



# SYLLABUS

For

**Master in Computer Application**

**(M.C.A.)**

**(For admission in 2022-23 and onwards)**



**[MCA- Model Curriculum Structure]**

**Proposed Scheme of Examination of M.C.A. 2-Year Programme  
MCA Bridge Course (Qualifying Papers)  
(Bridge Course must be completed before commencement of MCA I<sup>st</sup> Semester)**

S.No.	Sub. Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per			Total Credits
			Theory			Practical			L	T	P	
			End Sem.	Mid Sem.	Quiz /Assignment	End Sem.	Lab Work &Sessional					
1	CAT-001	Introduction of Information Technology	30	20				50	2	1	0	--
2	CAT-002	Programming Fundamentals With 'C'	30	20				50	2	1	2	--
3	CAT-003	Fundamental of Web Technology	30	20				50	2	1	2	--

**[MCA- Model Curriculum Structure]****MCA 1<sup>st</sup> Semester**

S.No.	Sub. Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
			Theory			Practical			L	T	P	
			End Sem.	Mid Sem.	Teachers Assessments	End Sem.	Lab Work & Sessional					
		<b>Theory</b>										
1	CAT-004	Discrete Structures	100	30	20			150	3	1		4
2	CAT-005	Data base management system	100	30	20			150	3	1		4
3	CAT-006	Operating System	100	30	20			150	3	1		4
5	CAT-007	Computer Organization	100	30	20			150	3	1		4
6	AHT- 303	Technical Communication Skills	100	30	20			150	3	1		4
7	CAT-008	Python Programming	30	10	10			50	2			
		<b>Practical</b>										
8	CAP-001	Data base management system				30	20	50			2	1
9	CAP-002	Operating System				30	20	50			2	1
10	CAP-003	Computer Organization				30	20	50			2	1
11	AHP-303	Technical Communication Skills				30	20	50			2	1
							<b>Total</b>	<b>1000</b>				<b>24</b>



**[MCA- Model Curriculum Structure]**

**MCA 2<sup>nd</sup> Semester**

S.No.	Sub. Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
			Theory			Practical			L	T	P	
			End Sem.	MidSem.	Teachers Assesme	End Sem.	Lab Work & Sessional					
		<b>Theory</b>										
1	CAT-009	Computer based numerical and statistical techniques	100	30	20			150	3	1		4
2	CAT-010	Data Structures and analysis of algorithm	100	30	20			150	3	1		4
3	CAT-011	Object oriented programming with Java	100	30	20			150	3	1		4
4	CAT-012	Computer networks	100	30	20			150	3	1		4
5	CAT-013	Artificial intelligence	100	30	20			150	3	1		4
6	AHT -304	Accounting and Financial Management (Non-Credit)		30	20			50	3	1		
		<b>Practical</b>										
7	CAP-004	Data Structures and analysis of algorithm				30	20	50			2	1
8	CAP-005	Object oriented programming with Java				30	20	50			2	1
9	CAP-006	Computer networks				30	20	50			2	1
10	CAP-007	Artificial intelligence				30	20	50			2	1
							Total	1000				24



**[MCA- Model Curriculum Structure]**

**MCA 3<sup>rd</sup> Semester**

S.No.	Sub. Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours/ Week			Total Credits
			Theory			Practical			L	T	P	
			End Sem.	Mid Sem.	Teachers Assessments	End Sem.	Lab Work & Sessional					
		<b>Theory</b>										
1	CAT-014	Graph Theory	100	30	20			150	3	1		4
2	CAT-015	Software Engineering	100	30	20			150	3	1		4
3	CAT-0XX	Program Elective 1	100	30	20			150	3	1		4
4		Open Elective 1	100	30	20			150	3	1		4
5	AHT -	Universal Human Values	100	30	20			150	3			3
		<b>PRACTICALS</b>										
6	CAP-008	Software Engineering				30	20	50			2	1
7	CAP-009	Seminar					100	100			4	2
8	CAP-010	Minor Project				50	50	100			4	2
							<b>Total</b>	<b>1000</b>				<b>24</b>

**List of Program Electives 1:**

- CAT-16 Big Data analytics
- CAT-17 Soft Computing
- CAT-18 Internet of Things
- CAT-19 Compiler Design
- CAT-20 Cloud Computing
- CAT-21 Multimedia

Tentative Open Elective list: (to be floated by other department)

1. Entrepreneurship
2. Startup
3. Principal of Management

**[MCA- Model Curriculum Structure]****MCA4<sup>th</sup> Semester**

S.No.	Sub. Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours Per Week			Total Credits
			Theory			Practical			L	T	P	
			End Sem.	Mid Sem.	Teachers Assessments	End Sem.	Lab Work & Sessional					
		<b>Theory</b>										
1	CAT-022	Network Security	100	30	20			150	3	1		4
2		Open Elective 2	100	30	20			150	3	1		4
3	CAT-0XX	Program Elective 2	100	30	20			150	3	1		4
4	CAT-0XX	Program Elective 3	100	30	20			150	3	1		4
		<b>Practical</b>										
5	CAP-011	Network Security				30	20	50			2	1
6	CAP-012	Open Elective 2				30	20	50			2	1
7	CAP-013	Major Project				20	100	300			12	6
							<b>Total</b>	<b>1000</b>				<b>24</b>

**List of Electives2:**

CAT-023 Simulation & Modeling  
 CAT-024 Neural Networks  
 CAT-025 Advanced Java  
 CAT -026 Data Science  
 CAT -027 Machine Learning

**Elective 3:**

CAT-028 Digital Image Processing  
 CAT-029 Computer Graphics & Multimedia  
 CAT-030 Software Testing & Quality Assurance  
 CAT-031 Block Chain Architecture  
 CAT-032 Natural Language Processing



## Syllabus

### Introduction of Information Technology (Bridge Course) (CAT-001)

L:T:P:: 2:1:0

Credits-0

#### Course Objectives:

This course provides an introduction to information technology and computing systems. It covers both the history and theory of information systems as well as the practical application of technologies. The student will be introduced to computer software, hardware, and networking technologies, as well as information security, privacy, and social issues inherent in information technologies.

**Course Outcomes:** At the end of the course, student will be able to

1. Explain and summarize the history and development of information technologies, including computing hardware, software, and Internet-based technologies.
2. Compare and analyze the fundamental structures of computer networks and the Internet.
3. Compare functions of and create projects based on current information applications, including productivity, data management, visualization, and website development.
4. Analyze and evaluate security, privacy, policy, and other social issues inherent in information technology development and use.
5. Summarize and compare emerging information technologies and their impacts on users, society, and organizations.

#### Syllabus:

##### UNIT-I (9 hours)

Computer Basics: Introduction, Typical Model of Computer, Classification and Characteristic of Computer, Computer generations, Description of Computer hardware components. Primary and secondary storage devices and their functions. Input and Output device and their functions. Comparison based analysis of various hardware components, Types of software.

##### UNIT-II (8 hours)

Basic Operating System Concepts: Functional knowledge of MS-DOS, WINDOWS, UNIX operating systems. Introduction to Basic Internal/ External Commands of DOS, Basic UNIX command and vi editor. Managing file and directories in various operating Systems.

##### UNIT-III (8 hours)

Computer and Information System in Business: Computer application in business, project Management, Computers in Personal and Administration, Accounting Information System, Computer Application in Purchasing, Material Management, Production Planning and Control.

##### UNIT-IV (8 hours)

MS-Office: Proficiency in performing functions in Microsoft WORD, Excel, Power Point, Access and Front Page, Internet: Introduction to internet and WWW, Web browsers, Search engines, Intranet, Extranet and Electronic mail.



## Syllabus

### UNIT-V

(7 hours)

IT Technologies: Electronic/ Mobile Commerce, Hypermedia, Data warehouses and Data marts, Data mining, On-Line Analytical Processing (OLAP)

#### Reference Books:

1. Fundamental of Information Technology: Alexis Leon, Leon Vikas Publication.
2. Fundamentals of Computers: V. Rajaraman, PHI.
3. Computers Today: Suresh K. Basandra, Galgotia Publication.
4. Learning DOS : R. Bangia, Khanna Book Publication.
5. Internet: An Introduction: Manish Dixit, TMH.
6. Internet for everyone : Mathews Leon , Lean Techworld.





## Syllabus

### Programming Fundamentals with 'C' (Bridge Course) (CAT-002)

L:T:P:: 2:1:2

Credits-0

**Course Objectives:** This course is aimed at enabling the students to Formulate simple algorithms forms (in C language), Test and execute the programs and correct syntax and logical errors in 'C' language.

**Course Outcomes (COs):** At the end of the course, student will be able to

1. Understand the basic concepts used in computer programming
2. Write, compile and debug programs in C-language
3. Design programs involving decision, structures, loops and functions.
4. Understand about the application and implementation of 2-dimensional array, structures and strings
5. Understand the dynamics of memory by the use of pointers, Develop solutions to problems using derived data types and files.

#### UNIT – I

(7 hours)

Basic Programming Concepts: Introduction to the basic ideas of problem solving and programming using principles of top-down modular design, Flowcharts, Abstraction Mechanisms, Stepwise Refinement.

#### UNIT – II

(8 hours)

Introduction to Programming Language C: Data Types, Instruction and its Types, Storage Classes, C character set, Identifiers and keywords, Data types, Declarations, Expressions, statements and symbolic constants, #include, define, if def. Preparing and running a complete C program.

#### UNIT – III

(8 hours)

Operators and expressions: Arithmetic, unary, logical, bit-wise, assignment and conditional operators, Library functions, Control statements: while, do-while, for statements, nested loops. If-else, switch, break, continue and go to statements, comma operator.

#### UNIT – IV

(9 hours)

Arrays: Defining and processing, passing to a function, Multi-dimensional arrays. Strings: Operations on strings.

Functions: Defining and accessing: Function passing arguments, prototypes, Recursion, Use of library functions. Storage classes: automatic, external and static variables.



## Syllabus

### UNIT – V

(8 hours)

Pointers: Declarations, Passing to a function, Operations on pointers, Pointers and arrays, Arrays of pointers. Structures: Defining and processing, passing to a function, Unions. Data files: Open, close, create, process, Unformatted data files.

#### References:

1. Hutchison, R. : “Programming in C”. McGraw Hill.
2. Johnsonbaugh R. and Kalin M. : “Applications Programming in C”. PHI.
3. Rajaraman, V.: “Computer Programming in C”. Prentice Hall of India.
4. D. Richi : C Programming. Prentice Hall of India.



## Syllabus MCA Semester –I

### Fundamentals of Web Technologies (Bridge Course) (CAT-003)

L:T:P:: 2:1:2

Credits-0

**Objective of the Course** The aim of this course is to provide you the conceptual and technological developments in the field of Internet and web designing with the emphasis on comprehensive knowledge of Internet, its applications and the TCP/IP protocols widely deployed to provide Internet connective worldwide. The World Wide Web with its widespread usefulness has become an integral part of the Internet. Therefore, this course also puts emphasis on basic concepts of web design.

**Course Outcome:** At the end of the course the students will be able to:

1. Review the current topics in Web & Internet technologies
2. Describe the basic concepts for network implementation and Learn the basic working scheme of the Internet and World Wide Web.
3. Understand fundamental tools and technologies for web design.
4. Specify design rules in constructing web pages and sites.
5. Effectively deal with programming issues relating to VB Script, JavaScript, Java, ASP, Front Page and Figure out the various security hazards on the Internet and need of security measures.

#### UNIT I: Web Designing & Introduction to HTML

(8 hours)

Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML5.

#### UNIT II: Introduction to JavaScript:

(8 hours)

JavaScript Variables and Data Types, Declaring Variables, Data Types, Statements and Operators, Control Structures, Conditional Statements, Loop Statements, Object-Based Programming, Functions, Executing Deferred Scripts, Objects, Message box in JavaScript, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes, JavaScript with HTML, Events, Event Handlers, Forms, Forms Array.

#### UNIT III Style Sheets:

(8 hours)

Need for CSS, Introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3



## Syllabus

### UNIT IV PHP

(8 hours)

Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP

### UNIT V: PHP Database Connectivity

(8 hours)

Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.

#### Text Books:

1. Jeffrey C. Jackson, “Web Technologies: A Computer Science Perspective”, Prentice Hall, 2007
2. Herbert Schildt, “Java: The Complete Reference”, McGraw-Hill Professional, 2006.

#### Reference Books:

1. Doug Tidwell, James Snell, Pavel Kulchenko; Programming web services with SOAP, O’ Reilly
2. Pardi, XML in Action, Web Technology, PHI
3. Yong, XML step by step, PHI
4. Aaron, Weiss, Rebecca Taply, Kim Daniels, Stuvan Mulder, Jeff Kaneshki, Web Authoring Desk reference, Techmedia publications, ASP.Net Chris payme, Techmedia



## Syllabus

### MCA Semester –I

#### DISCRETE STRUCTURES (CAT-004)

L:T:P:: 3:1:0

Credits-04

**Course Objectives:** The objective of this course is to provide the necessary back ground of discrete structures with particular reference to the relationships between discrete structures and their data structure counterparts including algorithm development.

**Course Outcomes:** At the end of the course, student will be able to:

1. Perform operations on various discrete structures such as sets, functions, relations, and sequences.
2. Ability to solve problems using Counting techniques, Permutation and Combination, Recursion and generating functions
3. Apply algorithms and use of graphs and trees as tools to visualize and simplify Problems
4. Use of K-Maps and Truth Tables to construct and verify correctness of a Boolean Expression
5. Create the various properties of algebraic systems like Rings, Monoids and Groups

#### UNIT I

(8 hours)

Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions. Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

#### UNIT II

(8 hours)

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, and complemented lattices.

Combinatorics: Basic Counting Technique, Pigeon-hole Principle, Recurrence Relation, Generating function, Poly's Counting Theorem Paths and Circuits, Isomorphism, Subgraphs, Walks, Paths and Circuits, Connected and disconnected graphs, Euler graphs, Operations on graphs, Hamiltonian graphs, Travelling salesman problem.

#### UNIT III

(8 hours)

Introduction and Basic Concepts: Definition, Representation of graphs, Finite and infinite graphs, Directed graphs, Incidence and degree, Bipartite graph, Planar graphs, Matrix representation of graphs, Applications of graph in computer science.

Graphs: Simple graph, multigraph, graph terminology, representation of graphs, Bipartite, Regular, Planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, Graph coloring, chromatic number, isomorphism and Homomorphism of graphs.



## Syllabus

Trees and Fundamental Circuits: Definition, Properties of trees, Spanning trees, Fundamental circuits and cut-sets, Connectivity and separability, Minimal spanning tree and connected algorithms, Rooted and Binary trees, Applications of trees.

### UNIT IV

**(8 hours)**

Tree: Definition, Rooted tree, properties of trees, binary search tree, tree traversal Shortest Path Problems: Shortest path algorithms, Generalized shortest path algorithms, Applications of shortest path problems. Network Flow Problems: Flows in network, formulation, Max-flow min-cut theorem, Minimum cost flow problems, Ford-Fulkerson algorithm for maximum flow.

### UNIT V

**(8 hours)**

Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

### Text books

1. Discrete Mathematics and Its Applications, By Kenneth H Rosen, McGrawHill, Sept.2002.
2. DiscreteMathematicalStructureswithApplicationstoComputerScience,ByJ. P.Tremblay, R.Manohar, McGraw Hill Pub, 1975.
3. “GraphTheoryWithApplicationstoEngineeringandComputerScience”PrenticeHall, Englewood Cliffs, 1974
4. Combinatorics: Theory and Applications, By V. Krishnamurthy, East-West Press Pvt. Ltd., New Delhi, 1986.
5. K. L. P. Mishra, N. Chandrasekaran, “Theory of Computer Science: Automata, Languages and Computation, PHI Publication



## Syllabus

### MCA Semester –I

#### Database Management System (CAT - 005)

L:T:P:: 3:1:0

Credits-04

**Course Objectives:** The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve efficiently, and effectively information from a DBMS.

**Course Outcomes (COs):** At the end of the course, student will be able to

1. Explain DBMS architecture, physical and logical database designs, database modelling, relational, hierarchical and network models.
2. Identify basic database storage structures and access techniques such as file organizations, indexing methods including B- tree, and hashing
3. Learn and apply Structured Query Language (SQL) for database definition and database manipulation
4. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database
5. Understand various transaction processing, concurrency control mechanisms and database protection mechanisms
6. Improve the database design by applying normalization techniques

#### UNIT I

(8 hours)

**Introduction:** An overview of database management system, Database System Vs File System, Database System concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure. Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of An ER diagrams to tables, extended ER model, relationships of higher degree.

#### UNIT II

(8 hours)

**Relational data Model and Language:** Relational data model concepts, integrity constraints: entity integrity, Referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus

**Introduction to SQL:** Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL Commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate Functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL. PL/SQL, Triggers and clusters



## Syllabus

### UNIT III

(8 hours)

**Data Base Design & Normalization:** Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design

### UNIT IV

(8 hours)

**Transaction Processing Concepts:** Transaction system, testing of serializability, Serializability of schedules, Conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, Checkpoints, deadlock handling

### UNIT V

(8 hours)

**Concurrency Control Techniques:** Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi- version Schemes, Recovery with concurrent transaction. Transaction Processing in Distributed system, data fragmentation. Replication and allocation techniques for distributed system, overview of concurrency control and recovery in distrusted database.

#### Text Books:

1. Date C J, "An Introduction To Database System", Addison Wesley
2. Navathe E, "Database management systems",

#### Reference Books:

3. Bharti P.K, "An introduction to Database Systems", JPNP
4. Paul Beynon Davies, "Database Systems", Palgrave Macmillan





## Syllabus

### MCA Semester –I

#### Operating System (CAT- 006)

L:T:P:: 3:1:0

Credits-04

#### Course Objectives:

- To introduce different types of operating systems.
  - To learn process management techniques.
  - To learn various memory management techniques.
  - To introduce the architecture of Linux operating system.
  - To learn basic Unix commands and to write shell scripts.
- 
- **Course Outcomes:** At the end of the course, student will be able to
    1. Understand the basics of operating systems like kernel, shell, types and views of operating systems
    2. Understands CPU scheduling algorithms and compare the results using Gantt chart.
    3. Explain various memory management techniques and concept of thrashing
    4. Apply disk scheduling algorithms for better utilization of external memory
    5. Understand the architecture of Unix operating system, Write and execute shell programs

#### UNIT I

(8 hours)

**Introduction:** Operating System and Function, Evolution of Operating System, Batch, Interactive, Time Sharing and Real Time System, System Protection. Operating System Structure: System Components, System Structure, Operating System Services.

#### UNIT II

(8 hours)

**Concurrent Processes:** Process Concept, Principle of Concurrency, Producer / Consumer Problem, Critical Section, Problem, Semaphores, Classical Problems in Concurrency, Inter Processes Communication, Process Generation, Process Scheduling.

#### UNIT III

(8 hours)

**CPU Scheduling:** Scheduling Concept, Performance Criteria Scheduling Algorithm, Evolution, Multiprocessor Scheduling. Deadlock: System Model, Deadlock Characterization, Prevention, Avoidance and Detection, Recovery from Deadlock.

#### UNIT IV

(8 hours)

**Memory Management:** Basic Machine, Resident Monitor, Multiprogramming with Fixed Partition, Multiprogramming With Variable Partition, Multiple Base Register, Paging, Segmentation, Paged Segmentation, Virtual' Memory Concept, Demand Paging, Performance, Paged Replaced Algorithm, Allocation of Frames, Thrashing, Cache Memory Organization, Impact on Performance.



## Syllabus

### UNIT V

(8 hours)

**I/O Management & Disk Scheduling:** I/O Devices and the Organization of I/O Disk I/O, Operating System Design Issues. File System: File Concept, File Organization and Access Mechanism, File Directories, File Sharing, Implementation Issues.

#### Text Books:

1. Stalling, William, "Operating System", Maxwell Macmillan
2. Silveschatza, Peterson J, "Operating System Concepts", Willey.

#### ReferenceBooks:

3. Milenekovie , "Operating System Concept", McGraw Hill.
4. Petersons, "Operating Systems", Addison Wesley.
5. Dietal, "An Introduction to Operating System", Addison Wesley.
6. Gary Nutt, "Operating System, A Modern Perspective", Addison Wesley.
7. Crow ley, "Operating System", TMH.



**Syllabus**  
**MCA Semester –I**

**Computer Organization (CAT-007)**

**L:T:P:: 3:1:0**

**Credits-04**

**Course Objectives:**

- The objectives of this course are to
- Conceptualize the basics of organizational and architectural issues of a digital computer.
- Learn the function of each element of a memory hierarchy.
- Study various data transfer techniques in digital computer.

**Course Outcomes:** At the end of the course, student will be able to

- Understand the basic organization of computer and different instruction formats and addressing modes
- Analyze the concept of pipelining, segment registers and pin diagram of CPU.
- Understand and analyze various issues related to memory hierarchy
- Evaluate various modes of data transfer between CPU and I/O devices and Examine various inter connection structures of multi processors.

**UNIT I**

**(8 hours)**

**Review of Number Systems** – Number representation: Signed, Unsigned, Fixed point, Floating point. Computer codes – BCD, Gray code, Excess 3 code, Error detection and correction codes, Parity, Hamming codes. Boolean algebra – Basic Postulates and theorems, Switching functions, Canonical forms, Logic gates. Simplifications of Boolean functions using Karnaugh maps and tabulation methods.

**UNIT II**

**(8 hours)**

**Analysis and design procedures of Combinational circuits** - Arithmetic Circuits: Binary / BCD adders and subtractors, Carry look ahead adder, Magnitude comparator, Code conversion Decoders, Encoders, Multiplexers and Demultiplexers.

**UNIT III**

**(8 hours)**

**Sequential Devices:** General model of sequential circuits – Latch, Design of Flip Flops, Master slave configuration. Mealy/Moore models -Sequence detector – Concept of state, State diagram, State table, State reduction procedures using Implication chart. Design of synchronous sequential circuits – Updown / Modulus counters, Serial adder, Binary counters.

**UNIT IV**

**(8 hours)**

Von Neumann Machine (IAS Computer), Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing UNIT, Hardwired & micro programmed control UNIT, Single Organization, General Register Organization, Stack Organization, Addressing modes, Instruction formats, data transfer & Manipulation, I/O Organization, Programming Registers.



## Syllabus

### UNIT V

(8 hours)

Memory Hierarchy, Main memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache memory, Virtual Memory, Memory Management Hardware, hit/miss ratio, magnetic disk and its performance, magnetic Tape etc.

#### Text Books:

1. Computer System Architecture, PHI/Pearson Education, 3rd Edition, M. Morris Mano
2. Digital Computer Fundamentals, Tata McGraw Hill, 6th Edition, Thomas C. Bartee

#### Reference Book:

1. Computer Organization, Vravice, Zaky & Hamacher (TMH Publication)
2. Structured Computer Organization, Tannenbaum(PHI)
3. Morris Mano," Computer System Architecture", PHI
4. Computer Organization, Stallings(PHI)
5. William Stalling,"Computer Organization & Architecture",Pearson Educaiton Asia
6. Computer Organization, John P.Hayes (McGraw Hill)



## Syllabus

### MCA Semester – I Technical Communication Skills (AHT-303)

L:T:P:: 3:1:0

Credits-04

#### Course Objectives:

Technical Communication is most essential for students and professionals. Thus there is a drastic need for effective communication. Due to the various phenomenal changes in the business environment, recruiters are now looking for students with good computer knowledge as well as good communication skills. Thus, the objective of this course is to equip the students with the basics of communication skills and technical writing, so that they can put it into use in their day to-day activities.

#### Course Outcomes:

1. Students will be enabled to understand to nature and objective of technical communication relevant for the work place as engineers.
2. Students will utilize the technical writing for the purpose of technical communication and its exposure in various dimensions.
3. Students would imbibe inputs by representation skills to enhance confidence in face of diverse audience.
4. Technical communication skills will create a vast know-how of the application of the learning to promote their technical competence.
5. It would enable them to evaluate their efficacy as fluent and efficient communicators by learning the voice-dynamics.

#### UNIT I

(8 hours)

##### Introduction to Communication

What is Communication, Levels of Communication, Importance of Technical Communication, Barriers to Communication, Non-Verbal Communication, Technology-Enabled Communication, Impact of Technology, Selection of Appropriate Communication Technology.

#### UNIT II

(8 hours)

##### Oral Forms of Communication

Effective listening, Active vs Passive Listening, Effective Presentation Strategies, Effective Use of Visual Aids, Understanding the Nuances of Delivery, Interviews, Types of Interviews, Group Discussion, Meetings, Conferences.



## Syllabus

### UNIT III

(8 hours)

#### Introduction to Essential English Grammar

Punctuation and Capitalization, Nouns and Verbs, Pronouns, Adjectives, Prepositions, Conjunctions, Tenses, Active and Passive Voice, Use of Articles, Common Errors in Usage, Words Commonly Misspelt .

### UNIT IV

(8 hours)

#### Effective Writing

Words and Phrases, Guidelines for Effectiveness, Sentence Construction, Paragraph Development, Precis Writing, Reading Comprehension.

### UNIT V

(8 hours)

#### Written Forms of Communication

Letter Writing, Memorandums, E-mails, Report Writing, Technical Proposals, Research Paper, Dissertation, Thesis, Instruction Manuals, Technical Description.

#### Text Books:

1. Technical Communication – Principles and Practice by Meenakshi Raman &Sangeeta Sharma, Oxford University Press, Sixteenth Impression 2007.
2. Business Communication by Meenakshi Raman &Prakash Singh, Oxford University Press, Seventh Impression 2008.
3. High School English Grammar and Composition by Wren & Martin

#### Reference Books:

1. Effective Business Communication by Herta A Murphy, Herbert W. Hilderbrandt & Jane P Thomas, Seventh Edition, Tata McGraw Hill Publication
2. Effective Business Communication by AshaKaul, Prentice-Hall India Pvt. Ltd., March 2008
3. Technical Writing by B. N. Basu, Prentice-Hall India Pvt. Ltd., 2007.



## Syllabus

### MCA Semester – I

#### Python Programming (CAT-008)

L:T:P:: 2:0:0

Credits-0

#### Course Objectives:

1. To acquire programming skills in core Python.
2. To acquire Object Oriented Skills in Python.
3. To develop the skill of designing Graphical user Interfaces in Python.
4. To develop the ability to write database applications in Python.

#### Course Outcomes(COs): At the end of the course, student will be able to

1. Understand and comprehend the basics of python programming.
2. Demonstrate the principles of structured programming and be able to describe, design, implement, and test structured programs using currently accepted methodology.
3. Explain the use of the built-in data structures list, sets, tuples and dictionary.
4. Make use of functions and its applications.
5. Identify real-world applications using oops, files and exception handling provided by python.

#### UNIT I

(8 hours)

**Introduction to Python:** Knowledge, Machines, Languages, Types, Variables

Core elements of program: Strings, Input/Output, IDEs (Anaconda), Control Flow, Iteration

Basic Program examples (not limited to): Swap, Various Calculators, Number series, Number Guess game etc.

Functions: Decomposition and Abstraction, Functions and Scope, Keyword Arguments, Specifications

#### UNIT II

(8 hours)

**Tuples and Lists:** Tuples, Lists, List Operations, Mutation, Aliasing, Cloning

**Dictionaries:** Functions as Objects, Dictionaries, Example with a Dictionary, Fibonacci and Dictionaries, Global Variables

#### UNIT III

(8 hours)

**Classes and Inheritance:** Object Oriented Programming, Class Instances, Methods Classes Examples, Why OOP? Hierarchies, building a Class, Visualizing the Hierarchy, adding classes, Using Inherited Methods

**Debugging and Exceptions:** Programming Challenges, Classes of Tests, Bugs, Debugging, Exceptions, Exception Examples, Assertions



## Syllabus

### UNIT IV

(8 hours)

**Computational Complexity:** Program Efficiency, Big Oh Notation, Complexity Classes Analyzing Complexity

**Searching and Sorting Algorithms:** Indirection, Linear Search, Binary Search, Bubble Sort, Selection Sort, Merge Sort

**Iteration vs Recursion:** Inductive Reasoning, Towers of Hanoi, Fibonacci and other examples

### UNIT V

(8 hours)

**Advanced topics on python:** Basics of Regular Expressions, Hash Tables, Plotting using PyLab

**File handling:** Basic file operations and their uses in simple programs

**Graphics and GUI Programming:** Drawing using Turtle, Tkinter and Python.

#### Text Books:

1. Python Programming using problem solving Approach by Reema Thareja, Oxford University, Higher Education Oxford University Press
2. Python Programming for the Absolute Beginner by Michael Dawson, Premier Press

#### Reference Books:

1. Python for Kids, A Playful Introduction to Programming by Jason R. Briggs
2. Learning Python by Mark Lutz, 5th Edition, O'Reilly Media





## Syllabus

### MCA Semester –I DBMS Lab (CAP-001)

L:T:P:: 0:0:2

Credits-01

#### Course Objectives:

- To design and implement a database schema for a given problem domain
- To create and manipulate tables using SQL queries
- To prepare reports
- To develop applications using PL/SQL

#### Course Outcomes (COs):

At the end of the course, student will be able to

1. Design and effectively explain the underlying concepts of database technologies
2. Design and implement a database schema for a given problem-domain
3. Apply normalization techniques to avoid redundancy and Populate and query a database using SQL commands
4. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
5. Write PL/SQL programs including stored procedures, stored functions, cursors, packages

#### List of Experiments:

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
4. Creating an Employee database to set various constraints.
5. Creating relationship between the databases.
6. Study of PL/SQL block.
7. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
8. Write a PL/SQL block that handles all types of exceptions.
9. Creation of Procedures.
10. Creation of database triggers and functions
11. Open Ended Mini project (Application Development using Oracle/ Mysql)
  - a) Inventory Control System.
  - b) Material Requirement Processing.
  - c) Hospital Management System.
  - d) Railway Reservation System.
  - e) Personal Information System.
  - f) Web Based User Identification System.
  - g) Timetable Management System.
  - h) Hotel Management System.
  - i) Online leave Management System.
  - j) Online quiz management system

12. **ACTIVE LEARNING ASSIGNMENTS:** Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered.



## Syllabus

### MCA Semester-I

#### OS Lab Linux & Shell Programming (CAP-002)

**L:T:P:: 0:0:2**

**Credits-01**

**Course Objective:** to give the students practical experience in developing and writing LINUX shell scripts. Most of the built-in shell commands are introduced together with the main program control structures.

**Course Outcome :** after completing the course the student will be able to :

1. Understanding the basic set of commands and utilities in Linux/UNIX systems and develop software for Linux/UNIX systems.
2. To learn the C language and get experience programming in C.
3. To learn the important Linux/UNIX library functions and system calls.
4. To understand the inner workings of UNIX-like operating systems.
5. To obtain a foundation for an advanced course in operating systems.

#### **List of Practicals :**

1. Execution of various file/directory handling commands.
2. Simple shell script for basic arithmetic and logical calculations.
3. Shell scripts to check various attributes of files and directories.
4. Shell scripts to perform various operations on given strings.
5. Shell scripts to explore system variables such as PATH, HOME etc.
6. Shell scripts to check and list attributes of processes.
7. Execution of various system administrative commands.
8. Write awk script that uses all of its features.
9. Use sed instruction to process /etc/passwd file.
10. Write a shell script to display list of users currently logged in.
11. Write a shell script to delete all the temporary files.
12. Write a shell script to search an element from an array using binary searching.



## Syllabus

### MCA Semester-I

#### Computer Organization Lab (CAP-003)

**L:T:P:: 0:0:2**

**Credits-01**

**Course Objectives:** This course is primarily meant to teach undergraduate students the basic operations of computing hardware and how it interfaces to software.

**Course Outcome:** After completing the course the student will be able to :

1. Understand the behavior of logic gates, adders, decoders, multiplexers and flipflops.
2. Understanding the behavior of ALU, RAM, STACK and PROCESSOR from working modules and the modules designed by the student as part of the experiment.

#### List of Experiments:

1. Study and Bread Board Realization of Logic Gates. K-Map, Flip-Flop equation,
2. Realization of characteristic and excitation table of various Flip Flops.
3. Implementation of Half Adder, Full Adder and Subtractor.
4. Implementation of Ripple Counters and Registers.
5. Implementation of Decoder and Encoder circuits.



## Syllabus

### MCA Semester-I

#### Technical Communication Skill Practical (AHP-303)

L:T:P:: 0:0:2

Credits-01

#### Syllabus:

Lab sessions will be devoted to practice activities based on all three modules of theory.

##### a. phonemic transcription

Students will be trained to find out the correct pronunciation of words with the help of a dictionary, to enable them to monitor and correct their own pronunciation.

- transcription of words and short sentences in normal English orthography (writing) into their IPA equivalents;
- transcription of words presented orally;
- conversion of words presented through IPA symbols into normal orthography
- syllable division and stress marking (in words presented in IPA form)

##### b. Listening

- listening with a focus on pronunciation (ear-training) : segmental sounds, stress, weak forms, into nation Students should be exposed, if possible, to the following varieties of English during listening practice: Standard Indian, British and American.

##### c. Speaking

- (i) pronunciation practice (for accent neutralization), particularly of problem sounds, in isolated words as well as sentences
- (ii) practicing words stress, rhythm in sentences, weak forms, intonation
- (iii) reading aloud of dialogues, poems, excerpts from plays, speeches etc. for practice in pronunciation

##### d. Grammar and usage

The focus will be on the elimination of common errors. Some writing activities (e.g. writing of short paragraphs on assigned topics) can be used to identify these errors.

- \* Identifying the central idea as well as supporting ideas
- \* Preparing notes in diagrammatic form after reading a text, showing the main idea and support in ideas and the relationships between them.

#### Project Work:

- \* Students will be required to produce and submit by the end of Semester 1 a 350-500 word project report on a topic of their choice. The project should involve a collection, analysis and reporting.



## Syllabus

### MCA Semester –II

#### Computer Based Numerical & Statistical Technique (CAT-009)

L:T:P:: 3:1:0

Credits-04

#### Course Objective:

- \* With the current deployment of computer technology and tools, it is very important to develop efficient algorithms for solving problems in science, engineering, technology, insurance & banking.

#### Course Outcome:

1. Obtain an intuitive and working understanding of numerical methods for the basic problems of numerical analysis.
2. Gain an experience in the implementation of numerical methods using a computer.
3. Trace error in these methods and need to analyze and predict it.
4. Have an adequate understanding of the application of Statistical methods.

#### UNIT I

(8 hours)

**Floating point Arithmetic:** Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation.

**Iterative Methods:** Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

#### UNIT II

(8 hours)

**Interpolation and approximation:** Finite Differences, Difference tables Polynomial Interpolation: Newton's forward and backward formula Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula. Interpolation with unequal intervals.

**Langrange's Interpolation, Newton Divided difference formula,** Approximation of function by Taylor's series.

#### UNIT III

(8 hours)

**Numerical Differentiation and Integration:** Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Boole's Rule, Weddle's Rule.

**Solution of differential equations:** Picard's Method, Euler's Method, Taylor's Method, Runge- Kutta methods,

**Simultaneous Linear Equations:** Solutions of system of Linear equations, Gauss Elimination, Gauss Jordan method, Gauss Seidal iterative method, Rate of Convergence.



## Syllabus

### UNIT IV

(8 hours)

**Curve fitting, Cubic Spline and Approximation:** Method of least squares, fitting of straight lines, polynomials, exponential curves etc. Cubic Spline, Approximation.

**Correlation and Regression analysis:** Introduction, Scatter Diagram, Types of Correlation, Karl Pearson's Method, Rank Correlation, Linear and Non-linear regression, Multiple regression.

### UNIT V

(8 hours)

**Time series and forecasting:** Method of Semi Averages, Method of Moving Averages, Method of Least Square, smoothening of curves, forecasting models and methods. Statistical Quality Controls: Advantages of Q.C, Controls charts, Types of control charts-Mean chart, R- Range chart, Standard Deviation Chart.

#### Text Books:

1. Rajaraman V., "Computer Oriented Numerical Methods", PHI-2004
2. Gerald & Wheatley, "Applied Numerical Analyses", AW-2003

#### ReferenceBooks

1. Burden, RichardL.,Fairs, J.DouglasFairs, "NumericalAnalysis",ThomsonAsia.PTE, 7thEdition.
2. Gourdin A., BoumahratM."Applied Numerical Method", PHI.
3. Rajasekaran, S."NumericalMethodinScience& Engineering,A Practical Approach"S.Chand&Co Ltd.,IIEdition.
4. Jain M. K. &IyengerR.K. "NumericalMethods for Scientific& Engg. Computation,"New Age, InternationalPub. 4th Edition.



## Syllabus

### MCA Semester – II

#### Data Structure & Analysis of Algorithms (CAT-010)

L:T:P:: 3:1:0

Credits-04

#### Course Objectives:

- To understand algorithms and its analysis procedure.
- To design and implement various data structure algorithms
- To introduce various techniques for representation of different types of data in the real world.
- Compute the complexities of various algorithms.

**Course Outcomes :** At the end of the course, student will be able to :

1. Select appropriate data structures as applied to specified problem definition.
2. Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
3. Compare Linear and Non-Linear data structures. Apply appropriate sorting/searching technique for given problem.
4. Design advance data structure using Non Linear data structure.
5. Determine and analyze the complexity of given Algorithms

#### UNIT I

(8 hours)

**Introduction:** Basic Terminology, Elementary Data Organization, Structure operations. Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Ordered List, Sparse Matrices. Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Applications of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.

#### UNIT II

(8 hours)

**Queues:** Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues. Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Garbage Collection and Compaction.



## Syllabus

### UNIT III

(8 hours)

**Trees:** Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, path length algorithm. Huffman Algorithm.

**Searching and Hashing:** Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. Red-Black Trees, Binary Search Tree, Augmenting Data Structure. B- Trees, Binomial Heaps, Fibonacci Heaps, Data Structure for Disjoint Sets.

### UNIT IV

(8 hours)

**Sorting:** Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Radix Sort, Sorting on Different Keys. Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Heap sort, Merge Sort

**Graph representation:** Adjacency matrix, Adjacency lists, Traversal schemes: Depth first search, Breadth first search. Spanning tree: Definition, Minimal spanning tree algorithms. Shortest Path algorithms (Prim's and Kruskal's).

### UNIT V

(8 hours)

**Introduction:** Algorithms, Growth of Functions, Algorithm Analysis – Time Space Trade off – Asymptotic Notations, Master's Theorem, Designing of Algorithms. Dynamic Programming, Greedy Algorithms, Amortized Analysis, Back Tracking. Sorting Networks, Starsen's algorithm for matrix multiplication, Randomized algorithms, String Matching, NP Completeness, and Approximation Algorithms.

#### Text Books:

1. Coreman, Rivest, Lisserson : "Algorithm", PHI.

#### Reference Books:

1. Basse, "Computer Algorithms: Introduction to Design & Analysis", Addison Wesley.
2. Horowitz & Sahani, "Fundamental of Computer Algorithm", Galgotia.





## Syllabus

### MCA Semester - II

#### Object Oriented Programming with Java (CAT-011)

L:T:P:: 3:1:0

Credits-04

#### Course Objectives:

- To learn the object oriented programming concepts.
- To introduce the principles of inheritance and polymorphism and demonstrate how they are related to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce the concept of multithreading and exception handling
- To introduce the design of Graphical User Interface using applets and swing controls

#### Course Outcomes : At the end of the course, student will be able to

1. Understand and apply the concepts of OOP to solve real world problems
2. Understand the concepts of packages and interfaces
3. Understand the concepts of exception handling, multithread applications with
4. synchronization
5. Design the GUI based applications using AWT and Swings
6. Understand the concept of Collection Framework

#### UNIT I

(8 hours)

**OOPS Concept:** Principle of OOP's, Introduction Procedural Vs Object Oriented Programming Classes, Object, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing Object Oriented Languages, Object Based languages.

#### UNIT II

(8 hours)

**Core Java:** Introduction to Java Programming Language, Data Types and Operations, Structured Programming, Selection Statements, Loops, Methods, Method Abstraction and Stepwise Refinement, Arrays, Object-Oriented Programming: Classes and Objects, Constructors, Implementing & Designing Classes.

#### UNIT III

(8 hours)

**GUI Programming:** GUI Basics, Graphics, Event-Driven Programming, Creating User Interfaces, Applets and Multimedia, Exception Handling, Binary I/O, Files & Streams, Recursion, Dynamic Binding, Generics & Generic Programming, Java Collections Framework, Algorithm Efficiency, Searching & Sorting.



## Syllabus

### UNIT IV

(8 hours)

**Java Swing:** Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel , Labels, Text fields, Buttons, Toggle Buttons, Check boxes, Radio Buttons, View Ports, Scroll Panes, Scroll Bars, Lists, Combo Box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner, Frame, JDBC: The connectivity Model, JDBC/ODBC Bridge, Java.sql Package, connectivity to remote database, navigating through multiple rows retrieved from a database.

### UNIT V

(8 hours)

**Java Beans:** Application Builder tools, The bean develop kit (BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Enterprise Java Beans (EJB), Introduction to RMI (Remote Method Invocation): A Single client-server application using RMI.

#### Text Books:

1. Margaret Levine Young, “The Complete Reference Internet”, TMH
2. Balagurusamy E, “Programming in JAVA”, TMH

#### Reference Books:

1. Naughton, Schildt, “The Complete Reference JAVA2”, TMH
2. Dustin R. Callway, “Inside Servlets”, Addison Wesley



## Syllabus

### MCA Semester –II

#### Computer Networks (CAT-012)

L:T:P:: 3:1:0

Credits-04

**Course Objectives:** At the end of the course, the students will be able to:

- Understands the fundamental concepts of computer networking and OSI reference model.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry advanced courses in computer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.
- 

**Course Outcomes(COs):** At the end of the course, student will be able to

1. Understand computer network basics, network architecture, TCP/IP and OSI reference models
2. Identify and understand various techniques and modes of transmission
3. Understand data link protocols, multi-channel access protocols and IEEE 802 standards for LAN
4. Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme. Discuss the elements and protocols of transport layer
5. Understand network security and define various protocols such as FTP, HTTP, Telnet, DNS

#### UNIT I

(8 hours)

**Introduction Concepts:** Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

#### UNIT II

(8 hours)

**Medium Access sub layer:** Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.



## Syllabus

### UNIT III

(8 hours)

**Network Layer:** Network Layer - Point - to Point Networks, Routing, Congestion control  
Internetworking -TCP / IP, IP packet, IP address, IPv6.

### UNIT IV

(8 hours)

**Transport Layer:** Transport Layer - Design issues, connection management, session Layer- Design issues, Remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

### UNIT V

(8 hours)

**Application Layer:** Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.

#### Text Books :

1. Forouzen, "Data Communication and Networking", TMH

#### Reference Books:

1. A.S. Tanenbaum, Computer Networks, Pearson Education
2. W. Stallings, Data and Computer Communication, Macmillan Press



## Syllabus

### MCA Semester –II Artificial Intelligence (CAT-013)

L:T:P:: 3:1:0

Credits-04

#### Course Objectives:

- Gain a historical perspective of AI and its foundations.
- Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- Experience AI development tools such as an ‘AI language’, expert system shell, and/or data mining tool. Experiment with a machine learning model for simulation and analysis.
- Explore the current scope, potential, limitations, and implications of intelligent systems.

#### Course Outcomes: At the end of the course, student will be able to

- Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents
- Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
- Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing
- Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
- Solve problems with uncertain information using Bayesian approaches.

#### UNIT I

(8 hours)

**Introduction** Definition of Artificial Intelligence (AI), Evolution of Computing, History of AI, Classical Romantic and modern period, subject area, Architecture of AI machines, logic family, classification of logic.

**Production System:** Production rules, the working memory, Recognize-act cycle, conflict resolution strategies, refractoriness, specify alternative approach for conflict resolution by Meta rules, Architecture of production system.

#### UNIT II

(8 hours)

**Propositional Logic:** Proposition, tautologies, Theorem proving, Semantic method of theorem proving, forward chaining, backward chaining standard theorems, method of substitution. Theorem proving using Wang’s algorithm. Predicate Logic: Alphabet of first order logic (FOL), predicate, well-formed formula, clause form, algorithm for writing sentence into clause form, Unification of predicates, unification algorithm, resolution Robinson’s interface rule, Scene interpretation using predicate logic.



## Syllabus

### UNIT III

(8 hours)

**Default and Non Monotonic Logic:** Axiomatic theory, Monotonicity, non-atomic reasoning using McDermott's NML-I, problems with NML-I, reasoning with NML-II, Case study of Truth Maintenance system (TMS), neural network fundamentals.

### UNIT IV

(8 hours)

**Imprecision and Uncertainty:** Definition, Probabilistic techniques, Certainty factor based reasoning, conditional probability. Medical diagnosis problem, Baye's Theorem and its limitations, Bayesian belief network, propagation of belief, Dempster-Shafer theory of uncertainty management, belief interval, Fuzzy relation, inverse Fuzzy relations, Fuzzy post inverse, Fuzzy Inversion.

### UNIT V

(8 hours)

**Intelligent Search Techniques :** Heuristic function, AND-OR graph, OR Graph, Heuristic search, A\* algorithm and examples. Logic Programming with Prolog: Logic program, Horn clause, program for scene interpretation, unification of goals, SLD resolution, SLD tree, flow of satisfaction, controlling back tracking using CUT, command use of CUT, implementation of backtracking using stack, risk of using cuts, fail predicate, application of cut-fail combination, replacing cut-fail by not.

#### Text Books :

1. Rich and Knight: Artificial Intelligence, 2/e 1992.

#### Reference Books:

1. Konar: Artificial Intelligence and Soft Computing—Behavioral and Cognitive Modeling of Human Brain, CRC Press,USA.
2. Trevor Hastie R . Tibshirani, J. Friedman “The Elements of Statistical Learning” Second Edition, Springer.2008.



## Syllabus

### MCA Semester - II Accounting & Financial Management (AHT-304)

L:T:P:: 3:1:0

Credits-0

#### Course Objectives:

The main objectives of this course are

- To understand the basic concepts and processes used to determine product costs
- To be able to interpret cost accounting statements
- To be able to analyze and evaluate information for cost ascertainment, planning, control and decision making

**Course Outcomes:** At the end of the course, student will be able to

1. Understand the balance sheet preparation and perform analysis
2. Understand the budget preparation and control of a company
3. Decide about the state of affairs of a particular firm / company
4. Ensure the preparation of fiscal policies of the organization
5. Ensure the factors to be considered in investment policies

#### UNIT I

(9 hours)

**Fundamentals of Management :** Management Thought- The Concept, Nature of and Process of planning– Objectives of Business– Instrument of Planning. Decision Making– Organization and organization Structures – process of organizing – Departmentation – Line – staff and lateral relations.

#### UNIT II

(8 hours)

**Delegation and decentralization :** Directing and problems in Human relations – Motivation. Communication – Leadership – Coordination – Management control–Control techniques. Dynamic Personnel Management–staffing policies and process–wage and salary administration.

#### UNIT III

(8 hours)

**Accounting Concepts:** Double Entry System – Journal – Ledger – Trial Balance – Subsidiary Books – Final accounts. Cost Accounting: Nature and significance–Cost classification and Analysis – Marginal Costing.

#### UNIT IV

(8 hours)

**Budget:** Budgetary control–standard costing–Finance Function. Financial Decision Making – Financial Analysis – Working Capital Management – Capital Budgeting.



## Syllabus

### UNIT V

(7 hours)

**Funds flow Analysis :** Cash flow Analysis - Ratio Analysis.

#### Text Book:

1. Agarwal RD, "Organisation and Management". Tata McGraw-Hill publishing Company Limited, New Delhi.
2. Kootz H, and Wehrich H, Essentials of Management, 5<sup>th</sup> edition, Tata Mc Graw – Hill, 1998.
3. Biswajeet Pattanayak, Human Resource management – Prentice – Hall India Private Ltd, New Delhi, 2001.
4. Aswathappa K., Human Resource and Personnel Management, Text and Cases, 3<sup>rd</sup> edition, Tata Mc Graw – Hill Publishing Company Ltd., New Delhi, 2004.
5. Rajeswara Rao K and Prasad G, Accounting & Finance (MCA), Jai Bharat Publishers, Guntur
6. Jain and Narang, *Accountancy Vol.* Kalyani Publishers.
7. Jain and Narang, *Cost Accounting*, Kalyani Publishers.
8. Sharma R K, and Gupta S K, *Management Accounting*, Kalyani Publishers.
9. Pandey I M, *Financial Management*, Vikas Publication.

#### Reference Books :

1. Mirza S Saiyadain Human Resource Management, 3<sup>rd</sup> edition, Tata Mc Graw Hill, New Delhi, 2003.
2. Wehrich H, and Koontz H, Management – A Global Perspective, 10<sup>th</sup> edition, Mc Graw – Hill, 1994.
3. Robbins SP. And DeCenzo D, Fundamentals of Management, 4<sup>th</sup> edition, Prentice Hall, 2003.
4. Dessler G, Management: Principles and Practices for Tomorrow's Leaders, 3<sup>rd</sup> Edition, Prentice Hall, 2003.
5. Chandan J S, Management Concepts and Strategies, Vikas Publishing House, 2002.
6. Ivencevich. John M., Human Resource Management 9<sup>th</sup> edition, Tata McGraw Hill, New Delhi, 2003.





## Syllabus

### MCA Semester –II

#### Data Structure & Analysis of Algorithm Lab (CAP-004)

L:T:P:: 0:0:2

Credits-01

#### Course Objectives:

- To design and implement various data structures.
- To implement operations like searching, insertion and deletion, traversing mechanism
- To develop applications using data structure algorithms.

**Course Outcomes:** At the end of the course, student will be able to

1. Implement various basic data structures and its operations.
2. Apply sorting and searching algorithms to given numbers
3. Implement various tree operations.
4. Implement various graphs algorithms.
5. Develop applications using various data structures.

#### List of Experiments :

1. Write a Program to implement insertion, deletion and searching operations in a singly linked list.
2. Write a Program to implement insertion, deletion and searching operations in a doubly linked list.
3. Write a Program to implement insertion, deletion and searching operations in a circular linked list.
4. Write a Program to implement a stack using array.
5. Write a Program to implement a queue using array.
6. Write a Program to implement a stack using singly linked list.
7. Write a Program to implement a queue using singly linked list.
8. Write a Program to implement a circular queue using array.
9. Write a Program to implement a circular linked list using singly linked list.
10. Write a Program to implement a circular linked list using doubly linked list.
11. Write a Program to count the number of occurrence of an element in the singly linked list.
12. Write a Program to swap  $m^{\text{th}}$  and  $n^{\text{th}}$  node in of a singly linked list
13. Write a Program for Insertion Sorting, Bubble Sorting, Selection Sorting.
14. Write a Program for Quick Sorting, Heap Sorting, Binary Search.
15. Write a Program to implement preorder traversing in Binary Search Tree.
16. Write a Program to implement post order traversing in Binary Search Tree.
17. Write a Program to implement in order traversing in Binary Search Tree.
18. Write a Program to find minimum & minimum element in Binary Search Tree.



## Syllabus

19. Write a Program to find successor of the root element in Binary Search Tree.
20. Write a Program to find predecessor of the root element in Binary Search Tree.
21. Write a Program to count the leaf and non leaf nodes of a Binary Search Tree.
22. Write a Program to count the total nodes and find the height of a Binary Search Tree.
23. Write a Program to implement Breath First Search of a graph.
24. Write a Program to implement Depth First Search of a graph.
25. Write a Program to implement Dijkstra shortest path algorithm.
26. Write a Program to implement Prim's algorithm for minimum spanning tree.
27. Write a Program to implement Kruskal's algorithm for minimum spanning tree.
28. Write a Program of stack where element will be pushed from last position of array.
29. Write a Program to calculate the sum of all the nodes in a Binary tree.
30. Write a Program to implement two (2) queues in one (1) array where first queue will start from 0<sup>th</sup> position and second queue will start from last position.
31. Write a Program to implement a stack which contains the address of the pointers for allocation of memory. Do the pop operation on stack and free the popped pointers.
32. Divide and conquer method (quick sort, merge sort,)
33. Greedy method (knapsack problem, job sequencing, optimal merge patterns, minimal panning trees).
34. Dynamic programming (multistage graphs, OBST, 0/1 knapsack, traveling sales person problem).
35. Implement Back tracking
36. Sorting : Insertion sort, Heap sort, Radix sort
37. Searching : Sequential and Binary Search
38. Selection: Minimum/ Maximum, K th smallest element.
39. Implement Depth First Search and Breadth First Search.
40. Write program to implement Prims algorithm.
41. Write program to implement Kruskal's algorithm



## Syllabus

### MCA Semester-II OOP & Java Lab (CAP-005)

L:T:P:: 0:0:2

Credits-01

#### Course Objectives:

- To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling and functions.
- To understand the importance of Classes & objects along with constructors, Arrays and Vectors.
- Discuss the principles of inheritance, interface and packages and demonstrate through problem analysis assignments how they relate to the design of methods, abstract classes and interfaces and packages.
- To understand importance of Multi-threading & different exception handling mechanisms.
- To learn experience of designing, implementing, testing, and debugging graphical user interfaces in Java using applet and AWT that respond to different user events.
- To understand Java Swings for designing GUI applications based on MVC architecture

#### Course Outcomes(COs): At the end of the course, student will be able to

- Apply OOP concepts to solve real world problems
- Implement different forms of inheritance
- Create packages and to reuse them.
- Implement multi threaded programs using synchronization concepts and Create user defined exceptions
- Design GUI applications using AWT and SWINGS.

#### List of Practicals:

1. Write a Java program to multiply two given matrices
2. Write a Java program that checks whether a given string is a palindrome or not.
3. Write a Java program for sorting a given list of names in ascending order
4. Write a Java program that displays the number of characters, lines and words in a text
5. Write a Java program that prints all real solutions to the quadratic equation  $ax^2 + bx + c = 0$ . Read in a, b, c and use the quadratic formula. If the discriminant  $b^2 - 4ac$  is negative, display a message stating that there are no real solutions
6. Write a Java program that prints the nth value of the Fibonacci sequence.
7. Write a program in java for illustrating overloading, over riding and various forms of inheritance.
8. Develop an applet that displays a simple message. Develop an applet that receives an integer in one text field and compute its factorial value and returns it in another text field when button "Compute" is clicked.



## Syllabus

9. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, \*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.
10. Write programs in Java for Keyboard events.
11. Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box
12. Write programs in Java to create and manipulate Text Area, Canvas, Scroll Bars, Frames and Menus using swing /AWT
13. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).
14. Write a java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape
15. Write a Java program that reads a file and displays the file on the screen, with a line number before each line
16. Write a Java program that displays the number of characters, lines and words in a text



## Syllabus

### MCA Semester-II

#### Computer Networks Lab (CAP-006)

L:T:P:: 0:0:2

Credits-01

#### Course Objectives:

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry into Advanced courses in computer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

**Course Outcome:** After completing the course the student will be able to :

1. Identify the fundamental technologies for the hardware and software of the internet and their addressing mechanism.
2. Analyze the conceptual and implementation aspects of network applications and their use in most of the application, Transport, and Data link layer protocols for implementing enterprise network.
3. Apply the knowledge of the basic binary system to solve sub-netting problems and can identify and make an evaluation of the underlying principles of routing algorithms and their related protocols being applied to the Internet.
4. Describe the components, services, principle, and protocol provided in a wireless network and can categorize between different wireless architecture.

#### List of Practicals:

1. Study of complete network architecture of your institution (including topology, network devices cabling standards, protocol and security features).
2. Hands on experiment for configuring network interface card for connecting two systems.
3. Test the connectivity between two hosts.
4. Test all options of ping.
5. Write a Program to find the IP address and domain name of your system.
6. Write a Program to establish connection between a TCP client & server for studying nature of client server communication.
7. Write a Program to connect ftp server to get & put file.
8. Study IEEE standards & find out their implementation in networking environment.
9. Write a program to find an IP address of host and turn on IP address into domain name.
10. Make a report on LAN establishment in any of organization including hardware & networking aspects.



**Syllabus**  
**MCA – Semester -II**

**Artificial Intelligence lab (CAP-007)**

**L:T:P:: 0:0:2**

**Credits-01**

**Course Objective :**

This course gives a basic introduction to machine learning (ML) and artificial intelligence (AI).

**Course Outcome:** After taking the course, the student will be able to :

1. have insight into the main methods used in machine learning (ML) and artificial intelligence (AI)
2. have knowledge of the historical development of the field
3. be able to design and conduct experiments using the methods, with emphasis on evaluation
4. be able to consider the pros and cons when choosing ML / AI methods for different applications
5. be able to implement algorithms for selected methods
6. have knowledge of basic philosophical and ethical issues related to the development and application of ML/AI

**LIST OF PRACTICALS :**

1. Write a python program to implement simple Chatbot?
2. Implementation of following algorithms:
  - a. A\* and Uniform cost search algorithms.
  - b. Implement AO\* Search algorithm.
  - c. Write a python program to implement Breadth First Search Traversal.
  - d. Implementation of TSP using heuristic approach.
3. Implementation of Hill-climbing to solve 8- Puzzle Problem.
4. Write a python program to implement Water Jug Problem?
5. Write a program to implement Hangman game using python.
6. Write a program to implement Tic-Tac-Toe game using python.
7. Write a Program for Expert System by Using Forward Chaining.
8. Write a python program to remove stop words for a given passage from a text file using NLTK?
9. Write a python program to implement stemming for a given sentence using NLTK?
10. Write a python program to implement Lemmatization using NLTK.
11. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
12. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.