enterprise Resource Planning

SECTION-A

ERP: Introduction, Evolution of ERP, Benefits, Conceptual Model of ERP, Structure of ERP.

Business Process Reengineering, Data ware Housing, Data Mining, Online Analytic Processing(OLAP), Product Life Cycle Management(PLM),LAP, Supply chain Management(SCM).

SECTION-B

ERP IMPLEMENTATION: Basics, Challenges, ERP Implementation Life Cycle, Post Implementation Activities.

Role of SDLC/SSAD, Object Oriented Architecture.

SECTION-C

ERP Functional Modules: Introduction, Functional Modules of ERP Software, Integration of ERP,

Supply chain and Customer Relationship Applications.

SECTION-D

ERP Application: Enterprise Application Integration, ERP and E-Business , ERP II , Total quality management , Future Directions, Trends in ERP, ERP and Internet factors.

References:

1. Alexis Leon, "ERP DEMYSTIFIED", Tata McGraw Hill, Second Edition, 2008.
2. Mary Sumner, "Enterprise Resource Planning", Pearson Education, 2007.
3. Jim Mazzullo,"SAP R/3 for Everyone", Pearson, 2007.
4. Jose Antonio Fernandez, "The SAP R /3 Handbook", Tata McGraw Hill, 1998.
5. Biao Fu, "SAP BW: A Step-by-Step Guide", First Edition, Pearson Education, 2003
6. Rahul V. Altekar "Enterprisewide Resource Planning", Tata McGraw Hill.

MSc (Computer Science) Batch 2013 onwards

MSC-404 Major Project

Student has to submit the following:

Ist synopsis (containing mainly literature survey corresponding to the problem taken up for the project work and line of attack to solve the problem) within one month of joining the training is to be submitted.

IInd synopsis (containing essentially the progress of work in comparative details) within three months of joining the training is to be evaluated.

MSc (Computer Science) Batch 2013 onwards

MSC-405 Seminar

Student has to deliver the seminar on any topic from the syllabus covered.