



SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR

An Autonomous College of Rashtrasant Tukadoji Maharaj
Nagpur University, Nagpur, Maharashtra, India

TEACHING SCHEME & SYLLABUS 2014-15

MASTER IN COMPUTER APPLICATION



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Principal

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ISO 9001 : 2008 CERTIFIED ORGANISATION

About the department

Master of Computer Application is a three year course, divided in six semesters. It has asanctioned intake of 120 students, that is, 60 each in morning and evening shifts.

Department Vision

To pursue excellence in quality education, research and innovation through team work with a focus on computer applications for the benefit of industry, students and society at large.

Department Mission

The department of computer application is working with a mission to excel in imparting quality education with dedicated and strongly motivated faculty. We also strive to foster mutually beneficial relationship with industry and academia.

Program Educational Objectives

1. To prepare students who would apply the broad set of techniques, tools and skills from mathematics to solve problems in computer applications.
2. To provide the students, a sound foundation of computer fundamentals and core computer knowledge.
3. To develop abilities to interpret, analyze, present and communicate the data in IT projects.
4. To prepare computer professionals meeting the needs of Multinational companies.
5. To provide exposure to emerging technologies, adequate training and opportunities to work as part of team in multidisciplinary projects.
6. To make students understand the importance of environmental, societal, professional, ethical issues and effective communication skills.

Program Outcomes

1. An ability to apply knowledge of computing and mathematics across disciplines.
2. An ability to analyze and define computing requirements commensurate with the solution.
3. An ability to apply current techniques, skills and tools for solving IT domain problems.
4. An ability to engage in continuing professional development.
5. Demonstrate communication skills and an ability to manage disciplinary and multidisciplinary projects as a team member.

DEPARTMENT OF COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

I SEMESTER MASTER IN COMPUTER APPLICATION

Sr. No.	Code	Course	L	P	Credits	Maximum Marks			Exam Duration
						Internal Assessment	End Sem Exam	Total	
1	MCT501	Discrete Mathematics and Graph Theory	4	0	8	40	60	100	3
2	MCT502	Data Structures	4	0	8	40	60	100	3
3	MCP502	Computer Programming and Data Structures Lab	0	4	4	25	25	50	3
4	MCT503	Computer Organization & Architecture	4	0	8	40	60	100	3
5	MCT504	Digital Electronics & Microprocessors	4	0	8	40	60	100	3
6	MCP504	Digital Electronics & Microprocessors Lab	0	4	4	25	25	50	3
7	MCT505	Systems Analysis & Design	3	0	6	40	60	100	3
8	MCP506	Basics of Computer Hardware Lab	0	4	4	25	25	50	3
		TOTAL	19	12	50				

DEPARTMENT OF COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

II SEMESTER MASTER IN COMPUTER APPLICATION

Sr. No.	Code	Course	L	P	Credits	Maximum Marks			Exam Duration
						Internal Assessment	End Sem Exam	Total	
1	MCT507	Statistics and Probability	4	0	8	40	60	100	3
2	MCT508	Operating Systems	4	0	8	40	60	100	3
3	MCT509	Systems Programming	4	0	8	40	60	100	3
4	MCT510	Computer Graphics	4	0	8	40	60	100	3
5	MCP510	Computer Graphics Lab	0	4	4	25	25	50	3
6	MCT511	Object Oriented Programming	4	0	8	40	60	100	3
7	MCP511	Object Oriented Programming Lab	0	4	4	25	25	50	3
8	MCP512	Computer Workshop-I Lab	0	2	2	25	25	50	3
9	MCT513	Communication Skills	0	2	-	-	-	-	-
		TOTAL	20	12	50				

DEPARTMENT OF COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

III SEMESTER MASTER IN COMPUTER APPLICATION

Sr. No.	Code	Course	L	P	Credits	Maximum Marks			Exam Duration
						Internal Assessment	End Sem Exam	Total	
1	MCT601	Software Engineering	4	0	8	40	60	100	3
2	MCP601	Software Engineering Lab	0	4	4	25	25	50	3
3	MCT602	Database Management Systems	4	0	8	40	60	100	3
4	MCP602	Database Management Systems Lab	0	4	4	25	25	50	3
5	MCT603	Computer Networks	4	0	8	40	60	100	3
6	MCP603	Computer Networks Lab	0	4	4	25	25	50	3
7	MCT604	Design and Analysis of Algorithms	4	0	8	40	60	100	3
8	MCT605	E-Commerce	3	0	6	40	60	100	3
		TOTAL	19	12	50				

DEPARTMENT OF MASTER IN COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

IV SEMESTER MASTER IN COMPUTER APPLICATION

Sr. No.	Code	Course	L	P	Credits	Maximum Marks			Exam Duration
						Internal Assessment	End Sem Exam	Total	
1	MCT606	Internet & Web Technology	4	0	8	40	60	100	3
2	MCP606	Internet & Web Technology Lab	0	4	4	25	25	50	3
3	MCT607	Mobile Computing	4	0	8	40	60	100	3
4	MCT608	Data Warehousing and Data Mining	4	0	8	40	60	100	3
5	MCT609	Information Security	4	0	8	40	60	100	3
6	MCT610	Data Base Administration	4	0	8	40	60	100	3
7	MCP610	Data Base Administration Lab	0	4	4	25	25	50	3
8	MCP611	Computer Workshop-II Lab	0	2	2	25	25	50	3
9	MCT612	Software Documentation	2	0	-	-	-	-	-
		TOTAL	22	10	50				

DEPARTMENT OF MASTER IN COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

V SEMESTER MASTER IN COMPUTER APPLICATION

Sr. No.	Code	Course	L	P	Credits	Maximum Marks			Exam Duration
						Internal Assessment	End Sem Exam	Total	
1	MCT701	Compiler Construction	4	0	8	40	60	100	3
2	MCT702	Distributed Computing	4	0	8	40	60	100	3
3	MCP702	Distributed Computing Lab	0	4	4	25	25	50	3
4	MCT703	Elective - I	4	0	8	40	60	100	3
5	MCT704	Elective - II	4	0	8	40	60	100	3
6	MCT705	Elective - III	4	0	8	40	60	100	3
7	MCP706	Mini Project	0	6	6	50	50	100	3
		TOTAL	20	10	50				

Course Code	Elective-I	Course Code	Elective-II	Course Code	Elective-III
MCT703-1	Operation Research	MCT704-1	Distributed Database Management Systems	MCT705-1	Multivariate Data Analysis
MCT703-2	Digital Image Processing	MCT704-2	Artificial Intelligence	MCT705-2	Neural Networks & Fuzzy Systems
MCT703-3	Real Time Operating Systems	MCT704-3	Embedded Systems	MCT705-3	Wireless Applications

DEPARTMENT OF MASTER IN COMPUTER APPLICATION

Scheme of Examination of Master in Computer Application

VI SEMESTER MASTER IN COMPUTER APPLICATION

Sr.No.	Course Code	Course Name	Contact Hours	Credits	Maximum Marks			Exam Duration
					Internal Assessment	End Semester Examination	Total	
1	MCP707	Project Work-Full Time	20 hours per semester	50	300	300	600	3
	TOTAL	20 hours per semester	50					

SYLLABUS OF SEMESTER -I, M.C.A. (Master in Computer Application)

Course Code: MCT501

Course: Discrete Mathematics and Graph Theory

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes:

Students will be able to:

1. Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, and integers.
2. Skilled in propositional logic, including modeling English descriptions with propositions and connectives and doing truth table analysis. Students will be conversant in predicate logic.
3. Prove elementary properties of modular arithmetic and explain their applications in Computer Science, for example, in cryptography and hashing algorithms.
4. Analyze code for efficiency using various notation used in design & analysis of algorithm.
5. Give more emphasis on the applications of discrete structures in computer science rather than the mathematical theory itself.

Syllabus:

UNIT-I

Fundamentals - Sets and Relations, Operations on sets, Sequences, Division in the Integers, Matrices, Logic - Proposition and logical operations, Methods of Proof, Mathematical Induction.

UNIT-II

Mathematical Logic – Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, Inference Theory of the Predicate Calculus.

UNIT-III

Counting – Permutations, Combinations, The Pigeonhole Principle, Recurrence Relations, Relations and Digraphs - Product Sets and Partitions, manipulation of Relations, Transitive Closure &Warshall's Algorithm,

UNIT-IV

Functions - Function for Computer Science, Permutation Functions, Growth of Functions.

UNIT-V

Graph Theory – Basic Concept of Graph Theory, Euler's Path & Circuits, Hamiltonian Path & Circuits, Partially

Ordered Sets Lattices, Finite Boolean Functions as Boolean Polynomials, Trees.(Minimal Spanning Trees).

UNIT-VI

Semi-groups & Groups – Binary Operations Revisited, Semi-groups, Group Products & Quotients of Groups.

Text Books :

1. Discrete Mathematical Structures: Bernard Kolman, Robert C. Busby & Sharon Ross, PHI.
2. Discrete Mathematical Structures with Applications to Computer Science: J.P.Tremblay & R. Manohar, Tata McGraw Hill.
3. Discrete Mathematics:J.K. Sharma, McMillan.

Reference Books:

1. Discrete Mathematics: S.K. Chakraborty and B.K. Sarkar, Oxford Uni. Press, India.
2. Combinational Mathematics: C.J. Liu.
3. Discrete Mathematics with Graph Theory: E. Goodaire, PHI.

SYLLABUS OF SEMESTER - I, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT502

Course: Data Structures

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes

1. Explore innovative applications for various data structures.
2. Understand optimal techniques in storing, searching and sorting.
3. Understand and distinguish the conceptual and applicative differences in trees, binary trees and binary search trees.
4. Implement binary tree traversals and operations on binary search trees to design applications like directory structure management and expression trees.
5. Understanding different Hashing & Collision Techniques & its implementation.

Syllabus

UNIT-I

Introduction to Data Structures - Basic programming constructs, Variables and simple data types, Assignments, Input/output, Conditions and branching, Loops and iteration, Pointers.

UNIT-II

Concept of data types, Abstract Data Type. Arrays -implementation in memory, Types of arrays. Linked List - Concept of Linked Lists, Types, Operations on Linked lists, concept of Doubly Linked List.

UNIT-III

Stacks - Definition and example, primitive operations on Stacks, Arithmetic expressions - (Infix, Postfix and Prefix), Evaluating postfix expression, converting an expression from infix to postfix. Uses of stacks in simulating recursive procedures/ functions. Applications of stacks. Queues - Definition and examples of queues, primitive operations, Types of Queues.

UNIT-IV

Trees - Definition and Basic Terminology of trees, Binary Tree, Binary Search Tree, Tree Traversal, types of Trees (Threaded Binary Tree, Height Balanced Tree), Introduction to B-trees.

UNIT-V

Sorting - Definition of sorting, Classification of Sorting Techniques, Different Sorting Techniques and their efficiencies.

UNIT-VI

Searching - Basic search techniques, Hash search. Files: File attributes File organization. Introduction to Hashing and Collisions.

Text Books:

1. Classical Data Structure: Samanta, PHI.
2. Data Structures using C/C++: Tanenbaum, PHI.
3. Let Us C: Yashwant Kanetkar, BPB.

Reference Books:

1. How to solve it by Computers: R G Dromey, PHI.
2. Science of Programming: David Greece: Springer Verlag New York Pub.
3. Data Structures and Program Design: Robert Kruse, PHI.
4. Fundamentals of Data Structures: Elis Horowitz, SartajSahani, Galgotia Publications.



SYLLABUS OF SEMESTER - I, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCP502

Course: Computer Programming and Data Structures
Lab

L: 0 Hrs., P: 4 Hrs., Per week

Total Credits: 4

Course Outcomes :

1. Master the programming so that they can accomplish the challenging programs in improved manner.
 2. Apply the knowledge gained for their future project work.
 3. Implement and know how to apply various searching and sorting algorithms.
 4. Understand and apply fundamental algorithmic problems including Tree traversals, Graph traversals, and shortest paths.
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Syllabus

Minimum 8 practicals based on theory subject.



SYLLABUS OF SEMESTER - I, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT503

Course: Computer Organization & Architecture

L: 4 Hrs., P: 0 Hrs., Per week

Total Credits: 8

Course Outcomes :

Students will have thorough knowledge about -

1. Basic structure of a digital computer.
2. Arithmetic operations of binary number system.
3. The organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.

Syllabus

UNIT-I

Basic Structure of Computer Hardware & Software - Introduction, Memory Locations and Address, Main memory operations, Instructions & Instruction Sequencing, Addressing modes, Assembly language, Basic I/O operations, Stacks, Subroutines.

UNIT-II

The Processing Unit – Fundamental concepts, Execution of Complete Instruction, Multiple bus Organization, Hardwired control, Micro Programmed Control, Introduction to RISC, CISC.

UNIT-III

Input–Output Organization-Accessing I/O devices , Interrupts, Direct Memory Access, Buses

UNIT-IV

Arithmetic – Number arithmetic, Logic design of Fast adders, Addition & Subtraction, Arithmetic & Branching conditions, Multiplication of positive numbers, Signed operand multiplication, Fast multiplication, Integer division, Floating point numbers & operations, IEEE standards.

UNIT-V

The Main Memory – Semiconductor RAM, ROM memories, Multiple-module memories and Interleaving, Cache memories, Virtual memories, Memory management requirements.

UNIT-VI

Pipelining – Basic Concepts, Data Hazards, Instruction Hazard, Influence on Instruction Set, Performance Consideration.

Text Books:

1. Computer Organization: Carl Hamacher, Zvonko Vranesic & Safwat Zaky. McGraw Hill, Fifth edition.

Reference Books:

1. Computer Organization & Architecture: William Stalling, Prentice Hall.
2. Computer Architecture & Organization: J.P.Hayes, McGraw-Hill.
3. Computer Architecture: Behrooz Parhami, Oxford University Press.

SYLLABUS OF SEMESTER - I, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT504

Course: Digital Electronics and Microprocessors

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes:

1. On completion of this course, the students can design combinational and sequential digital logic circuits.
2. Also they will have knowledge of the architecture, instruction set and assembly level programming of 8085 microprocessor.

Syllabus

UNIT-I

Number System, Binary Codes, Binary Arithmetic

UNIT-II

Logic gates : Truth table, properties and symbolic representation of NOT, AND, OR, NOR, NAND, EX-OR, EX-NOR gates. NOR and NAND gates as universal gates

UNIT-III

Boolean algebra, De-Morgan's theorem, Karnaugh map.

UNIT-IV

Combinational Logic - Adders, Subtractors (Half and Full), Decoders, Encoders, Multiplexers, Demultiplexers.

UNIT-V

Sequential Logic - Flip-Flop, Concept of clock, Counters - Ring Counter, Johnson Counter.

UNIT-VI

8085 Microprocessor - Architecture, Pin Diagram, Instruction set, Addressing modes, Memory organization and interrupts, Simple Assembly language programming using 8085.

Text Books:

1. Digital Design: M. M. Mano, Prentice Hall.
2. Fundamentals of Digital Circuits: A. Anand Kumar, PHI.
3. Microprocessors and Microcontrollers: N.Senthil Kumar, M.Saravanan, S.Jeevananthan, Oxford University Press.

Reference Books:

1. Modern Digital Electronics: R.P.Jain, Paperback (2003).
2. Digital Electronics: G.K.Kharate, Oxford University Press.



SYLLABUS OF SEMESTER - I, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCP504

Course: Digital Electronics and Microprocessors Lab

L: 0 Hrs., P:4 Hrs., Per week

Total Credits: 4

Course Outcomes

At the end of the course students are -

1. Able to design and construct simple digital electronic systems.
2. Able to understand and apply Boolean logic and algebra.

Syllabus

Minimum 8 practicals based on theory subject.



SYLLABUS OF SEMESTER - I, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT505

Course: System Analysis and Design

L: 3 Hrs., P:0 Hrs., Per week

Total Credits : 6

Course Outcomes :

1. Demonstrate the ability to apply knowledge of System concepts and functions in an integrated manner.
 2. Demonstrate ability to analyze, design, implement, and support Systems.
 3. Analyze System needs with the view to design and implement logical and dataflow networks.
 4. Perform the general planning and analysis of systems that will support the development of modern information systems (IS).
 5. Develop fundamental programming skills and apply those skills to solving information system problems.
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Syllabus

UNIT -I

System concept : System Concept, Elements of the system, types of System

System development life cycle : Introduction, Consideration for Candidate Systems, Prototyping

Role of system analyst : Introduction, Multi-Faceted role of the Analyst, The Analyst/User: Interface, Rising positions in system development

UNIT -II

System planning & the initial investigation : Introduction, Base for planning in System Analysis, Initial investigation, Information gathering : Introduction, types of information needed, Tools: review of literature, procedures & forms, on site observation, interviews, questionnaire & their types

UNIT -III

The tools of structured analysis : DFD, Data Dictionary, Decision Tree, Structured English, decision tables
feasibility study: Introduction, system performance definition, steps in feasibility analysis, feasibility report,
Cost benefit analysis: Data analysis, cost/benefit categories, procedure for determining cost/benefit, system proposal.

UNIT -IV

System design process : logical vs physical design, structured design methodologies like form driven, IPO charts, Major development activities: personnel allocation, audit considerations audit trail & document

control, input / output and form design, overview of database design

UNIT -V

System implementation : System testing (introduction, test plan, trends in testing), Quality assurance : quality assurance, goals in SDLC, levels of quality assurance, implementation & software maintenance.

UNIT -VI

Hardware / software selection and the computer contract : Introduction, procedure for H/W & S/W selection, financial considerations in selection (rental, lease, purchase options), Computer contract : Art of negotiation, contract checklist, Project scheduling : reasons of system failure, project management, Security, disaster/recovery: Threats to security, control measure.

Text books :

1. System Analysis and Design : Awad, Galgotia publication

Reference books:

1. System Analysis and Design: Edward, TataMcGraw Hill
2. System Analysis and Design : Don Yeats, Mcmillian
3. Fundamentals of System Analysis and Design: Hawryszkiwyez, PHI
4. Analysis and Design of Information System: Rajaraman



SYLLABUS OF SEMESTER - I, MCA (MASTER IN COMPUTER APPLICATION)

Course Code : MCP506

Course : Basics of Computer Hardware Lab

L: 0 Hrs., P:4 Hrs., Per week

Total Credits : 4

Course Outcomes :

1. Gain detail knowledge of evolution of motherboard on the basis of changes in components of motherboard.
 2. Assembling of CPU by interfacing different components.
 3. Know about formatting, installing OS and preparing machine for LAN setting.
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Syllabus

Minimum 8 practicals based on components inside a computer, networking hardware and assignments based on the same.



SYLLABUS OF SEMESTER - II, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT507

Course: Statistics and Probability

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes :

Students will be able to:

1. Demonstrate the ability to apply fundamental concepts in exploratory data analysis.
 2. Know how to work with bivariate distributions and how to calculate basic two-variable statistics (covariance, correlation).
 3. Understand how to calculate fundamental concepts such as the probability, cumulative distribution function, expectations and distributions for functions of random variables.
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Syllabus

UNIT -I

Introduction to Statistics– Definitions of Statistics, Importance & Scope of Statistics, Limitation & Distrust of Statistics, Statistical Data Collection, Presentation and Classification and its tools, Frequency Distributions.

UNIT -II

Descriptive Measures – Measures of Central Tendency, Measures of Dispersion, Moments, Skewness and Kurtosis. Correlation and Regression – Introduction, Coefficients and their Properties.

UNIT -III

Probability – Introduction, Types of Probabilities, Mathematical Tools, Mathematical Laws of Probabilities, Bays Theorem on Probability.

UNIT -IV

Random Variables and Distribution Functions – Discrete and Continuous Random Variable, Probability Mass Function, Probability Density Function, Discrete and Continuous Distribution Function.

UNIT -V

Mathematical Expectation and Variance – Introduction, Theorems of Expectation, Co-variance, Expectation & Variance of a Linear Combination of Random Variables, Moment Generating Function, Characteristics Function, Cumulate Generating Function.

UNIT -VI

Theoretical Discrete Distributions – Binomial Distribution, Poisson distribution, Geometric Distribution. Theoretical Continuous Distributions – Normal Distribution, Exponential Distribution, Gamma Distribution.

Text Books :

1. Fundamental of Mathematical Statistics : Gupta & Kapoor, Sultan Chand & Sons.
2. Probability & Statistics with Reliability, Queuing and Computer Science Applications : Kishor Trivedi, Wiley.

Reference Books :

1. Fundamental of Statistics: A. K. Agrawal & Sahib Singh, Sultan Chand & Sons.
2. Statistics for Management: Levin, PHI.
3. Statistics: Murray R. Spiegel, Schaum Series.



SYLLABUS OF SEMESTER - II, MCA (MASTER IN COMPUTER APPLICATION)

Course Code : MCT508

Course : Operating Systems

L: 4 Hrs., P:0 Hrs., Per week

Total Credits : 8

Course Outcomes :

1. Learn the system resources sharing among the users.
 2. Understand and analyze theory and implementation of : processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files
 3. Understand various areas of future work in OS.
-

Syllabus

UNIT-I

Introduction - Types of OS, Operating system services, user view, system view. File system Introduction, Access methods, Allocation methods, Directory system, protection, Implementation issues, Disk and drum scheduling.

UNIT-II

Process - Introduction, Threads, CPU Scheduling, Concurrent processes Precedence graph, the critical section problem, Semaphores, Classical process coordination problem, Inter-process communication.

UNIT-III

Memory Management - Swapping, Multiple partition, Paging, Segmentations, Combined systems. Virtual memory - Overlays, Demand Paging, Performance of demand paging, Page replacement, Allocation algorithm, Thrashing.

UNIT-IV

Deadlocks - Characterization, prevention, avoidance, Banker's algorithm for deadlock avoidance, combined approach.

UNIT-V

Protection Goal, Mechanisms and Policies, Domain of protection, Access matrix, Dynamic protection structures. Security - The security problem, User authentication, Program threats, System threats.

UNIT-VI

Case Studies - UNIX Operating System and Windows Operating System.

Text Books :

1. Operating System Concepts: Silberschatz Galvin: John Wiley & Sons.

Reference Books:

1. An Introduction to Operating System: H.M.Dietel, Pearson Education.
2. Operating System: Charles Crowley, IRWIN Publications.
3. Modern Operating Systems: Andrew Tanenbaum, PHI.

SYLLABUS OF SEMESTER - II, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT509

Course: Systems Programming

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes :

1. Understand logical flow of general operations of various system softwares.
 2. Master in the usage of make files, linking, object files, loading and symbol resolution, shared and static libraries, debugging and execution of system programs.
 3. Understand device drivers and their installation.
 4. Understand working of various system softwares like Assembler, Loader, Linker etc.
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Syllabus

UNIT-I

Machine structure, Machine Language and Assembly language - General Machine Structure, Machine structure 360-370, Assembly language Assembler- Concept of assembler, design of single pass and two pass assembler

UNIT-II

Macroprocessor - Concept of macro, macro call within macro, macro definition within macro, recursive macro calls, design of macro processor.

UNIT-III

Linker and Loader - Loader schemes, Design of Absolute loader, Design of Direct Linking loader, static and dynamic linking, design of linker.

UNIT-IV

Common Object file format - Structure of object file, Structure of executable file, Structure of executable link file, Symbol Table, String Table

UNIT-V

System utilities - Source code control system, symbolic debugger, pattern matching language like awk.

UNIT-VI

Device Drivers - Types of device drivers, character driver-line printer, Driver Installation.

Text Books:

1. Systems Programming: John J. Donovan, TMH.
2. Unix Device Drivers: Pajari George, Pearson Education.
3. Systems Programming: Samantha Pal, Oxford University Press.

Reference Books:

1. Assembly and Assemblers: Gorsline G.W, Prentice Hall.
2. Unix System Utilities manual.
3. Unix programming Environment: Kerningham and Pike, PHI.



SYLLABUS OF SEMESTER - II, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT510

Course: Computer Graphics

L: 4 Hrs., P: 0 Hrs., Per week

Total Credits: 8

Course Outcomes

1. Ability to specify & design 2D and 3D computer graphics algorithms.
 2. Ability to create interactive graphics applications.
 3. Ability to design application programming interfaces.
 4. Ability to write programs that demonstrate advanced computer graphics including animation texturing, modeling, curves & surfaces, etc.
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Syllabus

UNIT-I:

Scan Conversion - Geometry & Line generation, Points, Lines, Planes, Pixels and Frame buffers, Types of Display Devices, Line algorithms-DDA line generation algorithm, Bresenham's Line generation Algorithm, Circle generation-DDA circle generation algorithm, Midpoint circle generation algorithm, Bresenham's circle generation algorithm, Antialiasing.

UNIT-II:

Polygons, Segments, 2D Transformations - Graphics primitives, Display files, Polygon generation, Polygon filling, 2D transformations Segment tables, Operations on Segments.

UNIT-III:

Windows and Clipping - Clipping Window, Viewport, Viewing Transformations, Clipping, Line – Cohen Sutherland algorithm, Midpoint subdivision algorithm. Polygon Clipping - Sutherland Hodgman Polygon clipping algorithm.

UNIT-IV:

3D Transformations and 3D Projections - 3D Graphics, 3D primitives, Projections: Parallel, Perspective, Isometric. Viewing transformations, Viewing parameters.

UNIT-V:

Hidden lines and Surfaces - Hidden Surfaces and Line removal, Backface removal algorithm, Z-buffer algorithm, A-buffer Algorithm, Warnock's algorithm, Painters Algorithm, scan line algorithm, Hidden line

methods.

UNIT-VI :

Curve generation and Raster graphics - Curves and Surfaces, Cubic Bezier and cubic B-Spline curves, Raster Graphics Architecture, Standard Graphics Pipeline. Introduction to Image File format Standards.

Text Books :

1. Computer Graphics: Steven Harrington, TMH.
2. Procedural Elements for Computer Graphics: David F. Rogers, McGraw-Hill.
3. Multimedia System Design: Prabhat, K .Andleigh and KiranThakrar, PHI publication.

Reference Books:

1. Principles of Interactive Computer Graphics: Newman & Sproul, McGraw-Hill.
2. Mathematical Elements for Computer Graphics: David F Rogers & Adams, McGraw-Hill.
3. Multimedia making it work: Vaughan, Tata McGraw-Hill.
4. Computer Graphics : Hearn Baker [PHI]
5. Computer Graphics: A. P. Godse, Technical Publications.



SYLLABUS OF SEMESTER - II, MCA (MASTER IN COMPUTER APPLICATION)\

Course Code: MCP510

Course: Computer Graphics Lab

L: 0 Hrs., P:4 Hrs., Per week

Total Credits: 4

Course Outcomes

1. Ability to create applications using graphics primitives in 2D and 3D respectively.
2. Ability to create games and several applications related to animations.

Syllabus

Minimum 8 practicals based on theory subject.



SYLLABUS OF SEMESTER - II, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT511

Course: Object Oriented Programming

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes :

1. An ability to apply knowledge of mathematics, computing, science, and engineering.
2. An ability to design and conduct experiments, as well as to analyze and interpret data.
3. An ability to design and construct a software system, component, or process to meet desired needs, within realistic constraints.
4. An ability to identify, formulate, and solve problems.

Syllabus

UNIT-I

OOPs Features : Data encapsulation, Inheritance, Data abstraction, Polymorphism and Difference between OOPS and POP.

UNIT-II

Class and members : Concept of a class, Access control of members of a class, Instantiating a class, Static and Non-static members, Concept of an Abstract class.

UNIT-III

Inheritance and types : Deriving a class from another class, Access control of members under derivation, Different ways of class derivation, Overloading and Overriding of a method.

UNIT-IV

Interface and Exception : Concept of an interface, Implementation of an interface, Exception and exception handling mechanisms.

UNIT-V

Streams and Templates : Introduction to streams, use of stream classes, Serialization and de-serialization of objects, Templates and generic classes.

UNIT-VI

Collections : Introduction to Collection Framework, Collection Interfaces and classes: Collection Interface,

List Interface, Map Interface, Set Interface, Sorting.

Text Books :

1. Object Oriented Programming Using C++ : E. Balaguruswamy.
2. The Complete Reference Java: Herbert Schildt, Tata McGraw-Hill.
3. A Programmer's Guide to JAVA: Khalid Mughal & Rolf W. Rasmussen

Reference Books :

1. Java Generic and Collections: Maurice Naftalin and Philip Wadler, O'Reilly Publisher.
2. The Java Programming Language: Arnold Ken, Gosling J., Addison Wesley.
3. The C++ Programming Language: Stroustrup B., Addison Wesley.



SYLLABUS OF SEMESTER - II, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCP511

Course: Object Oriented Programming Lab

L: 0 Hrs., P:4 Hrs., Per week

Total Credits: 4

Course Outcomes

Students will be able to:

1. Conceptualize the given problem and transform it into an Object Oriented System.
2. Implement coding standard and verification practices.
3. Build expertise in Object Oriented programming language.

Syllabus

Minimum 8 practicals based on theory subject.



SYLLABUS OF SEMESTER - II, MCA (MASTER IN COMPUTER APPLICATION)

Course Code : MCP512

Course : Computer Workshop– I-Lab

L: 0 Hrs., P:2 Hrs., Per week

Total Credits : 2

Course Outcomes :

1. Understand Unix Operating System environment basic commands & its use.
2. Doing the Shell programming, writing device drivers & socket programming.
3. Getting the visual patterns after feeding the mathematical data into the Matlab IDE, thereby understanding the relevance of the equations in a better manner.

Syllabus

Minimum 8 practicals and assignments based on but not limited to the following topics:

- Unix
- shell programming
- device drivers
- semaphores
- socket programming
- Basic matlab commands, matlab programs for statistical analysis, graphical representation, discrete & continuous random variables, matlab for mathematical expectation & theoretical distribution.



SYLLABUS OF SEMESTER - II, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: HUT501

Course: Communication Skills

L: 0 Hrs., P:2 Hrs., Per week

Total Credits: 0

Course Outcomes

1. Verbally condense larger amounts of information into concise, condensed analysis.
2. Prepared for Group discussion, Personal interviews , etc.
3. Give a clear, organized and accurate oral presentation of course material

Syllabus

Introduction : Defining technical communication, producing the product, Objectives of technical communication, audience recognition and involvement

Correspondence : Memos, letters, job search

Visual Appeal : Document design, graphics

Report Strategies : Research, summary, reports, proposals.

Verbal and Non-verbal communication : oral presentations, presentation mediums, non-verbal communication, interviews and group discussions.

Grammar : Punctuations, mechanics, spellings.

Text Books :

1. Gerson, S.J., and Gerson S.M., Technical Writing: Process and Product, Pearson Education Inc., Singapore, Printed in India by Anand Sons.

Reference Books:

1. Basic Communication Skills for Technology: Rutherford, Dorling Kindersley Pvt. Ltd., Printed in India by Saurabh Printers Pvt. Ltd.
2. The functional aspects of communication skills: Prasad P., S.K. Kataria and Sons, New Delhi.



SYLLABUS OF SEMESTER - III, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT601

Course: Software Engineering

L: 4 Hrs. P: 0 Hrs. Per week

Total Credits: 8

Course Outcomes :

1. Employ a selection of concepts and techniques to complete a small-scale analysis and design project.
 2. Recognize the reasons for software evolution and how it affects the lifespan of software.
 3. Employ group working skills - including general organization, planning and time management, inter-group negotiation, etc.
 4. Reflect on the appropriateness of different software engineering methodologies in different circumstances.
-

Syllabus

UNIT-I

Introduction to Software Engineering : Software engineering paradigms, Generic view of software engineering, Software metrics, Measures and metrics, Estimation, Risk analysis, Scheduling, Metrics of software quality.

UNIT-II

Software Project Management : Software project estimation and planning, Decomposition techniques, Risk Management, Software reengineering, Requirement analysis, Task Analysis, Software prototyping

UNIT-III

Object Oriented Analysis : Object oriented analysis and data modeling, Object oriented concepts, Class Based Modeling, Inter object communication, Finalizing object definition, Object oriented analysis modeling.

UNIT-IV

Data Modeling : Data modeling concepts, Warner diagrams and the DSSD approach, Jackson system development.

UNIT-V

Software Design Engineering : The design process and fundamentals, Effective modular Design, Dataflow oriented design, Transform analysis, Transaction analysis, Design heuristics, Object oriented design methods and concepts, Refining operations.

UNIT-VI

Software Quality Management : Software quality assurance, Quality metrics, Halstead's S/W science, Software testing techniques, S/W testing fundamentals, White box testing, Black box testing, Validation testing, System testing, Debugging software maintenance maintainability, Maintenance tasks, Reverse engineering and reengineering.

Text Books :

1. Software Engineering : Roger S. Pressman, TMH.
2. Software Engineering For Students: D.Bell, Addison Wisley.

Reference Books:

1. Fundamentals of Software Engineering: Ghezzi, Jazayeri & Mandrioli, PHI.
2. Software Engineering concept: Richard Fairley, Tata McGraw Hill.
3. Fundamental of Software Engineering: Mall, PHI.



SYLLABUS OF SEMESTER - III, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCP601

Course: Software Engineering Lab

L: 0 Hrs. P: 4 Hrs., Per week

Total Credits: 4

Course Outcomes :

1. Ability to test and document software.
2. Ability to present their work in a professional manner.
3. Display capability of working as part of a software team and develop significant projects.

Syllabus

Minimum 8 Practical's based on the theory subject.



SYLLABUS OF SEMESTER - III, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT602

Course: Database Management Systems

L: 4 Hrs. P: 0 Hrs., Per week

Total Credits: 8

Course Outcomes :

1. Compare relational model with the SQL and know the constraints and controversies associated with relational database model.
2. An understanding of the context, phases and techniques for designing and building database information systems in business.
3. An ability to correctly use the techniques, components and tools of a typical database management system to build a comprehensive database information system.

Syllabus

UNIT-I

Introduction : Data, Information, Metadata, Conventional File Processing System.

Database Management System: Components of DBMS, Advantages and Disadvantages, The Three-level Architecture proposal for DBMS, Abstraction and Data Integration, Data Independence, Mapping between Views.

UNIT-II

Data Models : Introduction, Types of Data Models, Entity-Relationship Model.

The Relational Model: Keys, Relationship, Integrity rules. Relational Algebra, Relational Calculus.

UNIT-III

SQL : Overview of SQL, DDL, integrity constraints, DML, set operations, null values, aggregate functions, nested subqueries, Intermediate SQL, Advanced SQL/PL-SQL.

UNIT-IV

Relational Database Design : Functional Dependency, Normalization, File Organization Database Operations and Maintenance.

UNIT-V

Query Processing : Overview, Measures of Query Cost, Selection Operation, Join Operation

Query Optimization: Overview, Estimating Statistics of Expression Results, Transformation of Relational Expressions, Cost-Based Optimization, Heuristic Optimization

UNIT-VI

Concurrency Control & Database Recovery : Concept of Transaction, Serializability, Problems of Concurrent

Access, Deadlock, Database Recovery.

Text Books:

1. Database Systems Concepts: Silberschatz, Korth, Sudarshan, McGraw-Hill.
2. An Introduction to Database Systems: Bipin C. Desai, Galgotia.
3. An Introduction to Database Systems: C.J.Date, Narosa.

Reference Books:

1. SQL & PL/SQL using Oracle: Ivan Bayross, BPB Publications.
2. Fundamental of Database Systems: Elmasri, Navathe, Somayajulu, Gupta Pearson Publications
3. Database Management System: Raghu Ramkrishan, Johannes, McGraw Hill



SYLLABUS OF SEMESTER - III, MCA (MASTER IN COMPUTER APPLICATION)

Course Code : MCP602

Course : Database Management Systems Lab

L: 0 Hrs. P: 4 Hrs. Per week

Total Credits : 4

Course Outcomes

After undergoing this laboratory module, the participant should be able to:

1. Understand, appreciate and effectively explain the underlying concepts of database technologies.
2. Design and implement a database schema for a given problem-domain.
3. Normalize a database, populate and query a database using SQL DML/DDDL commands.
4. Declare and enforce integrity constraints on a database using RDBMS.
5. Programming PL/SQL including stored procedures, stored functions, cursors, packages.

Syllabus

Minimum 8 Practical's based on theory subjects.



SYLLABUS OF SEMESTER - III, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT603

Course: Computer Networks

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes :

1. The students understand the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.
 2. The students understand the Internet structure and can see how standard problems are solved in that context.
 3. The students can analyze simple protocols and can independently study literature concerning computer networks.
-

Syllabus

UNIT-I

Building a Network - Applications ,Requirements :Connectivity , Cost-Effective Resource Sharing , Support for Common Services Network Architecture : Layering and Protocols , OSI architecture , Internet Architecture Protocol implementation Issues Performance : Bandwidth and Latency, Delay \times Bandwidth Product ,High-Speed Networks ,Application Performance Needs

UNIT-II

Direct Link Networks - Error Detection , Two-Dimensional Parity, Cyclic Redundancy Check, Reliable Transmission : Stop-and-Wait, Sliding Window,Concurrent Logical Channels , Ethernet (802.3), Physical Properties, Access Protocol, Experience with Ethernet, Token Rings (802.5, FDDI) , Physical Properties , Token Ring Media Access Control, Token Ring Maintenance, Frame Format, FDDI

UNIT-III

Packet Switching - Switching and Forwarding , Datagrams ,Virtual Circuit Switching , Source Routing , Bridges and LAN Switches , Learning Bridges , Spanning Tree Algorithm , Broadcast and Multicast , Limitations of Bridges , Cell Switching (ATM) , Cells , Segmentation and Reassembly , Virtual Paths.

UNIT-IV

Internetworking - There Is More Than One Network, Simple Internetworking (IP) What Is an Internetwork? Service Model Global Addresses , Datagram Forwarding in IP ,Address Translation (ARP) ,Host Configuration (DHCP) ,Error Reporting (ICMP) , Virtual Networks and Tunnels, Routing ,Network as a Graph Distance Vector (RIP) ,Link State (OSPF), Metrics,Routing for Mobile Hosts, Global Internet Subnetting,Classless Routing (CIDR), Interdomain Routing (BGP), Routing Areas ,IP Version 6 (Ipv6)

UNIT V

End-to-End Protocols - Problem : Getting Processes to Communicate, Simple Demultiplexer (UDP),Reliable Byte Stream (TCP),End-to-End Issues,Segment Format Connection,Establishment and Termination,Triggering Transmission.

UNIT VI

Congestion Control and Resource Allocation - Problem: Allocating Resources, Issues in Resource Allocation, Network Model ,Taxonomy, Evaluation Criteria, Queuing Disciplines, FIFO ,Fair Queuing ,TCP Congestion Control, Additive Increase/Multiplicative Decrease, Slow Start ,Fast Retransmit and Fast Recovery, Congestion-Avoidance Mechanisms,DECbit,Random Early Detection (RED),Source-Based Congestion Avoidance.

Text Books:

1. Computer Network A system approach: Larry L. Peterson and Bruce S. Davie, Morgan Kaufmann Publishers, 5th Edition

Reference Books:

1. Computer Networks: Andrew Tanenbaum, PHI Publication,
2. Data & Computer Communication: William Stallings, PHI Publication,
3. Data Communications and networks :Forouzan, TMH.



SYLLABUS OF SEMESTER - III, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCP603

Course: Computer Networks Lab

L: 0 Hrs., P:4 Hrs., Per week

Total Credits: 4

Course Outcomes :

At the end of the course a student will:

1. Have knowledge of contemporary issues in computer networks.
 2. Show ability to design, implement, and analyze simple computer networks as well as to identify, formulate, and solve network engineering problems.
 3. Be able to configure Computer Network.
-

Syllabus

Minimum 8 Practicals based on theory subjects.



SYLLABUS OF SEMESTER - III, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT604

Course: Design and Analysis of Algorithms

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes

1. Students can evaluate and compare different algorithms using worst, average, and best-case analysis.
 2. Apply the algorithms and design techniques to solve problems.
-

Syllabus

UNIT-I

Elementary Algorithmics : Asymptotic analysis of algorithms. Analysis of Algorithms: Analyzing control structures– Amortized Analysis recurrences and generating functions.

UNIT-II

Introduction to Graphs : Basic terminology of Graphs, Operations on Graphs, Graph Traversals, Shortest Path Algorithms.

UNIT-III

Greedy Algorithms, Minimum spanning trees and shortest paths, Knapsack Problem, scheduling.

UNIT-IV

Divide and Conquer : Multiplying large numbers, binary search, quick sort, merge sort, matrix operations. Finding the median – matrix multiplication.

UNIT-V

Dynamic Programming : The Principle of optimality, knapsack problem, shortest paths, Chained matrix multiplication-approaches using recursion.

UNIT-VI

Back Tracking & Branch Bound : Traversing trees, traversing graphs, Branch and Bound, the minimax principle, Introduction to NP – Completeness Polynomial reductions- NP-Complete Problems, NP-Hard Problems.

Text Books :

1. Introduction to Algorithms: Thomas H. Cormen et.al, Prentice Hall of India.
2. Fundamentals of Algorithms: Gilles Brassard and Paul Bratelly, Prentice Hall India Ltd.
3. Fundamentals of Computer Algorithms : Ellis Horowitz and Sartaj Sahani Galgotia Publications.

Reference Book:

1. Computer Algorithms–Introduction to Design and Analysis :Sara Baase and Alien Van Gelder – Addison –Wesley Publishing Company.

SYLLABUS OF SEMESTER - III, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT605

Course: E-Commerce

L: 3 Hrs., P:0 Hrs., Per week

Total Credits: 6

Course Outcomes

Upon completion of this course, students will be able to -

1. Understand the basic concepts and technologies used in the field of management information systems.
 2. Understand the processes of developing and implementing information systems.
 3. Be aware of the ethical, social, and security issues of information systems.
 4. Learn about the importance of managing organizational change associated with information systems implementation.
-

Syllabus

UNIT-I

Overview of E-Commerce : Introduction, EDI, E-Commerce types, Internet Connectivity

UNIT-II

Electronic Communication : PCs and networking, Email, The internet and Intranets.

UNIT-III

Building Blocks of E-Commerce : Electronic Data Interchange, The UN/EDIFACT Standard, Internet and Extranet, Identification and Tracking Tools.

UNIT-IV

Reengineering : Business process reengineering, Management of Change.

UNIT-V

Concerns for E-Commerce Growth : Legal Issues, Cyber Security, Cyber Crimes.

UNIT-VI

Assurances in E-Commerce : Information Technology act 2000, Public Key Infrastructure, Electronic Payment systems and Internet Banking.

Text Books :

1. E-Commerce: The cutting Edge of Business-Bajaj & Nag, Second Edition, Tata McGraw-Hill.

2. E-Commerce – An Indian Perspective, P.T. Joseph, S.J., Third Edition

Reference Books:

1. E-Business: A beginners Guide: Elsenpeter, Tata McGraw-Hill.
2. Electronic Commerce From Vision to Fullfillment, Third Edition, E.M. Awad, PHI
3. E-Commerce: Bhushan Dewan, S. Chand
4. Electronic Commerce: Greenstein and Feinman, Tata McGraw-Hill.
5. E-Commerce: Strategy Technology and Application- David Whiteley, TMH
6. Introduction to Computers: Peter Norton's, TMH Fourth Ed



SYLLABUS OF SEMESTER - IV, MCA (MASTER IN COMPUTER APPLICATION)

Course Code : MCT606

Course : Internet & Web Technology

L:4 Hrs., P:0 Hrs., Per week

Total Credits : 8

Course Outcomes

1. Understanding the Internet and HTTP protocol
 2. Practical implementations of XML docs, XML DTD, XML Schemas, XSLT technologies.
 3. Creation of server pages using Java Server Pages technology & Servlets.
 4. Programming the client side pages for events & animation, using JavaScript language.
 5. Creation of server pages using Asp.Net technology
 6. Understand the concepts of JSP & Servlets
-

Syllabus

UNIT-I

Internet Basics - Overview of Internet, History, Web system architecture, Uniform Resource Locator, HTTP protocol basics, HTTP request & response, Cookies Basics.

XML- Intro & features of XML, XML writing elements, attributes etc. XML with CSS, DSO, XML Namespaces XML DTD, XML Schemas, Writing Simple sheets using XSLT, SAX & DOM Parsers, SOAP Intro.

UNIT-II

JSP- Why JSP?, JSP Directives, Writing simple JSP page, Scripting Elements, Default Objects in JSP, JSP Actions, Managing Sessions using JSP, JSP with beans JSP

UNIT-III

Servlets - Introduction Servlets vs CGI, Servlets API Overview, Servlets Life Cycle, Coding Writing & running simple Servlets, Generic Servlets, HTTPServlet Servlets Config, Servlets Contest Writing Servlets to handle Get & Post methods.

UNIT-IV

Client Side Programming : Introduction to Java script, Java script and HTML DOM, Advanced Java Script and HTML Forms.

UNIT-V

ASP.NET – DOT NET Architecture in detail, Introduction of ASP, Working with ASP page, Request & Response objects, State Management, web config file, database handling with ADO.NET, User controls and Custom

controls, Caching, Authentication.

UNIT-VI

Cloud Computing – Concepts of cloud computing, models of cloud computing – IAS, SAS, PAS, examples of all models, Issue of cloud computing.

Text Books:

1. Web enabled commercial Application Development using HTML, DHTML, JavaScript, and PERL: Ivan Bayross, PHI.
2. The Complete Reference: ASP .NET By Mathew Mac Donald –TMH.
3. Cloud Computing Bible: Barrie Sosinsks, Wiley India PVT LTD.

Reference Books:

1. Web Technologies: Godbole&Kahate, 2nd Edition, Tata McGraw Hill, 2008.
2. Web Technologies: Uttam K. Roy, Oxford Uni. Press.
3. Beginning XML: Wrox Press.
4. Developing Java Servlets: James Goodwill.
5. SCSWD Study Kit :HanumantDeshmukh , Manning Publications.



SYLLABUS OF SEMESTER - IV, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCP606

Course: Internet & Web TechnologyLab

L: 0 Hrs., P:4 Hrs., Per week

Total Credits: 4

Course Outcomes

1. Understanding of different web technological trends available in industry.
 2. Data storing and formatting methods by using XML and its supported technologies.
 3. Practice of different Platforms & coding languages implementations.
 4. Server side and Client side scripting involvement.
-

Syllabus

Minimum 8 Practicals based on theory subjects using JSP and .NET



SYLLABUS OF SEMESTER - IV, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT607

Course: Mobile Computing

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes

On completion of this course student should be able to-

1. Understand mobile and wireless computing phenomenon in terms of key technologies, relevant standards and example applications.
 2. To apply the concepts of mobile computing and conventional wired network and simulate it on simulator.
 3. Creatively analyze mobile and wireless networks
 4. Critically analyse security issues of mobile and wireless computing systems
-

Syllabus

UNIT-I

Wireless and Mobile network Architecture : Principles of Cellular Communication: Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Improving Coverage and Capacity in Cellular Systems. Mobile Computing Fundamental Challenges, Mobile Devices- Sensors, Embedded Controllers, Pagers, Mobile Phones, PDA, Pocket Computer, Notebook/Laptops. Mobile O.S: Palm OS, Windows, Symbian, Android.

UNIT-II

Medium Access Control : Need for a specialized MAC, Different MAC schemes: SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, CSMA, DAMA, PRMA, Reservation TDMA, MACA, CDMA, Spread Spectrum: DSSS, FHSS, Comparison of S/T/F/CDMA.

UNIT-III

Generation of Mobile Telecommunication Systems : Overview of 1G, 2G, 2.5G and 3G and 4G technologies. GSM: Mobile services, System architecture, Radio Interface, Protocols, Localization and Calling, Handover, Security, New data services. DECT: System architecture, Protocol architecture.

UNIT-IV

Wireless Data Services : Cellular Digital Packet Data CDPD, VOIP, GPRS Services, Advanced Radio Data Information Systems, Common Channel Signalling (CCS), Signalling System No.7 (SS7) protocols.

UNIT-V

Mobile Network Layer : Mobile IP, Entities and Terminologies, Operation of Mobile IP, Co-located address, Registration, Tunneling and Encapsulation, Optimizations, Reverse Tunneling .Dynamic Host Configuration protocol, Mobile Transport Layer : Traditional TCP,Classical Improvement,Indirect TCP,Snooping TCP,Mobile TCP,Fast retransmit/fast recovery,Transmission/Time-out freezing,selective

retransmission, Transaction-oriented TCP.

UNIT-VI

Wireless Application Protocol (WAP) : WAP architecture overview, Wireless Application Protocol application environment, WAP services, Wireless Application Protocol client software, Hardware and Websites, Wireless Application Protocol Gateways, Implementing enterprise wireless application protocol strategy. WAP session protocol, Wireless datagram protocol.

Text Books:

1. Mobile Communication: Jochen Schiller, Pearson Education.
2. Wireless Communication: Theodore S. Rappaport, Pearson Education.
3. Introduction to Data Communications and Networking: Wayne Tomasi

Reference Books:

1. Mobile Computing: Asoke Talukder, Roopa Yavagal, Tata McGraw Hill.
2. Wireless Communication & Networks: William Stallings, PHI.



SYLLABUS OF SEMESTER - IV, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT608

Course: Data Warehousing and Data Mining

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes :

1. Transform the dimensional model into a physical data design.
 2. Examine the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
 3. Discover interesting patterns from large amounts of data to analyze and extract patterns to solve problems, make predictions of outcomes.
 4. Understand future trends in Data storage and access.
-

Syllabus

UNIT -I

Introduction : Introduction to Data Mining, Data Mining Functionalities, Classification Of Data Mining Systems , Data Mining Task Primitives, Integration of Data Mining System with Data Warehouse System, Major issues in Data Mining.

UNIT -II

Data Preprocessing and Association Rules : Data Summarization Data Cleaning, Integration and Transformation, Reduction, Discretization and Concept Hierarchy Generation, Mining Various Kinds of Association Rules.

UNIT -III

Data Warehouse & OLAP Technology : What is Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

UNIT –IV

Mining Frequent Patterns, associations and Correlations : Basic Concepts and Road Map, Efficient and Scalable frequentItemset Mining methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint Based Association Mining.

UNIT-V

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

Methods, Hierarchical Methods.

Unit VI

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

1. Data Mining- Concepts and Techniques : Jiawei Han, MichelineKamber Morgan Kaufmann Publishers.

Reference Books:

1. Data Warehousing, Data Mining,& OLAP, Alex Berson,Stephen J. Smith, Tata McGraw- Hill, 2004.
2. Advances In Knowledge Discovery And Data Mining, UsamaM.Fayyad, Gregory Piatetsky - Shapiro, Padhrai Smyth And RamasamyUthurusamy, The M.I.T Press, 1996.
3. The Data Warehouse Life Cycle Toolkit, Ralph Kimball, John Wiley & Sons Inc., 1998.



SYLLABUS OF SEMESTER - IV, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT609

Course: Information Security

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes

1. Identify the threats to information security.
 2. Know how to protect information recourses.
 3. Design a security solution for a given application.
 4. Analyze a given system with respect to security of the system.
-

Syllabus

UNIT-I

Introduction to system security, Classical encryption techniques, Modern symmetric encryption techniques, Block cipher modes of operation.

UNIT-II

Mathematics of Cryptography : Integer Arithmetic, Modular Arithmetic, Algebraic structures, $GF(2^n)$ Fields, Primes, Factorization, Chinese Remainder Theorem, Random number generation.

UNIT-III

Message authentication & Hash functions, SHA, CRC's, Public key systems:RSA, diffie-Helman.

UNIT-IV

Digital Signatures, DSS, key management.

UNIT-V

Authentication applications: Karberos, X.509 Authentication services, E-mail security, IP security.

UNIT-VI

Web security, SSL, Secured electronic transaction, Networks management security, System security.

Text Books:

1. Cryptography & Networks Security Principles & Practice:William Stallings, Pearson Education.
2. Cryptography & Network Security: Behrouz A. Forouzan, TMH.
3. Cryptography & Network Security: AtulKahate, TMH.

Reference Books:

Network Security essentials: Applications & Standards : William Stallings, Pearsons Education



SYLLABUS OF SEMESTER - IV, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT610

Course: Database Administration

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes

1. Students learn about database physical and logical storage structures.
 2. Student understand about multiplexing database files
 3. Study installation and management of database
 4. Student know about tablespace management
 5. Study management of database transactions and security
 6. Student understand Database recovery procedures
-

Syllabus

UNIT-I

Introduction to Oracle DBA - Overview of databases & instances, Oracle Database Architecture, Logical Storage Database Structures, Physical Storage Structures, Multiplexing Database Files, Oracle Memory Structures, Oracle BackgroundProcesses, Oracle Initialization Parameters.

UNIT-II

Installing and Managing Oracle - The Software Installation, Database Creation, Tablespace Architecture, Installation Tablespaces, Managing Tablespaces, Automatic Storage Management.

UNIT-III

Monitoring Space Usage - Common Space Management problems, Oracle: Segments, Extents and Blocks, Data Dictionary Views and Dynamic Performance Views, Space Management Methodologies, Redo Log File Management, Space Management Tools.

UNIT-IV

Managing Transactions and Database Security – Transaction Basics, Undo Basics, Managing Undo Tablespaces, Sizing & Monitoring the Undo Tablespace, Flashback: Features, Query, Table, Version Query and Transaction Query, Database Authentication Methods, Database Authorization Methods, Privileges, Roles.

UNIT-V

Database Auditing and Backups – Auditing, Types of Auditing, Protecting the Audit Trail, Logical Backups, Physical Backups, Export, Import, Integration of Backup Procedures.

UNIT-VI

Recovery Strategies and Data Guard - Log file handling strategies, Recovery from Log Files, Query & Transaction recognition from Log Files, Data Guard Architecture, Data Protection Modes, Creating the Standby Database Configuration, Administrating the Databases.

Text Books :

1. Oracle Database 10g DBA Handbook; Kevin Loney& Bob Bryla, Tata McGraw Hill.
2. Oracle Administration & Architecture: Bobrowaski.

Reference Books :

1. Oracle 10G Database Admin: Sam Alapati, Apress.
2. Oracle Backup & Recovery: Oracle Press.



SYLLABUS OF SEMESTER - IV, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCP610

Course: Database Administration Lab

L: 0 Hrs., P:4 Hrs., Per week

Total Credits: 4

Course Outcomes

After taking this course students will, among other things, be able to:

1. Understand and use the system catalog in a variety of database administration tasks.
2. Gather, interpret, and act on database statistics to monitor database activity and tune for performance.
3. Plan and execute backup and recovery activities.
4. Secure the database and develop good database management discipline.

Syllabus

Minimum 8 Practicals based on the theory subject



SYLLABUS OF SEMESTER - IV, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCP611

Course: Computer Workshop-II-Lab

L: 0 Hrs., P: 2 Hrs., Per week

Total Credits: 2

Course Outcomes

1. Understand the Eclipse IDE for creating the Android applications.
2. Know the administration, operation & backup of Windows Server 2008 Operating System
3. Creating rich user interface applications using Adobe Flex SDK for both Windows & Web development.
4. Learn Software documentation techniques using Lex & YACC.

Syllabus

Practicals and assignments based on but not limited to the following topics:

Linux :

- Introduction to basic Linux commands
- System administration
- Shell programming
- Linux for monitoring system & creating GUI/ graphics
- Linux process management, memory usage
- Linux file system & storage devices

Eclipse & android :

- Introduction to Eclipse IDE & android OS
- Installation of Eclipse & android SDK
- Creating android project in Eclipse
- Running android applications, etc

Windows server 2003 :

- Installing windows server 2008
- Assigning server roles
- Storage management
- File system
- Windows server printer services, printer administration, advanced spool options
- Backup & Recovery.

Compiler Construction :

- Practicals based on Lex and Yacc



SYLLABUS OF SEMESTER - IV, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT612

Course: Software Documentation

L: 2 Hrs., P:0 Hrs., Per week

Total Credits: 0

Course Outcomes

1. An ability to design and construct the proper documentation of the considered system.
2. An ability to justify the flow and logic of the system by using the specific and appropriate available constructs.

Syllabus

Task Orientation, Principle of Software Documentation, Definition of task orientation, forms of software documentation, tutorial documentation, procedural documentation, reference documentation, processes of documentations.

Writing to teach tutorials, writing to guide procedures, writing to support reference.

Analyzing users, planning and writing documents, getting useful reviews, conducting usability tests, editing and fine tuning.

Designing for task orientation, laying out pages and screens, getting the language right, using graphics effectively, designing indexes.

Text Book:

1. Writing software documentation: Thomas Barker, Pearson publisher.



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT701

Course: Compiler Construction

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes

1. Students understand concepts and principles of compiler design.
2. Basic understanding of grammars and language definition.
3. Know the various phases of designing a compiler.

Syllabus

UNIT-I

Introduction Compilers and translators, Phases of compiler design, cross compiler, Bootstrapping, Design of Lexical analyzer.

UNIT-II

Syntax Analysis - Specification of syntax of programming languages using CFG, Top-down parser, design of LL(1) parser, bottom up parsing technique, LR parsing, Design of SLR, CLR, LALR parsers.

UNIT-III

Syntax directed translation - Study of syntax directed definitions & syntax directed translation schemes, implementation of SDTS, intermediate notations- postfix, syntax tree, TAC, translation of expressions, controls structures, declarations, procedure calls, Array reference.

UNIT-IV

Introduction to Lex and YACC - Lex-A scanner Generator, Structure of Lex specification file, Lex Regular Expressions, Lex Source Definition Program, Left Context Sensitivity: Start Conditions and sample program for use of start conditions. YACC-A Parser generator, Structure of YACC specification file, YACC Grammar Rules, YACC sample program.

Storage allocation & Error Handling- Run time storage administration stack allocation, symbol table management, Error detection and recovery- lexical, syntactic, semantic.

UNIT-V

Code optimization - Important code optimization techniques, loop optimization, control flow analysis, data flow analysis, Loop invariant computation, Induction variable removal, Elimination of Common sub expression.

UNIT-VI

Code generation – Problems in code generation, Simple code generator, Register allocation and assignment, Code generation from DAG, Peephole optimization.

Text Books:

1. Compilers Principles Techniques and Tools: A.V.Aho, Sethi, Ullman, Pearson education.
2. Principles of Compiler Design: Alfred V. Aho & Jeffery D. Ullman, Narosa Pub. House



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT702

Course: Distributed Computing

L: 4 Hrs, P:0Hrs, Per Week

Total Credits: 8

Course Outcomes

1. Develop, test and debug RPC based client-server programs in Unix.
2. Design and build application programs on distributed systems.
3. Improve the performance and reliability of distributed programs.
4. Design and build newer distributed file systems for any OS.
5. Know the various Algorithms based on Advance Operating System.

Syllabus

UNIT I

Introduction - Examples of Distributed System - Resource, Sharing and the Web-Challenges, case study on World wide web-System Models-Introduction-Architectural Models-Fundamental Models.

Distributed Objects and Components: Introduction, Distributed Objects, from objects to components, Case study: enterprise java beans and fractals.Remote Invocation- Remote Procedure Call-Events and Notifications.

UNIT II

Distributed Operating Systems - Introduction-Issues-Communication Primitives-Inherent Limitation-Lamport's Logical Clock; Vector Clock; Causal Ordering; Global State; Cuts; Termination Detection. Distributed Mutual Exclusion-Non-Token based Algorithms-Lamport's Algorithm-Token based Algorithms-Suzuki-Kasami's Broadcast Algorithm- consensus and related problems. Distributed Deadlock Detection-Issues-Centralized Deadlock-Detection Algorithms-Distributed Deadlock-Detection Algorithms.

UNIT III

Distributed Resource Management - Distributed File Systems-Architecture-Mechanisms-Design Issues-Case Study: Sun Network File System-Distributed Shared Memory-Architecture-Algorithm-Protocols-Design Issues.Distributed Scheduling-Issues-Components-Algorithms- Load Distributing Algorithms, Load Sharing Algorithms.

Unit IV

Transaction and Concurrency - Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control ,Time Stamp Ordering, Comparison for concurrency control.

Distributed Transactions : Flat and nested distributed Transactions, Atomic Commit Protocols, Concurrency



Control in distributed Transactions.

UNIT V

Resource Security and Protection - Access and Flow control-Introduction-The Access Matrix Model-Implementation of Access Matrix Model-Safety in the Access Matrix Model-Advanced Models of Protection-Data Security-Introduction-Modern Cryptography:-Private Key Cryptography, Public key cryptography.

UNIT VI

Distributed Multimedia Systems : Introduction - Characteristics Quality of Service Management- Resource Management-Stream Adaptation -Case Study.

Designing Distributed System : Google Case Study-Introducing the Case Study: Google- Overall architecture and Design Paradigm-Communication Paradigm- Data Storage and Coordination Services-Distributed Computation Services.

Text Books:

1. "Distributed Systems Concepts and Design", George Coulouris, Jean Dellimore and Tim KIndberg, Pearson Education, 5th Edition.
2. "Advanced Concepts in Operating Systems", MukeshSinghal and N.G.Shivaratri, McGraw-Hill.
3. "Distributed Operating Systems", Pradeep K. Sinha, PHI, 2005

Reference Books:

1. "Distributed Computing-Principles, Algorithms and Systems", Ajay D.Kshemkalyani and MukeshSinghal Cambridge University Press.
2. Distributed Algorithms, Nancy A.Lynch, Morgan Kaufmann Publishers.
3. "Grid Computing", Joshy Joseph and Craig Fellenstein, IBM Press.



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCP702

Course: Distributed Computing Lab

L: 0 Hrs., P:4 Hrs., Per week

Total Credits: 4

Course Outcomes

The student should be able to apply the concepts above to the following:

1. Design and build application programs on distributed systems.
2. Improve the performance and reliability of distributed programs.
3. Design and build newer distributed file systems for any OS.
4. Develop distributed applications using latest technologies.

Syllabus

Minimum 8 Practicals based on the above syllabus.



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT703-1

Course: Elective – I – Operation Research

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes

Student will be able to :

1. Appreciate nature and scope of various decision making situations within the complex environment.
2. Recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry.
3. Understand Operations Research models and apply them to real-life problems.

Syllabus

UNIT - I

Introduction to Operation Research (OR) - Origin and Development of OR, Nature of OR, Characteristics of OR, Classification of Problems in OR, Models in OR, Phases of OR, Uses and Limitations of OR, Methodologies in OR, Applications in OR. Linear Programming – Concept of Linear Programming Model, Mathematical Formulation of the Problem, Graphical solution Methods. Linear Programming Methods - Simplex Methods, Big M methods, Dual Simplex Method, Two Phase Methods. Duality Rules, Formulation of Dual Problem.

UNIT -II

Transportation Problem - Mathematical Model for Transportation Problem, Types of Transportation Problem. North-West Corner Rule, Least Cost Cell Method, Vogel Approximation Method, MODI Method. Assignment Problem – Zero-One programming model for Assignment Problem, Types of assignment Problem, Hungarian Method, Branch and Bound Technique for Assignment Problem. Travelling Salesman Problem.

UNIT -III

Decision Theory – Introduction, Decision under Certainty, Decision under Risk, Decision under Uncertainty, Decision Tree. Game Theory – Terminologies of Game Theory, Two person Zero-Sum Games, The Maximin-Minimax Principle, Saddle Point, Game of Mixed Strategies, Dominance Property, Graphical Solution of $2 \times n$ and $m \times 2$ Games.

UNIT -IV

Network Scheduling By CPM/PERT – Introduction, Basic Concept, Constraints in Network, Critical Path Methods (CPM), PERT Network, PERT calculations, PERT vs. CPM., Project Cost, Crashing Algorithm, Resource Allocation and Scheduling Concept of MOST, GERT, LOB and Precedence Planning.

UNIT-V

Inventory Control – Introduction, Inventory Control, Selective Control Techniques, Types of Inventory, Economic Lot Size Problem, Problem of EOQ without and with shortage(Purchase and Manufacturing Models) , Inventory Control with Price Breaks.

UNIT-VI

Queuing Theory – Introduction, Terminologies of Queuing System, Operating Characteristics of Queuing System, Poisson Process and Exponential Distribution, Classification of Queues, Definition of Transient and Steady States, Poisson Queues(M/M/1:/FCFS) and(M/M/N:/FCFS) models , Non-Poisson Queuing System(M/Ek/1: /FCFS), Cost-Profit Models in Queuing, Queuing Control.

Text Books :

1. Operation Research:KantiSwarup, P.K.Gupta, Man Mohan ,Sultan Chand.
2. Operation Research:R. Panneerselvam,PHI.
3. Operation Research:Hira and Gupta.,S. Chand.

Reference Books :

1. Introduction to Operation Research: Billy Gillett, Tata McGrawHill
2. Operation Research Theory & Application : Sharma J,K, MacMillan.
3. Operation Research : HemdyTaha, EEE



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT703-2

Course : Elective – I - Digital Image Processing

L: 4 Hrs., P:0 Hrs., Per week

Total Credits : 8

Course Outcomes :

1. Ability to acquire the fundamental concepts of a digital image processing system.
 2. Ability to identify and exploit analogies between the mathematical tools used for 1D and 2D signal analysis and processing.
 3. Ability to analyze 2D signals in the frequency domain through the Fourier transform.
-

Syllabus

UNIT-I

Introduction – Fundamental steps in Digital Image Processing, Components of an Image Processing System. Digital Image Fundamentals – A Simple Image Formation Model, Image Sampling and Quantization, Basic relationship between pixels, Neighbors of pixel, Adjacency, Connectivity, Regions, Boundaries: Labeling of connected components, Distance measure, Application of image processing.

UNIT-II

Intensity Transformations and Spatial Filtering - Some Basic Intensity Transformation Functions, Histogram equalization and histogram matching, Fundamentals of Spatial Filtering, Introduction to Smoothing and Sharpening Spatial Filters.

Filtering in the Frequency Domain - Discrete Fourier Transform (DFT), The Basics of Filtering in the Frequency Domain, Image Smoothing Using Frequency Domain Filters: Ideal Lowpass Filters, Butterworth Lowpass Filters, Gaussian Lowpass Filters, Image Sharpening Using Frequency Domain Filters: Ideal Highpass Filters, Butterworth Highpass Filters, Gaussian Highpass Filters.

UNIT-III

Image Restoration and Reconstruction - Degradation model, Restoration in the Presence of Noise Only—Spatial domain, Periodic Noise Reduction by Frequency Domain, Inverse filtering, Weiner filtering, Geometric Mean Filter.

Color image processing - Color Models, Pseudo Color Image Processing,

UNIT-IV

Image Compression - Coding Redundancy, Spatial and Temporal Redundancy, Fidelity Criteria, Image

Compression Models, Huffman Coding, LZW Coding, Lossy Compression, Digital Image Watermarking.

UNIT-V

Image Segmentation – Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding: Foundation, Basic Global Thresholding, Region Based Segmentation : Region Growing.

UNIT-VI

Representation and Description - Representation Schemes like Chain Coding, Polygonal Approximation Approaches, Signatures, Boundary Segments, Skeletons, Boundary Descriptors, Regional Descriptors.

Text Books :

1. Digital Image Processing: R.C.Gonzalez&R.E.Woods, Addison Wesley Pub.
2. Fundamentals of Digital Image Processing:A.K.Jain, PHI Pub.
3. Fundamentals of Electronic Image Processing:A.R.Weeks.

Reference Books :

1. Digital Image Processing: S. Sridhar, Oxford Uni. Press.



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT703-3
L: 4 Hrs., P:0 Hrs., Per week

Course: Elective – I -Real Time Operating Systems
Total Credits: 8

Course Outcomes :

1. Clearly differentiate the issues that arise in designing real-time systems; analyze a variety of real-time scheduling techniques, prove correctness of the resulting schedule; implement basic scheduling algorithms.
2. Apply real-time scheduling theory to the design and implementation of a real-world system.

Syllabus

UNIT-I

Real time applications : Hard and soft real time systems, timing constraints, A Reference model of Real-time systems, temporal parameters, precedence constraints & dependencies, scheduling Hierarchy, Commonly used approaches to scheduling, cyclic and priority drive approaches, Optimality of EDF and LST.

UNIT-II

Clock Driven Scheduling : Static timer driven scheduler, Cyclic Executives, Improving Average Response times of Aperiodic Jobs, Scheduling Sporadic jobs, Practical Considerations, Pros and Cons of Clock Driven Scheduling.

UNIT-III

Priority-driven scheduling of periodic tasks : Fixed priority vs Dynamic Priority schemes, Maximum schedulable Utilization, Optimality of the RM and DM algorithms, As Schedulable Test for Fixed Priority Tasks, Practical Factors.

UNIT-IV

Scheduling Aperiodic and Sporadic Jobs in Priority - driven scheduling : Deferrable Servers, Sporadic Servers, Constant Utilization, Total Bandwidth, and Weighted Fair-Queuing Servers, Scheduling of Sporadic Jobs

UNIT-V

Resources and resource access control : Non-preemptive critical sections, basic priority-inheritance, ceiling protocol, multiprocessor scheduling, predictability and validation of dynamic multiprocessor systems flexible applications, tasks with temporal distance constraints.

UNIT-VI

Real time Operating systems : Overview, Time Services and Scheduling Mechanisms, Basic Operating System Functions, Processor Reserves and Resource Kernel, Open System Architecture, Capabilities of Commercial RTOS.

Text Books :

1. Real-Time Systems: Jane W.S. Liu, Pearson Education Asia Pub.

Reference Books:

1. Real time Systems: C.M. Krishna & Kang G. Shin, McGraw Hills.



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT704-1

Course : Elective – II - Distributed Database
Management Systems

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes

The above exercise shall make the students competent in the following ways and will be able to learn following parameters at the end of the course:

1. Students are expected to perform well in sessional tests/ class assignments/ viva-voce examination.
 2. Students are expected to gain knowledge about the distributed DBMS.
 3. Students are expected to gain the knowledge of DDBMS architecture & design issues
 4. Student understand about Query processing and optimization techniques
 5. Students learn about Transaction concepts
 6. Students are expected to gain knowledge about distributed concurrency control mechanisms.
 7. Student understand about Distributed object management
-

Syllabus

UNIT-I

Introduction : Distributed data processing, what is a DDBMS, Advantages and disadvantages of DDBMS, Problem areas, Overview of RDBMS and computer network concepts.

UNIT-II

Distributed Database Management System Architecture And Database Design: Transparencies in a distributed DBMS, Distributed DBMS architecture, Global directory issues, Alternative design strategies, Distributed design issues, Fragmentation, Data allocation.

UNIT-III

Query Processing and Optimizing Distributed Queries : Overview of query processing- Problem, Objectives, Complexity of relational algebra, Characterization of processors, Layers, Query decomposition, Localization of distributed data, Query optimization, Centralized and Distributed query optimization, Algorithms.

UNIT-IV

Transaction Management : The Transaction Concepts- Model, Definition, Properties, Characterization, Goals of transaction management, Types of transactions, Distributed execution monitor.

UNIT-V

Distributed Concurrency Control : Serializability Theory, Taxonomy of Concurrency Control Mechanisms, Two-Phase Locking, Timestamp-Based Concurrency Control, Optimistic Concurrency Control, Deadlock

Management- Detection, Prevention, Avoidance.

UNIT-VI

Distributed Object Management : Object Concepts and Object Models, Object Distribution Design, Architectural Issues, Object Management, Object Storage, Object Query Processing, Object DBMSs Transaction Management.

Text Books:

1. Principles of Distributed Database Systems: M.T. Özsu and P. Valduriez, Prentice-Hall.
2. Distributed Databases Principles and Systems: S. Ceri and G. Pelagatti, McGraw Hill.

Reference Book:

1. Advances in Object-Oriented Database Systems: A. Dogac, M.T. Özsu, A. Billiris, and T. Sellis (editors), Springer-Verlag.



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT704-2

Course: Elective – II - Artificial Intelligence

L: 4 Hrs., P:0 Hrs., Per week

Total Credits: 8

Course Outcomes

1. Identify and specify a problem definition for a given real world problem domain.
 2. Apply both deterministic and non-deterministic Artificial Intelligence search techniques to a well defined problem domain.
 3. Develop software that learns through experience to interact with a well defined problem domain.
-

Syllabus

UNIT-I

Introduction : What is AI?, History, Overview, Intelligent Agents, Performance Measure, Rationality, Structure of Agents, Problem-solving agents, Problem Formulation, Uninformed Search Strategies

UNIT-II

Informed (Heuristic) Search and Exploration, Greedy best first search, A* search, Memory bounded heuristic search, Heuristic functions, inventing admissible heuristic functions, Local Search algorithms, Hill-climbing, Simulated Annealing, Genetic Algorithms, Online search

UNIT-III

Constraint Satisfaction Problems, Backtracking Search, variable and value ordering, constraint propagation, intelligent backtracking, local search for CSPs, Adversarial Search, Games, The minimax algorithm, Alpha-Beta pruning, Imperfect Real-Time Decisions, Games that include an Element of Chance

UNIT-IV

Knowledge Based Agents, Logic, Propositional Logic, Inference, Equivalence, Validity and satisfiability, Resolution, Forward and Backward Chaining, DPLL algorithm, Local search algorithms, First Order Logic, Syntax and Semantics of FOL, Inference in FOL, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution

UNIT-V

Planning, Language of planning problems, planning with state space search, partial order planning, planning

graphs, planning with propositional logic

UNIT-VI

Uncertainty, Handling uncertain knowledge, rational decisions, basics of probability, axioms of probability, inference using full joint distributions, independence, Baye's Rule and conditional independence, Introduction & Semantics of Bayesian networks, Exact and Approximate inference in Bayesian Networks

Text Books:

1. Artificial Intelligence: A Modern Approach: Stuart Russel and Peter Norving, Prentice Hall Series in AI.
2. Artificial Intelligence:Winston P.H., Addison Wesley,.
3. Artificial Intelligence:E.Rich and Knight, Tata McGraw Hill.

Reference Books:

1. Artificial Intelligence: E. Charniack and D. Mcdermott, Addison Wesley.
2. Introduction to Knowledge Systems: Mark Stefik, Morgan Kaufmann.



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT704-3

Course : Elective – II - Embedded Systems

L: 4 Hrs., P:0 Hrs., Per week

Total Credits : 8

Course Outcomes

Upon successful completion of this course, students will be able to:

1. Understand what is a microcontroller, microcomputer, embedded system.
 2. Understand different components of a micro-controller and their interactions.
 3. Become familiar with programming environment used to develop embedded systems.
 4. Understand key concepts of embedded systems like IO, timers, interrupts, interaction with peripheral devices.
 5. Learn debugging techniques for an embedded system.
-

Syllabus

UNIT-I

Introduction to Embedded Systems, Application areas, Categories, Architecture, Specialties, Recent trends in Embedded System Embedded systems overview, Hardware / Software co-design, Examples of embedded systems, Components of Embedded systems – sensors, actuators, micro-controller processor Technology, IC technology, Issues in Design Technology

UNIT- II

8051 Microcontroller : Architecture, Real world interfacing, Processor and memory organization, Memory types, memory maps and addresses, Processor selection, Memory selection, Addressing modes, Instruction set.

UNIT– III

Programming Languages for Embedded Systems - Desired Language Characteristics, Embedded programming in C, C++ and Java- Software programming in Assembly Language and 'C-language', Embedded programming in C + + , Embedded programming in Java.

UNIT - IV

Scheduling Paradigms for real time systems - Static Priorities, Static Schedules, Dynamic Scheduling,, Pre-emptive, Non-pre-emptive, Rate Monotonic, EDF, Real World Issues like - Task Assignment, CPU utilization, Blocking, Unpredictability, Performance Measures

UNIT-V

Hard & Soft Real Time Systems, Real Time Operating System – concepts, RTOS services, capabilities, Resource Management, Real Time Operating System: Basic design and functions, Programming, Types of

RTOSES: VxWorks , Windows CE.

UNIT-VI

Embedded Software Development Process and Tools: Introduction, Host and target machines, linking and locating software, Testing on host machine, Simulators, Issues in real time databases, real time communications, Fault Tolerance Techniques – Fault Types, Detection, Recovery

Text Books:

1. Embedded Systems: Architecture, Programming and Design: Raj Kamal, Tata McGraw Hill.
2. Embedded/Real Time Systems: Concepts, Design and Programming: Dr.K.V.K.K Prasad, Dream Tech Press November 2003.

Reference Books:

1. Embedded System Primer: David Simon, Addison-Wesley Professional.
2. Introduction to Embedded System: Shibu K V, Tata McGraw.



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code : MCT705-1

Course : Elective – III – Multivariate Data Analysis

L: 4 Hrs., P : 0 Hrs., Per week

Total Credits : 8

Course Outcomes

Student will be able to :

1. Differentiate between multivariate techniques and corresponding univariate techniques.
 2. Use multivariate techniques appropriately and identify the underlying correlations in large volumes of process data.
 3. To summarize and interpret appropriate conclusion for different kinds of real life problems.
-

Syllabus

UNIT-I

Mathematical Introduction : Probability concepts of Marginal and Joint distributions, Stochastic independence of random vectors, Conditional distributions. Multinomial and Multivariate Normal distributions, Markov chains and solutions.

UNIT-II

Basic concepts of Multivariate Analysis : Aspects of Multivariate Analysis, Classification of Multivariate Techniques, Structured approach to model building.

UNIT-III

Preparing for a Multivariate Analysis : Examination of data: Sample Mean and Variances, Normality assumption related data analysis. Factor analysis: Orthogonal factor model, estimation, factor rotation and factor scores.

UNIT-IV

Analysis of Multivariate Quantitative Data : Multiple Correlation and Partial Correlation, Multiple Regression Analysis their measures and related results, Concept of ANOVA.

UNIT-V

Dependence Techniques : Multiple Discriminate analysis and Logistic Regression, Multivariate Analysis of Variance and Covariance, Conjoint analysis, Canonical correlation analysis.

UNIT-VI

Interdependence Techniques and Advanced Techniques : Cluster analysis, Multidimensional Scaling, Structural Equation Modeling, Emerging Techniques.

Text Books:

1. Multivariate Data Analysis :Hair, Anderson, Tatham, Black Published, Pearson Education
2. Multivariate Analysis: Probability and Mathematical Statistics:Kanti V. Mardia, J. T. Kent, Academic Press

Reference Books:

1. Research Methodology: R. Panneerselvam, PHI.
2. Probability & Statistics with Reliability, Queuing and Computer Science Applications : KishorTrivedi, Wiley



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT705-2

Course : Elective – III – Neural Networks and Fuzzy Systems

L: 4 Hrs. P: 0 Hrs. Per week

Total Credits : 8

Course Outcomes

1. After the course the student should be able to explain the difference between supervised and unsupervised learning.
2. Achieves an understanding of the advantages and limitations of the learning and self organizing systems of today.
3. To teach about the concept of fuzziness involved in various systems. To provide adequate knowledge about fuzzy set theory.

Syllabus

UNIT I

Artificial Neural Systems : Preliminaries: Neural Computation: Some Examples and Applications - Classifiers, Approximators, and Autonomous Drivers, Simple Memory and Restoration of patterns, Optimizing Networks, Clustering and Feature Detecting Networks. History of Artificial Neural Systems Development.

UNIT II

Fundamental Concepts and Models of Artificial Neural Systems : Biological Neurons and their Artificial Models - McCulloch-Pitts Neuron Model, Neuron Modeling for Artificial Neural Systems. Models of ANN: Feed forward Network, Feedback Network. Supervised and Unsupervised Learning. Neural Network Learning Rules: Perceptron Learning Rule, Delta Learning Rule. Single-Layer Perceptron Classifiers: Classification Model

UNIT III

Multilayer Feed forward Networks : Linearly Non-separable Pattern Classification, Delta Learning Rule for Multi-perceptron Layer, Generalized Delta Learning Rule, Feed forward Recall and Error Back-Propagation Training: Feed forward Recall, Error Back-Propagation Training. Learning Factors: Initial Weights, Cumulative Weight Adjustment Versus Incremental Updating.

UNIT IV

Introduction to Fuzzy Logic - The Case for Imprecision, The Utility and limitations of Fuzzy Systems, Uncertainty and Information, Fuzzy Sets and Membership. Classical Sets and Fuzzy Sets- Operations and properties of Classical Sets and Fuzzy Set. Classical Relations and Fuzzy Relations- Crisp Relations, Cardinality, Operations and Properties of Crisp Relations, Fuzzy Relations, Cardinality, Operations and Properties of Fuzzy Relations

UNIT V

Properties of Membership Functions, Fuzzification, and Defuzzification - Features of the Membership Function, Various Forms, Fuzzification, Defuzzification to Crisp Sets Development of Membership Functions - Membership Value Assignments, Intuition, Inference, Rank Ordering

UNIT VI

Automated Methods for Fuzzy Systems - Gradient Method, Clustering Method. Decision Making with Fuzzy Information - Fuzzy Synthetic Evaluation, Fuzzy Ordering, Multi-objective Decision Making

Text Books:

1. Introduction to Artificial Neural Systems: Jacek M. Zurada, PWS Pub.
2. Fuzzy Logic with Engineering Applications: Timothy Ross, Wiley Publication.
3. Understanding Neural Networks and Fuzzy Logic, Basic Concepts and Applications: Stamatios V. Kartalopoulos, PHI Pub.

Reference Books:

1. Neural Networks and Fuzzy System: B.Kosko, PHI Pub.
2. Neural Networks, Algorithms, Application and Programming Techniques: J.P.Freeman& David M. Skapura, Pearson Pub.
3. Fuzzy Sets Uncertainty and Information: George Klir, PHI Pub.



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCT705-3

Course : Elective – III – Wireless Applications

L: 4 Hrs., P:0 Hrs., Per week

Total Credits : 8

Course Outcomes

1. Ability to learn internetworking in wireless systems.
 2. Ability to learn to implement some practical mobile applications.
-

Syllabus

UNIT-I

Wireless Communication Technologies : Introduction, Antennas, Propagation modes, Signal encoding techniques, Spread spectrum, Introduction to cellular Network.

UNIT-II

Wireless Networking : Satellite Communication: Application, basics, GEO, LEO, MEO, Routing, Localization, Handover. Wireless LAN: Wireless LAN Technology, IEEE 802.11 Wireless LAN Standard, Bluetooth: Overview, Radio specification, Baseband specification, Link Manager Specification, L2CAP.

UNIT-III

Advanced Mobile technologies : Advanced Air interface techniques - Orthogonal Frequency Division Multiple Access, Multiple Antenna techniques, Overview of Broadband wireless networks – WiMax, LTE, Femto Cells, Satellite Communication.

UNIT-IV

VoIP network and Signaling : VoIP network basics, VoIP network architecture, IP Multimedia Subsystem (IMS) overview, Quality of Service (QoS) in VoIP, IP based signaling – Overview of H.323 and Session Initiation Protocol (SIP), Concepts of SIP transaction, dialogs, servers, gateways, Real-time Transport Protocol (RTP).

UNIT-V

Applications of VOIP : Internet telephony – IP based voice and video calls, Overview of Open source IP telephony system like Asterisk (IP-PBX), Brief study of real time VoIP services like Skype, IP based voice and video conference systems – peer to peer, centralized architecture.

UNIT-VI

Advanced Application Areas : location based Services, Positioning in cellular network, architecture and protocols of location services, applications of location based services, Overview of Global Positioning System (GPS), Messaging architecture in cellular networks – SMS, MMS, wireless sensor networks, Adhoc networks,

Vehicular Communications.

Text Books :

1. Fundamentals of WiMAX – Understanding Broadband Wireless Networking: Jeffrey G. Andrews, Arunabha Ghosh, Rias Muhamed.
2. Fundamentals of LTE : Jeffrey G. Andrews, Arunabha Ghosh, Rias Muhamed
3. Location-based Services – Fundamentals and Operation : Axel Kupper.
4. Voice over IP Fundamentals : Jonathan Davidson; James Peters; Manoj Bhatia; Satish Kalidindi; Sudipto Mukherjee, Second Edition
5. Wireless Communication and Networking – William Stallings, PHI.

Reference Books:

1. Asterisk™: The Definitive Guide : Leif Madsen; Jim Van Meggelen; Russell Bryant
2. Android Application Development : Rick Rogers; John Lombardo; Zigurd Mednieks; G. Blake Meike
3. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, PHI, 2nd Edn, Pearson Education.
4. Mobile Communications – Jochen Schiller, 2nd Edition.



SYLLABUS OF SEMESTER - V, MCA (MASTER IN COMPUTER APPLICATION)

Course Code : MCP706

Course : Mini Project

L: 0 Hrs., P : 6 Hrs., Per week

Total Credits : 6

Course Outcomes

1. Students to get much practical exposure of coding the projects.
 2. Clear understanding of the project creation process and flow.
 3. Gradually learnt the techniques of avoiding the coding pitfalls.
-

Syllabus

Mini Project based on subjects studied till current semester using latest tools and technologies.



SYLLABUS OF SEMESTER - VI, MCA (MASTER IN COMPUTER APPLICATION)

Course Code: MCP707

Course: Project Work-Full Time

L: 0 Hrs., P:20 Hrs., Per semester

Total Credits: 50

Course Outcomes

1. Students undergo comprehensive project planning, designing and development process by implementing the learned skills.
2. Get ready for the industrial needs before their placements.

Syllabus

A full time project work to be carried out under the supervision of one external guide preferably from industry, one internal guide as appointed by project coordinator.

