- (1) <u>Vision</u>: "To be a globally recognized world class Institute for imparting IT related knowledge, Skill and attitude for entering into world of work and allied areas."
- (2) <u>Mission</u>: "To achieve excellence in teaching-learning, Research and development activities by creating technically capable and devoted Software engineers to serve their surroundings with pride".

#### (3) Program Educational Preambles (PEO's): Master of Computer Application (MCA)

**PEO1:** To develop computer Programming skills and abilities to face the changing trends and career opportunities in computer application for contribute in nation growth.

**PEO2:** To apply advanced tools and technologies of computer application for pursue higher education for Research development to solving industry oriented problems.

#### (4) <u>Programme Outcomes (PO's)</u> : Master of Computer Application (MCA)

- **PO-01: Computational Knowledge:** Apply knowledge of computer fundamental, computer Programming, Computer application and domain knowledge appropriate for software development life cycle from defined problems and requirements.
- **PO-02: Problem Analysis:** Identify, formulate, research literature, and solve complex applications and system programs reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
- **PO-03: Design /Development of Solutions:** Design application program and evaluate solutions for complex applications and system problems, and design and evaluate systems for computer application, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- **PO-04: Conduct investigations of complex Computing problems:** Use Computer Language based knowledge and programming concept including design of program, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO-05: Modern Tool Usage:** Apply advanced programming techniques, database resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
- **PO-06: Professional Ethics:** Understand and commit to professional ethics and cyber regulations, Notations/symbol of programming, Programming Concept, responsibilities, and norms of professional computing practices.
- **PO-07: Life-long Learning:** Identify the need, and have the ability, to involve in independent learning for continual software development as a computing professional.
- **PO-08: Project management and finance:** Demonstrate knowledge and understanding of the computing project and management, principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO-09: Communication Efficacy:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

- **PO-10: Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.
- **PO-11: Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
- **PO-12: Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

#### (5) Program Specific Outcomes (PSOs)

- **PSO-01:** Understand, analyse and develop computer programs in the areas related to algorithms, Process and solutions for specific application development using appropriate data modelling concepts.
- **PSO-02:** Apply standard Software Engineering practices and strategies in software project development using open-source programming environment

#### (06) Programme PO's and PSO's Mapping

	Courses Category	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Prog ram		Comp. Knowle dge	Prob. Analysi s	Design Sol	Invest. Probl	Tools	Ethics	Learn	Proj. Mgt	Comm n	Soc, Envirc	Team Work	Entrepr eneursł ip	n	
	Foundation Courses	*						*		*			*		
	Professional Core	*	*	*	*	*	*	*	*		*	*		*	*
A	Professional Electives	*	*	*	*	*	*	*	*		*	*		*	*
	Employability	*					*	*		*		*	*		
	Enhancement Courses														

#### (07) Semester wise PO's and SPO's Mapping

SEM	Name of the	PO1	PO 2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	Courses/POs	Comp	Broh	Docign	Invoct	Tools	Ethics	Loarn	Proi	Comm	Soc	Toom			
		Comp. Knowle	Analysi	Sol	Probl	10013	Luncs	Leann	Mgt	n	Enviro	Work	Entrepr		
		dge	s							[			eneursh		
	Computer Fundamental &	مله	44	44		ملد		ىلە	4			ملد	р	ملد	
	Programming in c	*	Ť	Ŧ		Ť		Ť	Ŧ			Ŧ		Ŧ	
	Computer Organization & Architecture	*	*	*		*		*							
I	Software Engineering	*	*	*	*	*		*							*
	Discrete Mathematical Structure	*						*		*			*		
	Business English & Communication	*						*		*			*		
	Prog. Lab in c	*	*	*		*		*	*			*		*	
	Communication Lab	*		*		*		*				*			
	Data Communication	*	*	*		*	*	*							
	Database Management System	*	*	*		*		*							
П	E-Commerce & Governance	*		*		*		*							
	Data Structure	*	*	*		*		*							*
	Operating System	*	*	*		*		*							
	DBMS/ORACLE Lab	*	*	*		*		*	*					*	
	Based on MCA-204&205 i.e. DS & OS	*	*	*		*		*	*			*		*	
	Computer Oriented Optimization Models	*						*		*			*		
	Internet Technology & Network Management	*	*	*		*		*							
Ш	Programming in C++	*	*	*		*		*	*			*		*	
	Theory of Computation	*	*	*		*		*							
	Computer Networks	*	*	*		*		*							
	Programming Lab (Any Two Tools from VB &	*	*	*		*		*	*			*		*	

	Program	me : N	Maste	r of C	ompu	ter A	Appli	catio	n (M	CA)			
	VC++)												
	Programming Lab in C++	*	*	*		*		*	*		*	*	
	Artificial Intelligence	*	*	*		*		*					*
	Analysis Design & Algorithm	*	*	*		*		*					*
IV	Computer Graphics & Multimedia	*	*	*		*		*					
	Web Technology	*	*	*		*		*	*		*	*	
	A) Java Technology	*	*	*		*		*	*		*	*	
	Advance Data Base Management System	*	*	*		*		*					
	Minor Project(HTML Based Web Development)	*	*	*		*		*	*		*	*	
	Programming Lab (Computer Graphics &	*	*	*		*		*					
	Cloud Computing	*	*	*		*		*					
	Data Warehousing & Mining	*	*	*		*		*					*
V	Network Security	*	*	*		*		*					
	Compiler Design	*	*	*		*		*					*
	Dot Net Technology	*	*	*		*		*	*		*	*	
	Distributed System	*	*	*		*		*					
	Information Storage & Management	*	*	*		*		*					
	Minor Project- II	*	*	*		*		*	*		*	*	
	Programming Lab in Cloud Computing	*	*	*		*		*	*		*	*	
VI	Major Project	*	*	*		*		*	*		*	*	

#### SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES Outcome based Curriculum for

(08) <u>Structure of Programme</u>: To fulfill the need of development of all the POs/ GAs, as per above mapping, the following semester wise programme structure are as under.

[L= Lecture, T = Tutorials, P = Practical's & C = Credits]

**Total Credits\*= 158** 

#### **Structure of MCA:**

S. No.	Course Category	Credits of the MCA Curriculum
1.	Foundation Courses	16
2.	Professional Core	126
3.	Professional Electives	12
4.	Employability Enhancement Courses	4
	Total	158

#### **\*Definition of Credit:**

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (Lab)/week	1 Credit

(09) Scheme of Exanimation (MCA) Academic Year 2019-20

#### I Semester

S. No.	Subject Code	Subject Name	Max Marks Theory		Ma Pi	x. Marks ractical	Total Marks	Pe	eriods Weel	Credits		
			End Sem. Exa m.	Mid Tests	Assign - ments/ Quiz	End Sem. Practi cal & Viva	Practical Record /Assignment / Quiz / Presentation		L	Т	Р	
1.	MCA- 101	Computer Fundamental & Programming in c	70	20	10			100	3	1	-	4
2.	MCA- 102	Computer Organization & Architecture	70	20	10			100	3	1	-	4
3.	MCA- 103	Software Engineering	70	20	10			100	3	1	-	4
4.	MCA- 104	Discrete Mathematical Structure	70	20	10			100	3	1	-	4
5.	MCA- 105	Business English & Communication	70	20	10			100	3	1	-	4
6.	MCA- 106	Lab-I(Prog. Lab in c)				100	50	150	-	-	2	2
7.	MCA- 107	Lab-II(Communication Lab)				50	50	100	-	-	2	2

#### **II Semester**

S. No	Subjec t Code	Subject Name	Max Marks Theory		Ma: Pr	x. Marks actical	Total Marks	Periods per Week		per k	Credits	
			End Sem. Exa m.	Mid Tests	Assign - ments/ Quiz	End Sem. Practi cal & Viva	Practical Record /Assignment / Quiz / Presentation		L	Т	P	
1.	MCA- 201	Data Communication	70	20	10			100	3	1	-	4
2.	MCA- 202	Database Management System	70	20	10			100	3	1	-	4
3.	MCA- 203	E-Commerce & Governance	70	20	10			100	3	1	-	4
4.	MCA- 204	Data Structure	70	20	10			100	3	1	-	4
5.	MCA- 205	Operating System	70	20	10			100	3	1	-	4
6.	MCA- 206	Lab-I(DBMS/ORACLE)				100	50	150	-	-	2	2
7.	MCA- 207	Lab-II(Based on MCA- 204&205				50	50	100	-	-	2	2

# SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES **Outcome based Curriculum for**

III	Semester							~ /				
S. No	Subjec t Code	Subject Name	Max Marks Theory			Max Pr	x. Marks actical	Total Marks	Pe	riods Weel	per ‹	Credits
			End Sem. Exa m.	Mid Tests	Assign - ments/ Quiz	End Sem. Practi cal & Viva	Practical Record /Assignment / Quiz / Presentation		L	т	Р	
1.	MCA- 301	Computer Oriented Optimization Models	70	20	10			100	3	1	-	4
2.	MCA- 302	Internet Technology & Network Management	70	20	10			100	3	1	-	4
3.	MCA- 303	Programming in C++	70	20	10			100	3	1	-	4
4.	MCA- 304	Theory of Computation	70	20	10			100	3	1	-	4
5.	MCA- 305	Computer Networks	70	20	10			100	3	1	-	4
6.	MCA- 306	Programming Lab (Any Two Tools from VB & VC++)				120	80	200	-	-	8	8
7.	MCA- 307	Programming Lab in C++				30	20	50	-	-	2	2

#### **Programme : Master of Computer Application (MCA)**

#### **IV Semester**

S. No	Subjec t Code	Subject Name	N	Max Marks N Theory		Max Pr	Max. Marks Practical		fotal Periods Narks Week		Total Periods per Varks Week		per k	Credits
•			End Sem. Exa m.	Mid Tests	Assign - ments/ Quiz	End Sem. Practi cal & Viva	Practical Record /Assignment / Quiz / Presentation		L	Т	Р			
1.	MCA- 401	Artificial Intelligence	70	20	10			100	3	1	-	4		
2.	MCA- 402	Analysis Design & Algorithm	70	20	10			100	3	1	-	4		
3.	MCA- 403	Computer Graphics & Multimedia	70	20	10			100	3	1	-	4		
4.	MCA- 404	Web Technology	70	20	10			100	3	1	-	4		
5.	MCA- 405	Elective-I	70	20	10			100	3	1	-	4		
6.	MCA- 406	Minor Project(HTML Based Web Development)				120	80	200	-	-	8	8		
7.	MCA- 407	Programming Lab (Computer Graphics & Multimedia)				30	20	50	-	-	2	2		

Elective I

A) Java Technology	4
B) Advance Data Base Management System	4

7

#### **V** Semester

S. No	Subjec t Code	Subject Name	Max Marks Theory		Ma: Pr	x. Marks actical	Total Marks	Pe	riods Wee	Credits		
			End Sem. Exa m.	Mid Tests	Assign - ments/ Quiz	End Sem. Practi cal & Viva	Practical Record /Assignment / Quiz / Presentation		L	Т	Р	
1.	MCA- 501	Cloud Computing	70	20	10			100	3	1	-	4
2.	MCA- 502	Data Warehousing & Mining	70	20	10			100	3	1	-	4
3.	MCA- 503	Network Security	70	20	10			100	3	1	-	4
4.	MCA- 504	Elective-II	70	20	10			100	3	1	-	4
5.	MCA- 505	Elective-III	70	20	10			100	3	1	-	4
6.	MCA- 506	Minor Project- II				120	80	200	-	-	8	8
7.	MCA- 507	Programming Lab in Cloud Computing				30	20	50	-	-	2	2

Elective II	
Compiler Design	4
Dot Net Technology	4
Elective III	
Distributed System	4
Information Storage & Management	4

#### **VI Semester**

S. No	Subjec t Code	Subject Name	N	lax Ma Theor	rks Y	Max Pr	x. Marks actical	Total Marks	Pe	riods Weel	per k	Credits
			End Sem. Exa m.	Mid Tests	Assign - ments/ Quiz	End Sem. Practi cal & Viva	Practical Record /Assignment / Quiz / Presentation		L	т	Р	
1.	MCA- 601	Major Project	-	-	-	300	200	500	-	-	20	20

(10) Course Content

Semester-I

Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA-101	COMPUTER FUNDAMENTAL AND PROGRAMMING IN C	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** The subject provides the basic knowledge of Programming to understand the various disciplines of Computer Programming. This knowledge area consists of those skills and concepts that are essential to problem-solving and programming practice independent of the underlying paradigm. Student will learn various concepts and techniques for problem-solving and will implement those ideas using C programming.

#### **COURSE OUTCOMES:**

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

- To design Software and program in C Language.
- To understand the flow and working principle of programming in C.
- To understand Function, Array, Pointer and union in C programming.

#### **COURSE CONTENT:**

#### UNIT-I

#### Introduction to programming& Basics of C:

Fundamentals of C Programming: History of C; Structure of a C Program Concepts of Algorithm and Flowcharts, Process of compilation, Generation of languages, Basic features of C Language like Identifier, Keywords, Variable, data types, Operators and Expression. Basic screen and keyboard I/O

#### UNIT-II

#### **Control Statements:**

Test Conditions, Conditional execution and selection, Iteration and Repetitive Executions, Nested loops. **Arrays**: Introduction to contiguous data types. One dimensional array, multidimensional arrays, Array as strings, multidimensional character arrays. Operations on strings.

#### (Total hours 40)

9 hours

#### UNIT-III

#### Functions :

Concept of modular programming, Using functions, Scope of data, Recursive functions. Command line arguments.

**Pointers:** Need of pointer, Types and uses of pointer, Array and Pointers, Pointers and strings, Pointer to Pointer, Pointers and functions, other aspect of pointers.

#### UNIT-IV

#### Dynamic memory management:

dynamic memory management functions like malloc(), calloc(), free(); **User Defined Data Types**: Introduction to structures, usage of structure, nested structures, Union and its usage, Enumeration types, bit fields.

#### UNITV

#### Miscellaneous Features:

File handling and related functions; printf & scanf family; C preprocessor – basics, #Include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef; Variable argument list functions.

#### Reference:-

- 1. Programming in ANSI C, by Balagurusamy, Publisher Tata McGraw Hill.
- 2. Computer Science: A Structured Programming Approach Using C, by Behrouz A. Forouzan & Richard F. Gilberg, Publisher Thomson Education.
- 3. Programming with ANSI and Turbo C, by Ashok N Kamthane, Publisher Pearson Education.
- 4. Let us C, by Yashwant Kanitkar, Publisher BPB Publication.

#### 8 hours

#### 7 hours

# **COURSE OUTCOMES:**

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

- To design digital circuits by simplifying the Boolean functions.
- To Understand the organization and working principle of computer hardware components.
- To understand mapping between virtual and physical memory.

#### **COURSE CONTENT:**

Unit-I

#### Information Representation:

Number systems, BCD codes, error detecting and correcting codes. Binary arithmetic operations, Booths multiplication.

Binary Logic: Boolean algebra, Boolean functions, truth tables, canonical and standard forms, simplification of Boolean functions, digital logic gates. Encoders, decoders, multiplexers, demultiplexers and comparators.

#### UNIT-II

#### Register

Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Micro-operation, Arithmetic Logic Shift Unit, Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers.

UNIT-III

#### **Outcome based Curriculum for Programme : Master of Computer Application (MCA)**

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Subject Code	Subject Name	L	т	Р	Credits	Hours
MCA-102	COMPUTER ORGANIZATION AND ARCHITECTURE	3	1	-	4 Credits	3Hrs/week

## **Course Preamble:** In the modern era, computer system is used in most aspects of life. You may use many different types of software on a computer system for particular applications ranging from simple document creation to space data processing. But, how does the Software is executed by the Computer Hardware? The answer to this basic question is contained in this Course.

#### 8 hours

(Total hours 40)

#### SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES Outcome based Curriculum for

#### **Programme : Master of Computer Application (MCA)**

#### Control Design: -

Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (Register Transfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control, Micro programmed control(Microinstruction, Micro program sequencing, Wide-Branch addressing, Microinstruction with Next-address field, Prefetching Microinstruction).

#### UNIT-IV

#### Processor Design:

Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer.

#### UNIT –V

#### Input-Output Organization:

I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.

**Memory Organization:** Memory Hierarchy, Main Memory (RAM and ROM Chips), Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

#### **Reference Books:**

- 1. Computer System Architecture, Morris Mano, PHI
- 2. Computer Organization, Hamacher, MGH
- 3. Computer Architecture, Carter, Schaum Outline Series, TMH
- 4. System Architecture, Buad, VIKAS
- 5. The Fundamentals of Computer Organization, Raja Rao, Scitech
- 6. Computer Organization & Design, Pal Chowdhury, PHI

# 7 hours

7 hours

Subject Code	Subject Name	L	Т	Ρ	Credits	Hours
MCA-103	SOFTWARE ENGINEERING	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** This Software engineering deals with the Software development process models, planning the Software Project and many analyses related to development of software. The objectives of this Course are to make the learner efficiently work as software engineer. S/he should be well acquainted with all the phases of Software Development Life Cycle. The learner should be able to apply the concepts learned for doing research.

#### **COURSE OUTCOMES:**

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

- To get an insight into the processes of software development
- To Model software projects into high level design using DFD,UML diagrams
- To Measure the product and process performance using various metrics

#### COURSE CONTENT:

#### UNIT-I

#### Introduction to Software Engineering:

Software crisis, Software engineering Approach and Challenges, Software development process models with comparis on: Waterfall, Rapid prototyping, Timeboxing and Spiral Models, and Automation through software environments.

#### UNIT-II

#### Planning the Software Project:

Cost Estimation, Planning Schedule, Staffing, Project Monitoring, Quality Assurance and Risk Management.

#### UNIT-III

#### Structured Analysis:

Initial Investigation, Feasibility study, Traditional and modern methods of requirement determination, SRS, Structuring the requirements: Process modeling, logic modeling, conceptual data modeling, Metrics. Validation VS verification

#### (Total hours 40)

# 8 hours

7 hours

#### UNIT-IV

#### **Design Fundamentals:**

8 hours

Function and Object Oriented Design concepts, Verification and Metrics.

**Coding and Maintenance :** Coding Process, Metrics, Testing fundamentals , Types of Testing, Metrics, Types of Maintenance.

#### UNIT-V

#### Software Re-Engineering:

9 hours

Source Code Translation, Program Restructuring, Data Re-Engineering, Reverse Engineering.

#### Reference Books:

1.Software Engineering, Rogers G. Pressman, MH

2. Fundamentals of Software Engineering, 2nd Ed., Ghezzi, PHI

3. Software Engineering, Pankaj Jalote, PHI

4. Software Engineering: Rajib Mall

Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA-104	DISCRETE MATHEMATICAL STRUCTURE	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** This is an introductory course in mathematics. This subject deals with the introduction to Set, Relation, Function Posets, Hasse Diagram and Lattice and Graph. The objectives of this Course are the student Know the theory and their application of Math function in computer. Solve the different types of problems by applying theory and Appreciate the important application of mathematics in Computer.

#### COURSE OUTCOMES:

#### At the end of the Course, the student will be:

- To understand , develop and solve mathematical Set theory.
- Able to design and solve Boolean functions for defined problems
- Apply the acquired knowledge of finite automata theory and design discrete problems to solve by computers.

#### COURSE CONTENT:

Unit-I:

#### Set Theory:

Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets **Relation**: Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation. **Function**: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions.

Unit-II:

#### 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, R ings and Fields: definition and standard results.

#### (Total hours 40)

#### 10 hours

#### Unit-III:

#### 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. Boolean Algebra: Basic definitions , Sum of Products and Product of Sums, Form in Boolean Algebra, Logic gates and Karnaugh maps.

#### **UNIT-IV**

#### Graphs:

Simple graph, multi graph, 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. Tree: Definition, Rooted tree, properties of trees, binary search tree, tree traversal.

#### Unit-V:

#### **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.

#### **Reference Books:**

- 1. Discrete Mathematics and Its Applications, By Kenneth H Rosen, McGraw Hill, Sept.2002.
- 2. Discrete Mathematical Structures with Applications to Computer Science, By J. P. Tremblay, R. Manohar, McGraw Hill Pub, 1975.
- 3. Graph Theory With Applications to Engineering and Computer Science, By Prentice Hall, Englewood Cliffs, N. J, 1974
- 4. Cominatorics: Theory and Applications, By V. Krishnamurthy, East-West Press Pvt. Ltd., New Delhi,1986.

#### 7 hours

#### 7 hours

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3

Т

1

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Course Preamble:	Communicate effectively (Verbal and Non Verbal). The objectives of this
Course are the Deve	elop interview skills and Develop Leadership qualities and essentials of the
student.	

#### **COURSE OUTCOMES:**

Subject

Code MCA-105

• To understand, develop and solve problem in Communication.

Subject Name

**BUSINESS ENGLISH AND** 

COMMUNICATION

- Improve Skill for communication •
- Discussion of audio-visual •

#### COURSE CONTENT:

#### UNIT-1

#### **Basics of Technical Communication:**

Technical Communication: features; Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group); Importance of technical communication; Barriers to Communication.

#### UNIT - II

#### Constituents of Technical Written Communication:

Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods -Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation- various steps.

UNIT - III

# (Total hours 40)

Credits

4 Credits

Hours

3Hrs/week

#### 7 hours

#### Forms of Technical Communication:

Business Letters: Sales and Credit letters; Letter of Enquiry; Letter of Quotation, Order, Claim and Adjustment Letters; Job application and Resumes. **Official Letters**: D.O. Letters; Govt. Letters, Letters to Authorities etc. **Reports**: Types; Significance; Structure, Style & Writing of Reports. **Technical Proposal**; Parts; Types; Writing of Proposal; Significance. Technical Paper, Project. Dissertation and Thesis Writing: Features, Methods & Writing.

#### UNIT - IV

#### Presentation Strategies:

Defining Purpose; Audience & Locale; Organizing Contents; Preparing Outline; Audio-visua | Aids; Nuances of Delivery; B ody Language; Space; Setting Nuances of Voice Dynamics; Time-Dimension.

#### UNIT - V

#### Value - Based Text Readings:

Following essays form the suggested text book with emphasis on Mechanics of writing,

- (i) The Aims of Science and the Humanities by M.E.Prior
- (ii) The Language of Literature and Science by A. Huxley
- (iii) Man and Nature by J.Bronowski
- (iv) The Mother of the Sciences by A.J.Bahm
- (v) Science and Survival by Barry Commoner
- (vi) Humanistic and Scientific Approaches to Human Activity by Moody E. Prior
- (vii) The Effect of Scientific Temper on Man by Bertrand Russell.

#### Reference Books

1. Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi

2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.

3. How to Build Better Vocabulary by M.Rosen Blum, Bloomsbury Pub. London.

4. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.

5. Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan India Ltd. Delhi.

6. Manual of Practical Communication by L.U.B. Pandey & R.P. Singh; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, Delhi.

# 8 hours

8 hours

#### Semester-II

	Subject Name	L	Т	Р	Credits	Hours
Subject Code						
MCA-201	Data Communication	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** To learn the basic concepts of data communications, the layered architecture of communication protocols, digital signal transmission and encoding techniques. and multiplexing techniques.

#### COURSE OUTCOMES:

#### At the end of the Course, the student will be able

- 1. Understand and explain Data Communications System and its components.
- 2. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer
- **3.** Understand and building the skills of subnetting and routing mechanisms. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation

#### COURSE CONTENT:

#### UNIT :- I

Introduction to data communication: Components , data representation ,data flow and basic model ,data representation ,Serial & Parallel transmission ,Modes of data transmission, Encoding: Unipolar, Polar ,Bipolar line & block codes ,Data compression, Run length encoding, Relative encoding ,Image and multimedia compression. Review of analog & digital transmission methods.

#### UNIT:-2

Multiplexing: FDM, TDM, WDM, Synchronous & Statistical TDM, North American digital multiplexing hierarchy, European TDM, Spread spectrum: Frequency Hopping & Direct Sequence spread spectrum. Terminal handling & polling. Switched Communication Networks: Circuit, Message, Packet & Hybrid Switching, Softswitch Architecture with their comparative study, X.25, ISDN.

## 8 hours

9 hours

# (Total hours 40)

#### UNIT:-3

Physical Layer: Introduction, Interface, Standards, EIA-232-D, RJ-45, RJ-11, BNC connector & EIA-449, standards Connecting Devices: Active and Passive Hubs, Repeaters, Bridges, Two & Three layer switches & Gateway. Study of various types of topology and their comparative study.

#### UNIT:-4

Transmission Errors : Content Error , flow integrity error , methods of error control ,Error detection ,Error correction ,Bit error rate , Error detection methods: Parity checking , Checksum Error Detection ,Cyclic Redudancy Check ,Hamming code , Interleaved codes , Block Parity , Convolution code, Hardware Implementation, Checksum.

#### UNIT:-5

Transmission Media: Transmission line characterestics, distortions, Crosstalk, Guided Media: Twisted Pair, Baseband & Broadband Coaxial.Optical Fibre : Physics and velocity of propagation of light , Advantages & Disadvantages ,Block diagram ,Nodes and classification ,Comparision,losses , light source and detectors , Construction.

#### **Reference Books**

- 1. Forouzan, "Data communication", TATA McGraw
- 2. William Stallings ,"Data & Computer Communication", Pearson Education
- 3. Miller," Data Network and Comunication", Cengage Delmar Learning
- 4. Godbole,"Data Communication & Network", TMH

#### 9 hours

#### 7 hours

Subject Code	Subject Name	L	т	Р	Credits	Hours
MCA-202	Data Base Management System	3	1	-	4 Credits	3Hrs/week

Course Preamble: This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems

#### **COURSE OUTCOMES:**

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

Understand the basic concepts and technologies used in the field of management information

systems;

- Have the knowledge of the different types of management information systems;
- Understand the processes of developing and implementing information systems;
- Be aware of the ethical, social, and security issues of information systems

#### **COURSE CONTENT:**

Introduction to e-commerce: History of e-commerce, e-business models B2B, B2C, C2C, C2B, legal; environment of e-commerce, ethical issues, electronic data interchange, value chain and supply chain, advantages and disadvantages of e-commerce.

Unit II

Unit III

Unit I

Electronic Payment Systems: Credit cards, debit cards, smart cards, e-credit accounts, e-money, Marketing on the web, marketing strategies, advertising on the web, customer service and support, introduction to m-commerce, case study: e-commerce in passenger air transport.

E-Government, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, its scope and content, benefits and reasons for the introduction of e-

(Total hours 40)

## 8 hours

#### 10 hours

governance, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

#### Unit IV

E-readiness, e-government readiness, E- Framework, step & issues, application of data warehousing and data mining in e-government, Case studies: NICNET-role of nation wide networking in e governance, e-seva.

#### Unit V

E-Government systems security: Challenges and approach to e-government security, security concern in e-commerce, security for server computers, communication channel security, security for client computers.

#### **Reference Books**

1. Gary P. Schneider, "E-commerce", Cengage Learning India.

2.C.S.R. Prabhu, "E-governence: concept and case study", PHI Learning Private Limited.

3.V. Rajaraman, "Essentials of E-Commerce Technology", PHI Learning Private Limited.

#### 7 hours

	MCA-203	E-Commerce and Governance	3	1	-	4 Credits	3Hrs/weel
(	Course Prea	mble: This course provides an int	troduction t	o informatio	n syster	ns for busin	ess and
r	nanagemen	t. It is designed to familiarize stud	lents with o	rganizationa	l and ma	anagerial fo	undations

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Credits

Hours

of systems, the technical foundation for understanding information systems

#### **COURSE OUTCOMES:**

Subject

Code

#### At the end of the Course, the student will be able

Subject Name

Understand the basic concepts and technologies used in the field of management information

systems;

Have the knowledge of the different types of management information systems;

- Understand the processes of developing and implementing information systems;
- Be aware of the ethical, social, and security issues of information systems

#### **COURSE CONTENT:**

#### Unit I

Introduction to e-commerce: History of e-commerce, e-business models B2B, B2C, C2C, C2B, legal; environment of e-commerce, ethical issues, electronic data interchange, value chain and supply chain, advantages and disadvantages of e-commerce.

#### Unit II

Electronic Payment Systems: Credit cards, debit cards, smart cards, e-credit accounts, e-money, Marketing on the web, marketing strategies, advertising on the web, customer service and support, introduction to m-commerce, case study: e-commerce in passenger air transport.

#### Unit III

E-Government, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, its scope and content, benefits and reasons for the introduction of egovernance, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

# 8 hours

## 10 hours

# (Total hours 40)

#### Unit IV

# E-readiness, e-government readiness, E- Framework, step & issues, application of data warehousing and data mining in e-government, Case studies: NICNET-role of nationwide networking in e governance, e-seva.

#### Unit V

#### 7 hours

7 hours

E-Government systems security: Challenges and approach to e-government security, security concern in e-commerce, security for server computers, communication channel security, security for client computers.

#### Reference Books:

1. Gary P. Schneider, "E-commerce", Cengage Learning India.

2.C.S.R. Prabhu, "E-governence: concept and case study", PHI Learning Private Limited.

3.V. Rajaraman, "Essentials of E-Commerce Technology", PHI Learning Private Limited.

4. David Whiteley, "E-commerce study, technology and applications", TMH.

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Credits

4 Credits

Hours

3Hrs/week

<b>Course Preamble:</b> To impart the basic concepts of data structures and algorithms ,To understand
concepts about searching and sorting Z techniques and basic concepts about stacks, queues, lists
trees and graphs ,And also about writing algorithms and step by step approach in solving,
problems with the help of fundamental data structures

#### COURSE OUTCOMES:

Subject

Code MCA-204

#### At the end of the Course, the student will be able

Subject Name

**Data Structure** 

- 1. Ability to analyze algorithms and algorithm correctness.
- 2. Ability to summarize searching and sorting techniques
- 3. Ability to describe stack, queue and linked list operation.
- 4. Ability to have knowledge of tree and graphs concepts.

#### **COURSE CONTENT:**

Stack and Queue: contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue; linked implementation of stack and queue- operations

#### **UNIT-II**

UNIT-III

UNIT-I

General List: list and it's contiguous implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays.

Trees: definitions-height, depth, order, degree, parent and child relationship etc; Binary Treesvarious theorems, complete binary tree, almost complete binary tree; Tree traversals-preorder, in order and post order traversals, their recursive and non recursive implementations; expression

#### 7 hours

#### 8 hours

# (Total hours 40)

tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition.

#### UNIT-IV

Searching, Hashing and Sorting: requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing-basics, methods, collision, resolution of collision, chaining; Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

9 hours

7 hours

#### UNIT-V

Graphs: related definitions: graph representations- adjacency matrix, adjacency lists, adjacency multilist; traversal schemes- depth first search, breadth first search; Minimum spanning tree; shortest path algorithm; kruskals & dijkstras algorithm. Basic idea of B-tree- definition, order, degree, insertion & deletion operations; B+-Tree- definitions,

#### Reference Books:

- 1. Kruse R.L. Data Structures and Program Design in C; PHI
- 2. Aho "Data Structure & Algorithms".
- 3. Trembly "Introduction to Data Structure with Applications".
- 4. TennenBaum A.M. & others: Data Structures using C & C++; PHI

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Credits

4 Credits

Hours

3Hrs/week

Course Preamble: To learn the fundamentals of Operating Systems. mechanisms of OS to
handle processes and threads and their communication mechanisms involved in memory
management in contemporary OS. To gain knowledge on distributed operating system
concepts that includes architecture, Mutual exclusion algorithms, deadlock detection
algorithms and agreement protocols

#### COURSE OUTCOMES:

Subject

Code MCA-205

#### At the end of the Course, the student will be able

Subject Name

**Operating System** 

- 1. Students demonstrate an ability to analyze a problem and identify and define the computing requirements appropriate to its solution
- 2. Students demonstrate an ability to design, implement, and evaluate a computer- based system, process, component, or program to meet desired needs.

#### COURSE CONTENT:

Introduction: Evolution of operating systems (History of evolution of OS with the generations of computers), Types of operating systems, Multitasking, Timesharing, Multithreading, Multi programming and, Real time operating systems, Different views of the operating system.

#### **UNIT-II**

UNIT-I

Processes: The Process concept, The process control block, Systems programmer's view of processes, Operating system services for process management, Scheduling algorithms, First come first serve, Round Robin, Shortest run time next, Highest response ratio next, Multilevel Feedback Queues, Performance evaluation of scheduling algorithms stated above.

#### UNIT-III

Memory Management : Memory management without swapping or paging, Concepts of swapping and paging, Page replacement algorithms namely, Least recently used, Optimal page replacement, Most recently used, Clock page replacement, First in First out (This includes discussion of Belady's

9 hours

#### 9 hours

#### 8 hour

(Total hours 40)

anomaly and the category of Stack algorithms), Modeling paging algorithms, Design issues for paging system, Segmentation, Segmented Paging, Paged Segmentation.

#### UNIT-IV`

**Deadlocks:** Concepts of deadlock detection, deadlock prevention, deadlock avoidance. Banker's Algorithm Inter-process Communication and Synchronization: The need for inter-process synchronization, Concept of mutual exclusion, binary and counting semaphores, hardware support for mutual exclusion.

#### UNIT-V

**Disks:** Disk hardware, Disk scheduling algorithms (namely First come first serve, shortest seek time first,SCAN, C-SCAN, LOOK and C-LOOK algorithms) Error handling, track-at-a-time caching, RAM Disks.Clocks: Clock hardware, memory-mapped terminals, I/O software.

#### Reference Books:

**1**.Galvin P.L.Abraham Silberschatz. "Operating System Concepts". John Wiley & Sons Company.

2. William Stallings "Operating Systems", Prentice Hall of India Pvt. Ltd.

3. Joshi R.C. "Operating System" Wiley India

#### 7 hours

#### Semester-III

Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA- 301	COMPUTER ORIENTED OPTIMIZATION MODELS	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** The course is aimed to develop problem-solving method using different type of computer oriented optimization models. Main object is to provide the concept and an understanding of basic concepts in Operations Research Techniques for Analysis and Modeling in Computer Applications.

#### **COURSE OUTCOMES:**

#### At the end of the Course, the student will be able

• Understand and apply linear, integer programming to solve operational problem with constraints

• Apply transportation and assignment models to find optimal solution in warehousing and Travelling,

- To prepare project scheduling using PERT and CPM
- Identify and analyze appropriate queuing model to reduce the waiting time in queue.

Able to use optimization concepts in real world problems

#### **COURSE CONTENT:**

#### UNIT – I

#### Linear Programming:-

Applications in linear programming, Graphical method for solving LP's, Mathematical Model, Assumptions of Linear Programming, simplex Method, Degeneracy, Applications, Duality, Dual Simplex Method, & Algorithm Assignment Problem, Hungarian Method & its Algorithm.

#### UNIT – II

#### **Transportation Problem, Integer Programming: -**

Gomorra's method, Branch and Bound techniques. Integer Programming Algorithm. **Dynamic Programming:-** Basic Concept, Bellman's Principle of optimality, Dynamic Programming Approach, optimal subdivision problem, Decomposition, DPP Algorithms.

#### UNIT – III

#### **Inventory Model:-**

Introduction to the inventory problem, Deterministic Models, classification of Inventory systems & models, Economic order quantity, EoQ Models without shortages, EoQ Models with shortages, Probabilistic Inventory Models within stantaneous demand, no set up cost model, Discrete and continuous cases.

# (Total hours 40)

9 hours

9 hours

#### UNIT – IV

#### Games Theory:-

Solution of games with saddle points, Minimax-Maxmin principle for Mixed strategy games, Dominance, to reduce size of game, Graphical method, solution of (mxn) game by simplex method & Algorithms.

#### UNIT V

#### Sequencing Models:-

Job sequencing: Processing n jobs through 2 machines, Processing n jobs through 3 machines & Algorithms. PERT – CPM: introduction, applications, network diagram representation, Determination of the critical path, updating.

#### **Reference Books**

- 1. S.D. Sharma Operations Research, Kedarnath Ramnath & Co. Meerut
- 2. P.K.Gupta & D.S.Hira Operations Research, S.Chand & Co.
- 3. Kantiswaroop Operations Research, S.Chand & Sons.
- 4. Gillet, B.E. Introduction to operations Research A Computer Algorithm Approach,

#### McGraw Hill.

5. Introduction to operations Research, 7/e by Hillier. TMH.

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Credits

4 Credits

Hours

3Hrs/week

Course Preamble: To understand the basics of Address Resolution Protocol & RARP, ARP &
RARP,To learn various fundamental and emerging protocols of all layers in ad-hoc network.To
study about the issues Network management and its applications.

#### **COURSE OUTCOMES:**

Subject

Code MCA-302

#### At the end of the Course, the student will be able

Subject Name

**INTERNET TECHNOLOGY &** 

**NETWORK MANAGEMENT** 

Ability to study, analyze and design seven layers of protocols of wired and wireless networks

#### **COURSE CONTENT:**

#### UNIT-I

#### **Binding Protocol Address-**

Address Resolution Protocol & RARP, ARP & RARP, packet format, Encapsulation. Internet protocol: Introduction, Ipv4 header, Ipv4Datagrams, Encapsulation, Fragmentation and Reassembly, IP routing, Subnet addressing, Subnet mask, Supernetting- special case of IP addresses Ipv6-Motivation, frame format and addressing, comparison of Ipv4 and Ipv6.

# UNIT-II

ICMP: -

Introduction, ICMP Header, ICMP message types, ICMP timestamp request and reply, trace route, ping program. Intra & inter domain routing-distance vector routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP. Unicast Routing protocols. IGMP-IGMP message, operation encapsulation.

#### UNIT-III

#### TCP:-

Introduction, services, headers, connection establishment and termination, timeout of connection establishment, maximum segment size- half, close, state transition diagram, port no. and socket addresses, TCP timers UDP: Introduction, UDP header, UDP checksum, UDP operations , encapsulation & decapsulation ,queuing ,SCTP-Services, transmission sequence number, stream identifier ,stream sequence number, packet format.

#### UNIT-IV BOOTP:-

Operation, packet format. DHCP:-Address allocation, configuration & packet Format DNS:-Distribution of name spaces, DNS in the internet . FTP:-Connection, Communication, command processing, TFTP. E-Mai:-SMTP, POP & IMAP. SNMP:-Management components, SMI, MIB.

#### 9 hours

(Total hours 40)

#### 9 hours

8 hours

#### UNIT-V

#### Network management applications:-

7 hours

Configuration management, Fault Management, Performance management, Security management, Accounting management, Report Management, policy based management.

#### **Reference Books**

- 1. "TCP/IP-Protocol suite", Forouzan, TMH 3<sup>rd</sup> edition
- 2. "Computer Networks and Internets", D.E.Comer, Pearson
- 3. "Network management- principles & practice" Mani Subramaniam, Pearson education.

Subject	Subject Name	L	Т	Р	Credits	Hours
Code						
MCA-	PROGRAMMING IN C++	3	1	-	4 Credits	3Hrs/week
303						

**Course Preamble:** To learn how C++ supports Object Oriented principles such as abstraction, polymorphism etc To understand and apply the principles hiding, localization and modularity in software development.Use the generic programming features of C++ including the STL

## **COURSE OUTCOMES:**

### At the end of the Course, the student will be able

- Able to understand and design the solution to a problem using object-oriented programming concepts.
- Able to use proper class protection mechanism to provide security.
- Able to demonstrate the use of virtual functions to implement polymorphism.
- Understand and implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems
- Able to reuse the code with extensible Class types, User-defined operators and function overloading

## **COURSE CONTENT:**

## UNIT-I

#### **Concept of OOPS:**

Concept of OOPS, Objects and classes, Encapsulation and Information hiding, Type of objects, C++ basics, loops and decisions, structures and functions, object and classes, object arrays, constructor and destructor functions, passing objects as function arguments.

## UNIT-II

#### Inheritance and overloading:

Function overloading, Constructor overloading, Operator overloading pointers, object pointer, pointers to base and derived classes inheritance, public and private inheritance, Type of inheritance, multiple inheritance.

# UNIT-III

#### **Polymorphism:**

Introduction of Polymorphism, Type of polymorphism, virtual functions, abstract base classes and pure virtual function, friend function, early and late binding.

#### (Total hours 40)

# 9 hours

9 hours

#### UNIT-IV

#### Formatted I/O with manipulators:

Formatted I/O with manipulators, C++ I/O system, formatted I/O, creating insertors and extractors, file I/O basis, creating disk files and file manipulations using seekg(), seekp(), tellg() and tellp() functions, exception handling: try, catch and throw.

#### UNIT-V

#### UML:

UML concepts, object-oriented paradigm and visual modeling, UML diagrams, UML specifications, object model, object oriented design, identifying classes and object, object diagrams. Functional modeling – functional models, example of functional model, relation of functional to object and dynamic models, OMT methodology

#### **Reference Books**

- 1. Lafore R. "Object Oriented Programming in C++", Galgotia Pub.
- 2. Lee "UML & C++ a practical guide to Object Oriented Development 2 ed, Pearson.
- 3. Schildt "C++ the complete reference 4ed, 2003.
- 4. Hans Erit Eriksson "UML 2 toolkit" Wiley.
- 5. Balagurusawmy "Object Orienter Programming with C++".

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<b>Course Preamble:</b> To make the students aware of and well-groomed in the use of the tools &
Techniques of designing and analyzing algorithms and To understand Regular languages, Context
free grammar, Use the turing machine and an undecidable problem

#### **COURSE OUTCOMES:**

Subject

Code MCA-304

#### At the end of the Course, the student will be able

Subject Name

THEORY OF COMPUTATION

- Apply the acquired knowledge of finite automata theory and design discrete problems to solve by computers.
- Understand and implement the features DFA,NFA, Transition systems and Conversion of NDFA to DFA.

#### **COURSE CONTENT:**

#### UNIT – I

#### Theory of automata:

Theory of automata, Strings Alphabets and language, Finite state systems, Deterministic finite automata with moves, Two way finite automata, finite automata with output, Mealy & Moore machines

#### UNIT – II **NFA and DFA:**

Description, DFA,NFA, Transition systems, Conversion of NDFA to DFA, Removal of ∈ transition from  $\in$  – NDFA, Pumping lemma for regular set, Closure properties of regular set, Decision algorithm for Regular set, Myhill - Nerode theorem and initialization of finite automata Regular Expression and Language.

#### UNIT – III

#### **Regular languages:**

Context free grammar, Chomsky Normal form, Greibach Normal form, Pumping lemma for CFL, Application for CFL of Pumping lemma. Closure properties of CFL, CYK algorithm, YACC, Introduction to LR grammar.

#### UNIT - IV**Pushdown automata:**

# 9 hours

9 hours

# 8 hours

#### 7 hours

Credits

4 Credits

Hours

3Hrs/week

# (Total hours 40)

Informal description Definition Equivalence of PDA's and CFL's Prop Turning machine construction. Modification of turning machine.

#### $\mathbf{UNIT} - \mathbf{V}$

#### 7 hours

Undecidability Universal turing machine and an undecidable problem Rice theorem, Greibach theorem. Recursion finite theory, Chomsky hierarchy, Unrestricted Grammar. Context sensitive Language Computational Complexity theory, Intractable problem.

#### **Reference Books**

- 1. Introduction to Automata Theory Language and Computation, By John E. Hopcraft & Jeffary D. Ullman
- 2. Introduction to Automata Theory Language and Computation, By John E. Hopcraft Jeffary D. Ullman & Rajeev Motwani.
- 3. Theory of Computer Science K.L.P. Mishra, N. ChandraShekaran.

Subject Code	Subject Name	L	т	Р	Credits	Hours
MCA- 305	COMPUTER NETWORKS	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** The Course is designed around the TCP/IP Model. Some of the important topics discussed in the Course are: Data Encoding Techniques, MAC Protocols, Routing Techniques, Transport Services, Mechanism and Network Security. networking concepts and basic communication model, network architectures and components required for data communication. analyze the function and design strategy of physical, data link, network layer and transport layer, Acquire knowledge of various application protocol standard developed for internet

#### **COURSE OUTCOMES:** At the end of the Course, the student will be able

- Trace the flow of information from one node to another node in the network
- Identify the components required to build different types of networks
- Understand the functionalities needed for data communication into layers
- Choose the required functionality at each layer for given application
- Understand the working principles of various application protocols
- Acquire knowledge about security issues and services available

#### **COURSE CONTENT:**

#### UNIT-I

#### **Overview of Computer Network:**

Introduction: Computer Network, Use of computer networks; Type of networks; Network software: protocol hierarchies. Design; issues for the layers, interface and services, types of services, services primitives; Reference models: The OSI reference model, TCP/IP reference model, Example networks: The Internet, Novel Netware, Window NT.

#### UNIT-II

#### **Physical layer:**

Transmission media: magnetic media, Twisted pair, Base band / broadband coaxial cable, fiber optics; Analog, digital, wireless transmission; Transmission and switching; ISDN system architecture, Satellite versus fiber; Terminal handling. The Data link layer Design issues: services provided, framing, Error control, flow control; Error detection and correction; Error correcting codes, Error detecting codes; Elementary data link protocols: Unrestricted simplex, simplex stop and

# (Total hours 40)

9 hours

wait, simplex protocol for noisy channels; sliding window protocols: one bit, go back n, selective repeat; DLL in the Internet.

#### UNIT-III

#### Medium access sub layer:

Static/dynamic channel allocation in LANs and MANs; multiple access protocols: ALOHA, carrier sense, collision free, limited contention, wireless LAN; IEEE standard 802 for LANs and MANs: Ethernet; token bus, token ring, comparison of 802.3, 802.4, 802.5; Bridges: bridges from 802.x and 802.y, transparent bridges, High speed LANs.

#### UNIT-IV

#### Network Layer:

Design issues, Internet organization of network layer; Rating algorithms: optimality principle, shortest path, flooding, Flow - bared, hierarchical, multicast, broadcast; congestion control algorithms: General principle, prevention, Traffic shaping, choke packets, load shading etc.; Internetworking: How network differ, connectionless internetworking, Tunneling, internetworking, fragmentation, firewalls; Network layer in the Internet: IP protocol, IP address, subnets, OSPF, BGP, FTP, telnet, email. etc

#### UNIT-V

#### Network Programming: Basically Sockets :

Overview, Unix Domain Protocols, Overview, Unix Domain Protocols, socket-address, socketsystem calls, reserved ports, passing file descriptions, I/O asynchronous & multiplexing, socket implementations.

#### **Reference Books**

- 1. A.S.Tanenbaum, "Computer Network", 4th addition, PHI
- 2. Forouzan "Data Communication and Networking 3ed", TMH
- 3. William Stallings, "Data and Computer Communications", Nineth Edition, Prentice Hall, 2011.
- 4. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-down Approach, Pearson Education, Limited, sixth edition, 2012

# 8 hours

7 hours

#### Semester- IV

Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA-401	Artificial Intelligence	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** Springer The objectives of this course are to understand the fundamentals of Cryptography, to acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity, to understand the various key distribution and management schemes, to understand how to deploy encryption techniques to secure data in transit across data networks, to design security applications in the field of Information technology.

#### COURSE OUTCOMES:

#### At the end of the Course, the student will be able

- Understand and explain the basic concepts of information theory, source coding, channel and channel capacity, channel coding and relation among them.
- Describe the real life applications based on the fundamental theory.
- Calculate entropy, channel capacity, bit error rate, code rate, steady-state probability and so on.
- Implement the encoder and decoder of one block code or convolutional code using any program language

#### **COURSE CONTENT:**

#### UNIT-I

Introduction: Overview of AI, AI technique and problems, Characteristics of AI, LISP Programming, input output and local variables, Numeric and Basic list manipulation functions, predicates and conditionals, Iteraction and recursion, property lists and arrays.

#### UNIT-II

Search and Control Strategies: overview of production systems, characteristics of production systems, control strategies, forward and backward chaining, study of depth first and breadth first search, Hill climbing Techniques, branch and bound technique, best first search & A\* algorithm, AND / OR graphs, problem reduction & AO\* algorithm, constraint satisfaction problems.

#### 9 hours

8 hours

(Total hours 40)

#### UNIT-III

Knowledge Representations: Problems in representing knowledge, knowledge representation using propositional and predicate logic, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

#### UNIT-IV

Planning: Planning, various types of planning techniques like goal stack planning, hierarchical planning, non linear planning. Parsing techniques, context free grammar, recursive ransitions nets, augmented transition nets, case and logic grammars, semantic analysis. Introduction to game playing, game playing techniques like minimax procedure.

#### UNIT-V

Probabilistic Theory and Expert System: Introduction of Probability theory, bayes theorem and bayesian networks, certainty factor. Introduction to expert system and application of expert systems, various expert system shells, vidwan frame work, knowledge acquisition, case studies, MYCIN.

#### **Reference Books**

- 1. Rich E and Knight K, "Artificial Intelligence", TMH, New Delhi.
- 2. Nelsson N.J., "Principles of Artificial Intelligence", Verlag, Berlin.

#### 7 hours

# 7 hours

Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA-402	Analysis Design and Algorithms	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** Analyze the asymptotic performance of algorithms.Write rigorous correctness proofs for algorithms.emonstrate a familiarity with major algorithms and data structures.Apply important algorithmic design paradigms and methods of analysis.

#### COURSE OUTCOMES:

#### At the end of the Course, the student will be able

- 1. Argue the correctness of algorithms using inductive proofs and invariants.
- 2. Analyze worst-case running times of algorithms using asymptotic analysis.
- 3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- 4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them

#### COURSE CONTENT:

#### UNIT – I

Introduction: Data structure, models of computation, algorithm analysis Algorithms, Designing algorithms, analyzing algorithms, asymptotic notations, heap and heap sort, order architecture, time space complexities average and worst case analysis.

#### UNIT-II

Divide and conquer: Introduction to divide-and-conquer Structure of divide-and-conquer algorithms, Binary search, quick sort, strassen's matrix Multiplication; Analysis of divide and conquer run time recurrence relations.

### 9 hours

(Total hours 40)

#### SSSUTMS

#### UNIT-III

Study of Greedy Method: Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths.

#### UNIT-IV

Dynamic programming: Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, Matrix multiplication, Traveling salesman Problem, longest Common sequence, Overview, 8-queen problem, and Knapsack problem

#### UNIT-V

Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity; NPhard and NP-complete classes, examples. Combinational algorithms, string processing algorithm, Algebric algorithms, set algorithms

#### **Reference Books:**

- 1. Coremen Thomas, Leiserson CE, Rivest RL; Introduction to Algorithms; PHI.
- 2. Horowitz & Sahani; Analysis & Design of Algorithm
- 3. Dasgupta; algorithms; TMH
- 4. Ullmann; Analysis & Design of Algorithm;
- 5. Michael T Goodrich, Robarto Tamassia, Algorithm Design, Wiely India

#### 7 hours

7 hours

#### 8 hour

Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA-403	Computer Graphics & Multimedia	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** Basic principles and techniques for computer graphics on modern graphics hardware. Students will gain experience in interactive computer graphics using the OpenGL API. Topics include: 2D viewing, 3D viewing, perspective, lighting, and geometry. Prerequisites: COSC 2437, MATH 2413. MATH 3311, Linear Algebra is recommended. Fall.

This course will introduce students to all aspects of computer graphics including hardware, software and applications. Students will gain experience using a graphics application programming interface (OpenGL) by completing several programming projects.

This course is required of some COSC students, and can be taken as an elective for other COSC students.

#### COURSE OUTCOMES:

#### At the end of the Course, the student will be able

- students should: Have a basic understanding of the core concepts of computer graphics.
- Be capable of using OpenGL to create interactive computer graphics.
- Understand a typical graphics pipeline.
- Have made pictures with their computer.

#### COURSE CONTENT:

#### UNIT –I

Introduction to Raster scan displays, Storage tube displays, refreshing, flickring, interlacing, colour monitors, display processors resolution, working principle of dot matirix, inkjet laser printers, working principles of keyboard, mouse scanner, digitizing camera, track ball, tablets and joysticks, graphical input techniques etc.

UNIT –II

#### (Total hours 40)

Scan conversion techniques, image representation, line drawing, simple DDA, Bresenham's Algorithm, Circle drawing, general method, symmetric DDA, Bresenham's Algorithm, curves, parametric function, Beizier Method, B-spline Method.

#### UNIT –III

2D & 3D Co-ordinate system, Translation, Rotation, Scaling, Reflection Inverse transformation, Composite transformation, world coordinate system, screen coordinate system, parallel and perspective projection, Representation of 3D object on 2D screen. Point Clipping. Line Clipping Algorithms, Polygon Clipping algorithms, Introduction to Hidden Surface elimination, Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading ray tracing, color models like RGB, YIQ, CMY, HSV etc.

#### UNIT –IV

An Introduction – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Data interface standards – Multimedia Databases. Multimedia components, Multimedia Hardware, SCSI, IDE, MCI, Multimedia -Tools, presentation tools, authoring tool.

#### UNIT –V

Compression & Decompression – Multimedia Data & File Format standards :-TIFF, MIDI, JPEG, DIB, MPEG,RTF, – Multimedia I/O technologies - Digital voice and audio – Video image and animation– Full motion video – Storage and retrieval technologies.

#### Reference Books:

1. Donald Hearn and M.Pauline Baker, "Computer Graphics C Version", Pearson Education, 2003.

2. Prabat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", PHI Learning, 3rd Indian reprint edition, 2008.

3. Tay Vaughan, "Multimedia making it work", Tata McGraw Hill edition.

4. Amarendra N Sinha & Arun D Udai , "Computer Graphics", McGraw Hill publication Fundamental of Computer Graphics and Multimedia, Mukherjee, PHI Learning

#### 8 hours

9 hours

Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA- 404	Web Technology	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers.

#### **COURSE OUTCOMES:**

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#### At the end of the Course, the student will be able

- Develop a dynamic webpage by the use of java script and DHTML.
- To write a well formed / valid XML document.
- To connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
- To write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
- To write a server side java application called JSP to catch form data sent from client and store it on database.

#### COURSE CONTENT:

#### (Total hours 40)

#### 9 hours

# History of the internet, internetworking concepts, architecture, and protocol: switch, router, protocols for internetworking, internet address and domains. Introduction World Wide Web (WWW), working of web browser and web server, N-tier architecture, services of web server, Common gateway interface (CGI), Uniform Resource Locator (URL), Hyper Text Transfer Protocol (HTTP), feature of HTTP protocol HTTP request-response model, Hyper Text Transfer Protocol Secure (HTTPS).

#### UNIT II

UNIT I

Introduction to Hyper Text Markup Language (HTML), HTML elements, XHTML syntax and Semantics, eXtensible Markup Language (XML), element, attributes, entity declarations. DTD files and basics of Cascading Style Sheet (CSS). Document object Model (DOM) history and levels, Document tree, DOM event handling.

#### UNIT III

7 hours

Introduction to Java Script, Basic concepts, variables and data types, functions, conditional statements, Loops, Operators, Arrays, Standard Objects and form processing in Java

#### UNIT IV

Evaluation of web applications, type of web documents, feature of web pages, multitier web applications, introduction to Apache web server. Security in application: authentication, authorization, auditing, security issues, security on the web, proxy server, Firewall. Middleware Concepts, CORBA, Java Remote Method Invocation (RMI), EJB, Microsoft's Distributed Component Object Model( DCOM) Web server and its deployment, Web client, services of web server, mail server proxy server, multimedia server.

8 hours

7 hours

#### UNIT V

Introduction to servlet, Overview Architecture Handling HTTP Request, Get and post request, redirecting request multi-tier applications. Introduction to JSP, basic JSP, Java Bean class and JSP. Setting up an Open Data Base Connectivity (ODBC) data source.

#### **Reference Books:**

- 1. Web Technologies- A computer science perspective By Jeffrey C. Jackson, Pearson Eduction .
- 2. Web Technologies-TCP/IP Architecture, and Java Programming By Achyut S. Godbole and Atul Kahate
- 3. An introduction to Web Design+Programming by Paul S. Wang Sanda, S Katila, CENGAGE Learning.

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Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA- 405	Java Technology Elective-I (A)	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** programming in the Java programming language, knowledge of objectoriented paradigm in the Java programming language, and The use of Java in a variety of technologies and on different platforms.

#### COURSE OUTCOMES:

#### At the end of the Course, the student will be able

1. Knowledge of the structure and model of the Java programming language, (knowledge)

2. Use the Java programming language for various programming technologies (understanding)

3. Develop software in the Java programming language, (application)

4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)

5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)

#### **COURSE CONTENT:**

## **UNIT-I**

# The Java Environment: History of Java: Comparison of Java and C++; Java as an object oriented language: Java buzzwords; A simple program, its compilation and execution; the concept of CLASSPATH; Basic idea of application and applet; Basics: Data types; Operators- precedence and associativity; Type conversion; The decision making – if, if else, switch; loops – for, while, do...while; special statements-return, break, continue, labeled break, labeled continue; Modular programming methods; arrays; memory allocation and garbage collection in java keywords.

#### **UNIT-II**

# Object Oriented Programming in Java: Class; Packages; scope and lifetime; Access specifies; Constructors; Copy constructor; this pointer; finalize () method; arrays; Memory allocation and garbage collection in java keywords. Inheritance: Inheritance basics, method overriding, dynamics method dispatch, abstract classes.

#### UNIT-III

Interfaces: defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces. Multithreading and Exception Handling: Basic idea of multithreaded

(Total hours 40)

7 hours

#### 9 hours

programming; The lifecycle of a thread; Creating thread with the thread class and runnable interface; Thread synchronization; Thread scheduling; Producer-consumer relationship; Daemon thread, Selfish threads; Basic idea of exception handling; The try, catch and throw; throws Constructor and finalizers in exception handling; Exception Handling.

#### UNIT-IV

#### 7 hours

Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTML Tags for applet. The AWT: The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, Choice menu, Text area, Scroll list, Scroll bar; Frame; Layout managers- flow layout, Grid layout, Border layout, Card layout.

#### UNIT-V

#### 8 hours

The Java Event Handling Model: Java's event delegation model – Ignoring the event, Self-contained events, Delegating events; The event class hierarchy; The relationship between interface, methods called, parameters and event source; Adapter classes; Event classes action Event, Adjustment Event, Container Event, Focus Event, Item Event, Eey Event, Mouse Event, Text Event, Window Event

#### **Reference Books:**

- 1. Naughton & Schildt "The Complete Reference Java 2", Tata McGraw Hill
- 2. Deitel "Java- How to Program:" Pearson Education, Asia
- 3. Horstmann & Cornell "Core Java 2" (Vol I & II ) , Sun Microsystems
- 4. Ivan Bayross "Java 2.0" : BPB publications

Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA-405	Advanced Data Base Management System Elective-I (B)	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** This course is intended to provide you with an understanding of the current theory and practice of database management systems. To help you more fully appreciate their nature, the course provides a solid technical overview of database management systems, using a current database product as a case study. In addition to technical concerns, more general issues are emphasized. These include data independence, integrity, security, recovery, performance, database design principles, and database administration

#### COURSE OUTCOMES:

#### At the end of the Course, the student will be able

- Understand the role of a database management system in an organization.
- Understand basic database concepts, including the structure and operation of the relational data model.
- Construct simple and moderately advanced database queries using Structured Query Language (SQL).
- Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
- Design and implement a small database project using Microsoft Access.
- Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.
- Describe and discuss selected advanced database topics, such as distributed database systems and the data warehouse

#### COURSE CONTENT:

# 8 hours

(Total hours 40)

#### UNIT-I

Introduction: Objected oriented database, Object Relational Databases, Objects, Object Identity and its implementation, Architecture of Object Oriented and Object Relational databases, Clustering, Equality and Object Reference, Persistent Programming Languages, Cache Coherence, Specialization, Generalization, Aggregation and Association.

#### UNIT-II

Deductive Databases and Active Database: Data log, Evaluation of Data log program, Recursion, Recursive queries with negation, Parallel architectures, shared nothing/shared disk/shared memory based architectures, Data partitioning, Intra-operator parallelism, pipelining, ECA Rules, Query Processing and Concurrency Control, Recursive query processing, Compensation and Databases Recovery, multi-level recovery.

#### UNIT-III

Distributed Database: DDBMS, Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel, Databases, and Parallel Query Evaluation.

#### UNIT-IV

Transaction: Transaction process, Property of Transaction, Advanced transaction models, Save points, Nested transaction, Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors, Shared disk systems.

#### UNIT-V

Multimedia Databases: Modeling ,Storage of Image data, Multimedia Data, Multimedia Data Formats, Video Data Model, Audio & Handwritten Data, Geographic Information Systems (GIS),Data Structures- R-tree, k-d tree, Quad trees, Content Based Retrieval, Color Histograms, Textures, etc., Image Features, Spatial and Topological Relationships

#### **Reference Books:**

- 1. Elmasri, Navathe, "Fundamentals Of Database Systems", Addision Wesley
- 2. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
- 3. Toledo; Data base management systems;TMH
- 4. Elmagarmid.A.K. "Database transaction models for advanced applications", Morgan Kaufman.
- 5. Transaction Processing, Concepts and Techniques, J. Gray and A. Reuter, Morgan Kauffman.

# 8 hours

7 hours

#### 8 hours

#### Semester-V

Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA- 501	CLOUD COMPUTING	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** The key objectives of this course are for participants to be able to: Understand the concepts, characteristics, delivery models and benefits of cloud computing. Understand the key security and compliance challenges of cloud computing. Understand the key technical and organisational challenges

#### **COURSE OUTCOMES:**

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

- Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
- Explain the core issues of cloud computing such as security, privacy, and interoperability.
- Choose the appropriate technologies, algorithms, and approaches for the related issues.
- Identify problems, and explain, analyze, and evaluate various cloud computing solutions.
- Provide the appropriate cloud computing solutions and recommendations according to the Applications used.
- Attempt to generate new ideas and innovations in cloud computing.
- Collaboratively research and write a research paper, and present the research online.
- Effectively communicate course work in writing and oral presentation.

#### COURSE CONTENT:

#### (Total hours 40)

8 hours

#### UNIT-I

Introduction, Cloud computing history, Cloud architecture, Characteristics of cloud computing as per NIST, Cloud services requirements, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture, Applications, ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis, Satellite Image Processing, CRM and ERP, Social networking.

#### UNIT-II

Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources, Cloud services (Iaas, Paas & saas).

#### UNIT-III

Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices, Virtual Clusters and Resource management, Virtualization for Data-center Automation, Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits.

#### UNIT-IV

Cloud Security:- Security Overview Infrastructure security, Data security and storage, Network security - I, Network security - II, Host security, Disaster recovery and management, Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture.

#### UNIT-V

Cloud Solutions: - Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management Third Party Cloud Services, Market Based Management of Clouds. Case study: - Amazon cloud services, Amazon EC2, Amazon S3, Google cloud services, Google Map reduce, GFS, Sales Force, Windows Azure- EMC cloud services, IBM cloud services, Apache Hadoop.

#### **Reference Books:**

- 5. 1. George Reese Cloud Application Architectures: Building Applications and Infrastructures in the cloud O'Reilly Media Inc., 2009
- 6. 2. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter Cloud Computing A practical Approach McGraw Hill, 2010Godbole,"Data Communication & Network", TMH
- 7. Shahed Latif, Tim Mather, Subra Kumara swamy Cloud Security and Privacy : An Enterprise perspective on risks and compliance O'Reilly Media Inc., 2009
- 8. Gautam Shroff Enterprise Cloud Computing: Technology, Architecture, Applications Cambridge University Press, 2010

#### 8 hours

7 hours

#### 9 hours

<b>Course Preamble:</b> this course is to familiar with mathematical foundations of data mining tools,
Understand and implement classical models and algorithms in data warehouses and data mining,
Characterize the kinds of patterns that can be discovered by association rule mining, classification

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Credits

4 Credits

Hours

3Hrs/week

#### COURSE OUTCOMES:

Subject

Code MCA-502

and clustering.

#### At the end of the Course, the student will be able

Subject Name

**DATA WAREHOUSING & MINING** 

- Understand Data Warehouse fundamentals, Data Mining Principles .
- Design data warehouse with dimensional modelling and apply OLAP operations.
- Identify appropriate data mining algorithms to solve real world problems
- Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
- Describe complex data types with respect to spatial and web mining

#### **COURSE CONTENT:**

#### UNIT-I

Introduction to Data warehouse, Need for data warehousing, Data warehousing Components, Data Mart, Data Warehouse Architecture, Data Extraction, Cleanup, and Transformation Tools -Metadata repository and management, Discretization and Concept Hierarchy Generation, Major Issues in Data Mining, Star, Snowflake and Galaxy Schemas for Multidimensional databases

#### UNIT-II

Data Preprocessing, Data Integration and Transformation, Data Reduction, Fact and dimension data, Partitioning Strategy-Horizontal and Vertical Partitioning, Discretization and Concept Hierarchy Generation, Basics of data mining, Data mining techniques, KDP (Knowledge Discovery Process), Application and Challenges of Data Mining,

#### UNIT-III

Introduction of Web Structure Mining, Web Usage Mining, Spatial Mining, Text Mining, Security Issue, Privacy Issue, Ethical Issue, Reporting and Query tools and Applications, Tool Categories, The

(Total hours 40)

#### 8 hours

#### 8 hours

Need for Applications, Online Analytical Processing (OLAP) Need Multidimensional Data Model, OLAP Guidelines, Multidimensional versus Multi relational OLAP, Categories of Tools ,OLAP Tools and the Internet.

#### UNIT–IV

Data mining algorithms Association rules, Association Rule Mining, Single Dimensional Boolean Association Rules, Multi-Level Association Rule, Apriori Algorithm, Fp Growth Algorithm, Time series mining association rules, latest trends in association rules mining.

#### UNIT-V

Clustering, Basic issues in clustering, Types of Clustering, First conceptual clustering system, Partitioning methods: k-means, expectation maximization (EM), Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Categorization of methods, Partitioning methods, Outlier Analysis.

#### **Reference Books:**

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Person Education, 2007.

2. K.P. Soman, Shyam Diwakar and V. Ajay ", Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.

3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.

4. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006

#### 7 hours

Subject Code	Subject Name	L	т	Р	Credits	Hours
MCA-503	NETWORK SECURITY	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** this course is to understand basics of Cryptography and Network Security, to be able to secure a message over insecure channel by various means, to learn about how to maintain the Confidentiality, Integrity and Availability of a data, to understand various protocols for network security to protect against the threats in the networks

#### **COURSE OUTCOMES:**

#### At the end of the Course, the student will be able

- identify some of the factors driving the need for network security
- identify and classify particular examples of attacks
- define the terms vulnerability, threat and attack
- identify physical points of vulnerability in simple networks
- compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems.

#### **COURSE CONTENT:**

#### **UNIT-I**

Classical Encryption Techniques: Symantec Cipher model, substitution Techniques, transposition techniques, Steganography. Block Ciphers and the Data Encryption standards: Simplified DES, block cipher principles, the data Encryption standard, the strength of DES, differential and linear cryptanalysis, block cipher design Principles block cipher modes of operation. Confidentiality using symmetric encryption: Placement of Encryption function, traffic confidentiality, key distribution, and random number generation.

#### **UNIT-II**

Public key Encryption and Hash functions: Prime numbers, Euler's Theorems, Public key cryptography and RSA: Principles of Public key cryptosystems, the RSA algorithm. Key Management other public key cryptosystems: Key management, diffie-Hallman key exchange, Elliptic curve arithmetic and elliptic curve cryptography.

#### **UNIT-III**

#### 9 hours

7 hours

**SSSUTMS** 

#### 10 hours

(Total hours 40)

Message authentication and Hash function: Authentication Requirements, Authentication functions, Message authentication codes, hash functions, security of hash function and MACs. Hash Algorithms: MD5 message digest algorithm, secure Hash algorithm, HMAC. Digital Signature and Authentication protocols: Digital signatures, Authentication protocols, and digital Signature standard, Authentication Applications: Kerberos, X.509 Authentication service.

#### UNIT-IV

Electronic Mail Security: Pretty Good privacy, S/MIME. IP Security: IP Security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations, key management. Web Security: Web security considerations, secure sockets layer and transport layer security, secure electronic transaction.

7 hours

7 hours

#### UNIT-V

Part four system security: Intruders, intrusion detection, and password Management Malicious software: Viruses and related threats, virus Counter measures. Firewalls: Firewall Design Principles, functionality, Polices and Access Control, Packet filters, Application level gateway, Encrypted tunnel, Security architecture,

#### Reference Books:

- 1. William Stallings "Cryptography and Network Security", 3 ed, Pearson Education.
- 2. W. Stallings "Network security Essential "Applications & Standards", Pearson ed.
- 3. Kanfren "Network Security: Private Communications in a public world 2/e
- 4. Eric Maiwald "Network Security: A Preginner's Guide, second ed.", Tata Mcgraw Hill.

5. Roberta Bragg " Mark Rhodes, Ousley & Keith Strassberg Network Secirity : The Complete Reference " Tata McGraw Hill.

Subject Code	Subject Name	L	т	Р	Credits	Hours
MCA-504	COMPILER DESIGN (A)	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** this course is to introduce the major concept areas of language translation and compiler design and to develop an awareness of the function and complexity of modern compilers. This course is a study of the theory and practice required for the design and implementation of interpreters and compilers for programming languages.

#### COURSE OUTCOMES:

#### At the end of the Course, the student will be able

- To realize basics of compiler design and apply for real time applications.
- To introduce different translation languages To understand the importance of code optimization.
- To know about compiler generation tools and techniques.
- To learn working of compiler and non-compiler applications.
- Design a compiler for a simple programming language

#### COURSE CONTENT:

40)

#### UNIT-I

Introduction of Compiler: -Analysis of the source program, Phases of a compiler, Cousins of the Compiler, Grouping of Phases, Compiler construction tools, Lexical Analysis, Role of Lexical Analyzer, Input Buffering, Specification of Tokens.

#### UNIT-II

Syntax Analysis & Syntax Directed Translation Syntax analysis:- CFGs, Top down parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR, LALR, LR), Parser generation. Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation, Analysis of Syntax directed definition.

UNIT-III

#### 10 hours

7 hours

# 8 hours

(Total hours

Type Checking & Run Time Environment Type checking:- type system, specification of simple type checker, equivalence of expression, types, type conversion, overloading of functions and operations, polymorphic functions, Run time Environment: storage organization, Storage allocation strategies, parameter passing, dynamic storage allocation, Symbol table

#### UNIT–IV

Code Generation : -Intermediate code generation, Declarations, Assignment statements, Boolean expressions, Case statements, Back patching, Procedure calls Code Generation, Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks, peephole optimization, generating code from DAG.

#### UNIT–V

Code Optimization: -Introduction to Code optimization, sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations, Data flow analysis of structure flow graph, Symbolic debugging of optimized code.

#### Reference Books:

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", PearsonEducation, Asia 2003.

2. Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2003.

3. C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003.

4. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw-Hill, 2003

# 8 hours

Subject	Subject Name	L	Т	Р	Credits	Hours
Code						
MCA-504	DOT NET TECHNOLOGY (B)	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** This course is designed to provide the knowledge of Dot Net Frameworks along with C#

#### **COURSE OUTCOMES:**

#### At the end of the Course, the student will be able

• use the features of Dot Net Framework along with the features of C#

#### COURSE CONTENT:

#### UNIT-I

Basic .NET Programming using C#, Introduction to .NET technologies, Structure of a C# Program, Data Types, Basic Control Structures, Introduction to classes and objects, Arrays, Introduction to Visual Studio .NET, Introduction to debugging, Classes and Objects, this keyword, Static Properties and Indexer, Inheritance, Overloading (Compile Time Polymorphism), Overriding and Runtime Polymorphism System, Object Boxing and Unboxing, Typecasting, Memory Management, Exception Handling.

#### UNIT-II

Visual Basic fundamentals:- The Visual Basic .NET Development Environment, The element of VB.NET, VB.NET operators, Software design, Conditional structure and control flow, Methods. Classes and Objects: - Types, Structure and Enumeration, Classes, Interfaces, Exception handling and Classes, Collections, Arrays and other Data Structure.

#### UNIT-III

Advance design concepts, Patterns, Roles and Relationships, Advanced Interface Patterns, Adapters and Delegates and Events Data Processing and I/Writing Software with Visual Basic .NET, Interfacing with the End User, Introduction to ASP.NET and C#.NET and their features.

#### UNIT-IV

Installing ASP.NET framework, overview of the ASP .net framework, overview of CLR, class library, overview of ASP.net control, understanding HTML controls, study of standard controls, validations controls, rich controls. Windows Forms: - All about windows form, MDI form, creating windows applications, adding controls to forms, handling Events.

UNIT-V

# **7 hours**

#### 7 hours

#### 8 hours

# (Total hours 40)

# 10 hours

Understanding and handling controls events, ADO.NET- Component object model, ODBC, OLEDB, and SQL connected mode, disconnected mode, dataset, data-reader. Data base controls: Overview of data access data control, using grid view controls, using details view and frame view controls, ado .net data readers, SQL data source control, object data source control, site map data source.

#### **Reference Books:**

- 1. C# for Programmers by Harvey Deitel, Paul Deitel, Pearson Education
- 2. Balagurusamy; Programming in VB; TMH
- 3. Web Commerce Technology Handbook by Daniel Minoli, Emma Minoli, TMH
- 4. Web Programming by Chris Bates, Wiley 5. XML Bible by Elliotte Rusty Harold ,
- 6. ASP .Net Complete Reference by McDonald, TMH.
- 7. ADO .Net Complete Reference by Odey, TMH

	towards these sources.
•	Write a longer continuous report and present her research clearly in w

Express own reflections and attitudes in regard to the area of research.

#### **COURSE CONTENT:**

#### UNIT-I

Introduction to Distributed Systems:- Introduction, Examples of distributed Systems, Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System.

#### UNIT-II

Distributed Share Memory And Distributed File System:- Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Structure of Share Memory Space, Consistency model, Desirable features of good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File application.

**SSSUTMS** 

#### Subject Subject Name L Т Ρ Credits Hours Code MCA-505 **DISTRIBUTED SYSTEM (A)** 3 1 4 Credits 3Hrs/week

Course Preamble: Understanding Remote Communication and Inter process Communication Study about various distributed client server models, Create an awareness of the major technical challenges in distributed systems design and implementation, Emerging trends in distributed computing. Understanding Distributed Shared Memory and File System

#### COURSE OUTCOMES:

#### At the end of the Course, the student will be able

- Analyze a problem and form a plan on how to work towards a solution.
- Construct theoretical models and implement them on a computer.
- Make realistic plans, taking other possibilities, limitations and time consume into consideration.
- Collect and analyze various types of information, and possess a healthy, critical attitude
- vritten work.

## 7 hours

(Total hours 40)

#### UNIT-III

Distributed Objects and Remote Invocation: - Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study. Security: - Overview of security techniques, Distributed File Systems, File service architecture, Sun Network File System, The Andrew File System.

#### UNIT-IV

Distributed Multimedia & Database System: - Distributed Data Base Management System (DDBMS), Types of Distributed Database, Distributed Multimedia:- Characteristics of multimedia Data, Quality of Service Managements.

#### UNIT-V

Distributed Transactions: - Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication, System model and group communication, Fault-tolerant services, Transactions with replicated data.

#### **Reference Books:**

- Sinha, Distributed Operating System Concept & Design, PHI
- Coulouris & Dollimore, Distributed System Concepts and Design, Pearson Pub
- Singhal & Shivratari, Advance Concept in Operating System, McGraw Hill
- Attiya & Welch, Distributed Computing, Wiley Pub.

#### 9 hours

#### 8 hours

Subject Code	Subject Name	L	Т	Р	Credits	Hours
MCA-505	INFORMATION STORAGE & MANAGEMENT (B)	3	1	-	4 Credits	3Hrs/week

**Course Preamble:** The course provides detailed knowledge, practical training and insight into the implementation and management of various storage technologies with a focus towards applying these technologies in an information lifecycle paradigm. This course focuses on the following key aspects:

- 1. The evolution of storage and implementation models
- 2. Storage devices principles including structure, host I/O processing, & core algorithms
- 3. Storage classes (SAN, NAS. CAS), interconnection protocols, and management principles
- 4. Storage network design principles
- 5. Networked storage capabilities (Snaps, mirroring, virtualization)
  - 6. Backup, Business Continuity, and Disaster Recovery principles

#### COURSE OUTCOMES:

#### At the end of the Course, the student will be able

- Evaluate storage architectures and key data center elements in classic, virtualized and cloud environments
- Explain physical and logical components of a storage infrastructure including storage subsystems, RAID and intelligent storage systems
- Describe storage networking technologies such as FC SAN, IP SAN, FCoE, NAS, and object-based and unified storage
- Articulate business continuity solutions backup and replication, plus archive for managing fixed content
- Explain key characteristics, services, deployment models and infrastructure components for cloud computing
- Describe information security requirements and solutions, and identify parameters for managing and monitoring storage infrastructure in classic, virtualized and cloud environments

#### **COURSE CONTENT:**

#### UNIT-I

Introduction: - Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Data creation and The value of data to a business, Information Lifecycle Management, Challenges in data storage and data management, Solutions available for data storage, Core elements of a Data Center infrastructure, Data categorization.

#### UNIT-II

Storage Systems Architecture:- Intelligent disk subsystems overview, Contrast of integrated vs modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

#### UNIT-III

Introduction To Networked Storage: - Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, IP-SAN, Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN. Introduction to Information Availability: - Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques.

#### UNIT-IV

Managing & Monitoring: - Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management, Metric analysis methodologies & trend analysis, Reactive and pro-active management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.

#### UNIT-V

Securing Storage and Storage Virtualization: - Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes

#### R ference Books:

1. EMC Corporation, Information Storage and Management, Wiley, India.

2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003.

3. Marc Farley, "Building Storage Networks", Tata McGraw Hill ,Osborne, 2001.

4. Additional resource material on www.emc.com/resource-library/resource-library.esp

# (Total hours 40)

# 7 hours

7 hours

#### 8 hours

8 hours