



PROGRAMME

MASTER OF COMPUTER APPLICATIONS

CURRICULUM AND SYLLABI

(For students admitted from the academic year 2015-16)

**SRM UNIVERSITY
Sikkim**

Master of Computer Applications Curriculum with effect from 2015-16

Course Code	Course Name	L	T	P	L+T+P	C	
Semester I							
Compulsory Core Courses:							
MCA1511	Programming in C	3	0	3	6	4	
MCA1512	Web Technology	3	0	3	6	4	
MCA1513	Digital Logic and Architecture	4	1	0	5	4	
MCA1514	Operating Systems	4	1	0	5	4	
Supportive Course:							
MCA1515	Business Communication (Internal Evaluation)	3	0	1	4	4	
		Total	17	2	8	26	20
Semester II							
Compulsory Core Courses:							
MCA1521	Object Oriented Programming using C++	3	0	3	6	4	
MCA1522	Data Structures	3	0	3	6	4	
MCA1523	Data Communication and Networking	4	1	0	5	4	
Supportive Courses:							
MCA1524	Discrete Mathematics	4	1	0	5	4	
MCA1525	Case Study: Management Information System [Internal Evaluation]	0	1	4	5	4	
		Total	18	3	6	27	20
Semester III							
Compulsory Core Courses:							
MCA1531	Programming in Java	3	0	3	6	4	
MCA1532	Database Management Systems	3	0	3	6	4	
MCA1533	Software Engineering	4	1	0	5	4	
MCA1534	Cloud Computing	4	1	0	5	4	
Skill based supportive course:							
MCA1535	Personality Development-I[Internal Evaluation]	3	2	0	5	4	
		Total	17	4	6	27	20
Semester IV							
Compulsory Core Course:							
MCA1541	ASP.Net	3	0	3	6	4	
Elective / Choice based Core Courses:							
MCA1542	Android Applications Development [or]	3	0	3	6	4	
MCA1543	Unix and Network Programming						
MCA1544	Object Oriented Analysis and Design [or]	4	1	0	5	4	
MCA1545	Information and Storage Management						
MCA1546	TCP / IP Networks [or]	4	1	0	5	4	
MCA1547	Database Administration						
Skill based supportive Courses:							
MCA1548	Personality Development-II (Internal Evaluation)	3	2	0	5	4	
		Total	17	4	6	27	20
Semester V							
Elective / Choice based Core Courses:							
MCA1551	Software Testing and Quality Assurance	3	0	3	6	4	
MCA1552	[or] XML and Web Services						
MCA1553	Big Data and its applications [or]	4	1	0	5	4	
MCA1554	Wireless Application Protocols						
MCA1555	Open Source Technologies [or]	4	1	0	5	4	
MCA1556	Network Security						

Compulsory Core Courses:						
MCA1557	Mini Project	0	1	4	5	4
MCA1558	Term Paper and Seminar [Internal Evaluation]	0	1	4	5	4
	Total	11	4	11	26	20
Semester VI						
Elective / Choice based Core Course:						
MCA1561	Data Warehousing and Data Mining [or]	3	0	2	5	4
MCA1562	Python Programming					
MCA1563	Data Analytics [or]	4	1	0	5	4
MCA1564	Cyber Crime and Laws					
Compulsory Core:						
MCA1565	Project Work	0	2	18	20	12
	Total	7	3	20	30	20

Total Credits to be earned : 120

- Total Number of Hours per week : 30 including Counseling / Library / Digital Reference / Guest Lecture / Co-curricular Activities

SEMESTER I

Course Code	Course Name	L	T	P	Total LTP	C
MCA1511	Programming in C	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES:

At the end of this course the learner is expected:

1. To write simple programs in C.
2. To apply pointers, arrays, functions and files using C Programming.

UNIT-I INTRODUCTION

Concept of programming language; high level, low level, assembly languages, concept of system software, operating system, compilers, interpreters, assemblers, concept of software, concept of algorithms and flows charts.

UNIT-II INTRODUCTION TO C

Variables, constants, basic data types, int., float, double and char. Qualifiers, short, long, unsigned. Arithmetic expressions, operators arithmetic, logical, bitwise, increment, decrement, sizeof, precedence of operators, conditional expressions.

UNIT-III CONDITIONAL STATEMENTS

Preprocessors, define, include, control flow, if statement, if-else and else-if constructs. Nested if statements. Switch statements, looping, for loop, nested loop, while and do-while statements, break and continue statements.

UNIT-IV ARRAYS AND FUNCTIONS

Arrays, initializing array elements, multidimensional arrays, functions, arguments, local and global variables, return values, recursive functions, auto, static register variables, structures and unions, typedef statement, data type conversions, type casting, character strings, string manipulations.

UNIT-V POINTERS AND FILES

Pointers, operations on pointers, pointers and arrays, pointers and functions, pointers and structures, input and output, character I/O, formatted I/O, file I/O, fopen; feof and fclose functions, stdin; stdout, stderr, exit function, null statement, goto statement, dynamic memory allocation, command line arguments.

REFERENCE BOOKS

1. Gottfried, B.S. ,*"Theory and problems of Programming with C"*, Schaum's Outline Series, Tata McGraw Hill, New Delhi, 1997.
2. Balagurusamy .E, (2010), *"Programming In ANSI C"*, Tata McGraw Hill Education Private Limited (2010).

Course Code	Course Name	L	T	P	Total LTP	C
MCA1512	Web Technology	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES:

At the end of this course the learner is expected:

1. To develop web applications using HTML and Java Script
2. To write Server side programming using Servlets

UNIT-I INTRODUCTION TO INTERNET AND WORLD WIDE WEB

Introduction to networks, LAN, MAN and WAN, History of the Internet, Email concepts, Sending and Receiving files by E-mail, Intranet, Web system Architecture, Exploring HTTP, URL, Domain Name System, Web Browsers, Web Pages

UNIT-II HYPER TEXT MARKUP LANGUAGE AND WEB DESIGN

Basics of HTML, HTML Document display, Formatting Text, Link, Lists, Images, Tables, Forms, Frames, Website Design consideration,

UNIT-III CASE STUDY

Designing Layout of a web page for any Domain Usage of Cascading Style Sheet :Syntax of CSS, Style sheets types, Properties and Text attributes Padding, List properties, List Properties, Positioning, Margins, Colors, Properties and Table attributes

UNIT-IV FUNDAMENTALS OF JAVA SCRIPT

DHTML, HTML and JavaScript, JavaScript Elements, Variables, Operators, Flow Control Statements, Arrays, Functions, Event Handling, Browsers and JavaScript, Web Pages and JavaScript, Frames and JavaScript, Validation of User Form

UNIT-V CONTENT MANAGEMENT SYSTEM

Tools used for content management system, Build a website, Use HTML and CSS with CMS, Use Theme Editor, customize themes,

REFERENCE BOOKS

1. Deven N. Shah , "*A Complete Guide to Internet and Web Programming*", DreamTech Press, New Delhi , 2012
2. Raj Kamal , "*Internet and Web Technologies*", TataMcGraw Hill, New Delhi, 2002.
3. Margaret Levine Young , "*Internet The Complete Reference*", TataMcGraw Hill, Second Edition, New Delhi, 2012.
4. Brad Williams, David Damstra and Hal Stem , "*Professional Word Press Design and Development*" ,Wrox Publications, Second Edition, 2013.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1513	Digital Logic and Architecture	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To convert number system and solve Boolean algebra functions
2. To describe the logical function of gates, Circuits and Process Units

UNIT-I BINARY SYSTEMS

Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, Complements, Binary Codes, Binary Storage and Registers, Binary logic, Integrated Circuits.

UNIT-II BOOLEAN ALGEBRA AND LOGIC GATES

Basic Definitions, Boolean Algebra: Theorems and Properties, Boolean Functions, Canonical and Standard Forms and Other Logic Operations. Digital Logic Gates and its Different Types.

UNIT-III SIMPLIFICATION OF BOOLEAN FUNCTIONS

Map Method: Two, Three and Four variable maps. Product of Sums Simplification, NAND and NOR implementation, Don't Care Conditions.

UNIT-IV COMBINATIONAL LOGIC AND SEQUENTIAL LOGIC ADDERS

Half Adder, Full Adder and Binary Parallel Adder. Decoder, Encoder, Multiplexer, Demultiplexer. Flip-Flops and its different types, Registers, Shift Registers, Counters.

UNIT-V PROCESSOR AND CONTROL LOGIC DESIGN

Arithmetic Logic Unit and its Design, Status Register. Hard-Wired Control, Microprogram Control.

REFERENCE BOOKS:

1. Morris Mano, "Digital Design", Prentice Hall of India, 1997.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Tata McGraw Hill, 2002
3. Charles H. Roth, Jr., "Fundamentals of Logic Design", Jaico Publishing House, Mumbai, Fourth Edition, 1992.
4. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1514	Operating Systems	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To identify the functions of OS
2. To demonstrate Process synchronization, deadlocks and memory management

UNIT-I INTRODUCTION

OS Functions, Computer System Organization, Computer System Architecture, Operating System Structure, Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.

UNIT-II PROCESS

Basic Concepts, Process Scheduling, operations on 'Processes, Inter process communication, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

UNIT-III PROCESS COORDINATION

Synchronization, The Critical Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Dead Locks: System Model, Dead Lock Characterization, Methods of handling Dead Locks, Dead Lock Prevention, Dead Lock Avoidance, Dead Lock Detection, recovery from Dead Lock

UNIT-IV MEMORY MANAGEMENT

Memory management Strategies-Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management, demand paging, Copy-on- Write, Page Replacement.

UNIT-V STORAGE MANAGEMENT & FILE SYSTEM

File Concept, Access methods, Directory Structure, Protection. File System Structure, Directory Implementation, Allocation Methods, Free Space management, Efficiency and performance, Recovery.

REFERENCE BOOKS:

1. Silberschatz, Galvin & Gagne, "Operating system principles", John Wiley & Sons, 7th Edition, 2006.
2. Milan Milenkovic, "Operating System Concepts and Design", McGraw Hill, 2003.
3. Andrew S. Tannenbaum, "Modern Operating System", Prentice Hall India, 1997.
4. Deital, "An Introduction to Operating System", Pearson Education, 1990.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1515	Business Communication (Internal Evaluation)	3	0	2	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To achieve interpersonal communication skill
2. Apply presentation skills, behavior skills in real-time scenario

UNIT-I ORAL COMMUNICATION

The Communication Process: An overview of business communication, Role of communication in the business organisation, A model of the communication process, Some fundamental truths of communication, Perception and reality.

Listening Skills: What is effective listening? Inefficiency of listening, Improving your listening ability, Class discussion, Role of effective listening towards organisational excellence.

Business Presentations: What is business presentation - Presentation principles. Determination of presentation techniques, Determination of personal aspects, Advance analysis, Appearance and bodily actions, Use of voice and visual aids, Class discussion.

UNIT-II CONDUCTING MEETINGS AND GROUP DISCUSSIONS

Techniques for conducting meetings, Class discussion on problems on meetings and contributing to a productive meeting.

Group Discussions: Pedagogy to conduct group discussion. Class discussion on "The importance of listening and non verbal messages in interpersonal communication".

Negotiations: What is negotiation? Negotiation process & effective negotiation techniques & skills.

UNIT-III WRITTEN COMMUNICATION

Process of Communication: Principles of clear business writing and effective communications model, taking down notes in seminars/lectures/from reference material.

Preparation of Curriculum Vitae: Techniques, Variety, Effect.

Grammar Problems, Quality Aspects of Communication: Fundamentals of grammar and usage, How it affects effective written communication? Essay and precisewriting.Live examples from the Industry, Class discussion.

UNIT-IV WRITTEN PRESENTATION OF TECHNICAL MATERIAL

Preparation and Presentation Techniques etc.Effective Reading: Ingredients and pedagogy of effective reading, to bring home by video recording and replay.

Basic Official Correspondence: Memos, Letters, Reports etc. Formats: Discussion on formats and class assignment on physical presentation of reports, Business letters and Memo writing including social correspondence.

UNIT-V CASE ANALYSIS METHODOLOGY

Present methodology and discussion of a case study.Technology, Methodology for Effective Communication: Early development of communication technology. Advent of electronic and other technology.Revolutionary electronic innovations.Use of computers to improve working. Advances in E-mail, Tele Conferences, A look to the future- Class discussion.

REFERENCE BOOKS:

1. Kitty O Locker & Stephen KyoKaczmarek, "*Business Communication – Building Critical Skills*", Third Edition, Tata McGraw Hill.
2. Simon Sweeney, "*English for Communication*", Second Edition, Cambridge University Press.
3. Sharma, "*Business Correspondence & Report Writing*", Fourth Edition, Tata McGraw Hill.
4. Joann Baney, "*Guide to Interpersonal Communication*", First Edition, Prentice Hall.

SEMESTER II

Course Code	Course Name	L	T	P	Total LTP	C
MCA1521	Object Oriented Programming Using C++	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To develop programs using Object Oriented concepts
2. To apply Inheritance, Polymorphism and Exception handling in programs

UNIT-I INTRODUCTION TO OBJECT ORIENTED PROGRAMMING AND C++

Object Oriented Programming Paradigm – Basic concepts of Object Oriented Programming – Benefits of OOP – Object Oriented Languages – Applications of OOP. Beginning with C++ - Tokens, Expressions and Control Structures – Functions in C++.

UNIT-II CLASS, OBJECTS AND OVERLOADING

Classes and Objects – Constructors and Destructors: Constructors parameterized Constructors, Multiple Constructors in a class, Constructors with default Arguments, Dynamic initialization of objects, Copy Constructors, const Objects, Destructors – Operator Overloading.

UNIT-III INHERITANCE, POINTERS & POLYMORPHISM

Extending Classes: Defining derived classes, single, Multilevel, Multiple, Hierarchical and Hybrid Inheritance, Virtual Base Classes, Abstract Classes – Pointers and Virtual Functions.

UNIT-IV I/O OPERATIONS AND FILES

Managing Console I/O Operations: C++ Streams, C++ Stream Classes, Unformatted I/O Operations, Formatted Console I/O operations, Managing output with Manipulators – Working with Files: Classes for File Stream Operations, Opening and closing a file, Detecting end-of-file, File Modes and Error handling during file operations.

UNIT-V TEMPLATES & EXCEPTIONS

Templates: Class Templates, Class templates with multiple parameters, Function Templates, Function Templates with multiple parameters, overloading of Template functions- Exception Handling – Introduction to Standard Template Library: Components of STL, Containers, Algorithms, and Iterators.

REFERENCE BOOKS:

1. Balagurusamy, E., "Object Oriented Programming with C++", TATA McGraw Hill, Third Edition, New Delhi, 2007
2. Herbert Schildt, "C++ The Complete Reference", TATA McGraw Hill, Third Edition, New Delhi, 2001.
3. Rob McGregor, "Using C++ - Prentice", Hall India, New Delhi, 2001.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1522	Data Structures	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To use proper data structure for the application / program
2. To understand computer applications which use each data structures
3. To identify algorithms which effectively solve the problem statement

UNIT-I DATA STRUCTURES AND ALGORITHMS

Data structures & algorithms-Introduction to Data Structures and algorithms, Data structure operations, complexity of algorithms, asymptotic notations for complexity, string operations, word processing, pattern matching algorithms, Linear Arrays, Representation of linear arrays, traversing linear arrays, inserting and deleting linear arrays.

UNIT-II CONCEPTS OF LINKED LISTS

Linked lists-Representation of linked lists in memory, traversing a linked list, searching a linked list, insertion in to a linked list, deletion from a linked list-header linked lists, memory allocation – two way lists, operations on two way lists.

UNIT-III REPRESENTATION OF STACKS AND QUEUES

Stacks & queues-Array representation of stacks, Linked representation of stacks, Arithmetic expressions, Towers of Hanoi, Array representation of queues, Linked representations of queues, Deques, priority queues.

UNIT-IV TREES AND GRAPHS TRAVERSAL

Trees-General Trees- binary Trees-representation of binary trees, traversing, binary trees -traversal algorithms of binary trees, Minimum cost spanning tree algorithms-Height balance tree - AVL Rotations -Graph theory :Terminology, representations of graphs, graph traversals – single source shortest path algorithm – all pairs of shortest path algorithm - topological ordering.

UNIT-V SORTING AND SEARCHING ALGORITHMS

Sorting-bubble sort, binary search, linear search, Quick sort, Heap sort, insertion sort, selection sort, merge sort, Radix sort. Introduction to hashing.

REFERENCE BOOKS:

1. Ellis Horowitz & Sartaj Sahni, "*Fundamentals of Data Structures*", Galgotia Book Source, 2nd Editions, New Delhi, 1992.
2. Seymour Lipschutz, "*Data Structures*", Tata McGraw Hill, 2nd Edition, New Delhi, 2006.
3. Aho, V., Hopcroft, E., Ullman, D., "*Data Structures and Algorithms*", Pearson Education, 1st Edition, New Delhi, 1993.
4. Alfred V. Aho, John Hopcroft, "*Data Structures and Algorithms*", Pearson, New Delhi, 2008
5. Mark Allen Weiss, "*Data Structures and Algorithm Analysis in C*", Pearson, 2nd Edition, New Delhi, 2008.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1523	Data Communication and Networking	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To understand OSI architecture
2. To demonstrate error detection and correction, congestion control, and applications of each layers of OSI model

UNIT-I OVERVIEW AND PHYSICAL LAYER

Data communications-Networks-Protocols and standards. Network Models: - OSI model-Layers in the OSI model - TCP/IP Protocol suite - Addressing. Data and Signals: - Analog and Digital-Periodic analog signals - Digital signals-Transmission impairment. Digital Transmission:-Transmission modes. Multiplexing and spreading. Transmission Media: - Guided and Unguided media-Switching:- Circuit switched, datagram-Virtual-circuit networks.

UNIT-II DATA LINK LAYER

Data Link Layer - I :Error Detection and Correction: - Introduction – Block Coding-Cyclic codes- Checksum - Data Link Control: - Framing- Flow and Error control - Noiseless channels - Noisy channels - HDLC.

Data Link Layer – II:Wireless LAN: - IEEE802.11- Bluetooth – SONET: - Architecture and layers - Frame Relay - Asynchronous Transfer Mode.

UNIT-III NETWORK LAYER

Logical Addressing - Internet Protocol - IPV4 - IPV6 – ICMP - IGMP – Delivery, Forwarding and Routing - Unicast Routing protocols- Multicast routing protocols.

UNIT-IV TRANSPORT LAYER

Process-to-process delivery - User Datagram Protocol-Transmission Control Protocol - Stream Control Transport Protocol - Congestion Control.

UNIT-V APPLICATION LAYER AND NETWORK SECURITY

DNS-Remote logging-E-mail-File transfer-Hyper Text Transfer Protocol-Simple Network Management Protocol-Digitizing audio and video-Audio and video compression-Streaming stored audio/video. Network Security: Symmetric key cryptography-Asymmetric key cryptography

REFERENCE BOOKS:

1. Behrouz A Forouzan, “Data communication and networking”, Tata McGraw Hill, 4th Edition, New Delhi, 2006.
2. William Stallings, “Data and computer communications”, Prentice Hall India, Sixth Edition, New Delh, 1997.
3. Andrew S. Tanenbaum, “Computer Networks”, Prentice Hall India, 4th Edition, New Delhi, 2013.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1524	Discrete Mathematics	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To understand mathematical logic
2. To apply the knowledge of combinatorics in real life
3. To solve Recurrence relation problems and understand the algebraic system
4. To convert the real life network problems into graph theory problems and to study the problem

UNIT-I MATHEMATICAL LOGIC

Statements, Connectives, Truth tables, Normal forms DNF and CNF, PCNF and PDNF, Validity using truth tables, Inference theory of statement calculus- Direct method, Inference theory of statement calculus using rule CP, Consistency and inconsistency.

UNIT-II COMBINATORICS

Definition of Permutation and combination. Pigeonhole Principle - Generalized Pigeonhole principle - Principle of inclusion and exclusion - Principle of inclusion and exclusion.

UNIT-III RECURRENCE RELATIONS

Definition of Recurrence relation, Homogeneous Recurrence, Nonhomogeneous recurrence relation, Solution of linear recurrence relation- Solution of Homogeneous recurrence relation and solution of Non- Homogeneous recurrence relation. Definition of generating function. Solution of Recurrence relations using generating functions

UNIT-IV GROUP THEORY

Groups, Properties of Groups- Cyclic groups-Permutation groups- Subgroups, Homomorphism, Isomorphism-Properties of homomorphism-Cosets, Lagrange's Theorem-Cayley's theorem.

UNIT-VBASIC SET THEORY AND GRAPH THEORY

Definition of Set, Relation. Properties-Equivalence relations, Partial orderings – Poset,, Matrix representation of relations, Graphical representation of relations, Hasse Diagram for the poset. Definition of graph, Types of graphs, Matrix representation of graphs, Isomorphism of two graphs.

REFERENCE BOOKS:

1. T. Veerarajan, *Discrete Mathematics with graph theory and combinatorics*. McGraw Hill Education (India) Pvt. New Delhi , 18th Edition, 2013
2. Tremblay, J.P. and Manohar, R. ,*“Discrete Mathematical Structures with applications to Computer Science”*,Tata McGraw Hill Edition, New Delhi, 2001.
3. Sundaresan, V., Ganapathy Subramanian, K.S., and Ganesan, K. ,*“Discrete Mathematics”*, New Revised Edition, A.R.Publication, Arpakkam, Chennai , 2002.
4. Alan Doerr and Kenneth Levasseur ,*“Applied Discrete Structures for Computer Science”*, Galgotia publications, New Delhi, 1992.
5. Kenneth H Rosen ,*“Discrete Mathematics and its applications”*, Tata McGraw Hill, 7th Edition, New Delhi, 2011.
6. Liu, C.L. ,*“Elements of Discrete Mathematics”*, 2nd Edition, McGraw Hill Publications, New Delhi, 2002.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1525	Management Information System (Internal Evaluation)	0	1	4	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To understand and analyze MIS system and decision making
2. To apply MIS principles for the organizations
3. To demonstrate Information System requirement planning

UNIT-I SYSTEM CONCEPTS & STRUCTURE OF MIS

Introduction - Subsystems of MIS - Role of MIS Professional - Operating Elements of an Information System –MIS support for decision making- MIS structure based on organizational functions- Synthesis and Some Issues of MIS Structure.

UNIT-II SURVEY OF INFORMATION SYSTEMS TECHNOLOGY

Computer Hardware & data Representation – microelectronics and instructing a computer- Communication Facilities and Networks - Wide Area Network and Distributed Systems -Physical & Logical Models of Data - File &Database Organizations - Transaction Processing Cycle - Document preparation- Message & Document Communication, Information Processing Control-Information system availability controls.

UNIT-III CONCEPTUAL FOUNDATIONS &SYSTEM SUPPORT

Phases in decision Making Process - Methods Of decision making process - Documenting and communicating decision rules - The Basic model of Organizational structure - Organization Structure Implications for Information System Design - Decision Support systems and Expert.

UNIT-IVINFORMATION SYSTEM REQUIREMENTS

Systems - Approaches to develop decision support systems Knowledge work and different types- -Software support facilities for knowledge work-Information System Requirements:Planning for information systems – The NOLAN stage model-Three stage model of planning process - Analysis of organizational information requirements - Three levels of information requirements and constraints - A strategy approach to determine information requirements – Determining application information requirements-Database Requirements- Data model concepts and terminology- Normalization in database design-Approaches in determining Data Requirements- User Interface Requirements and Interactive User Dialogue -Alternate interaction mechanisms

UNIT-VDEVELOPMENT, IMPLEMENTATION AND MANAGEMENT OF INFORMATION SYSTEM RESOURCES

Prototyping approach to application development - Life cycle approach to application development – Life cycle development stage-Project Management and Implementation of Information Systems - Organizational functions for control and quality assurance- Quality assurance with user developed systems and post audit evaluation –Auditing of information system- Organization of information resources functions - Organization and management of end user computing.

REFERENCE BOOKS:

1. Gordon B. Davis and Margrethe H. Olson. , "*Management Information Systems Conceptual Foundations, Structure and Development*", Tata McGraw Hill International Book Company, New Delhi, 2008.
2. Kenneth C.Laudon and Jane P.Laudon,"*Management Information Systems-Managing the Digital Firm*", Pearson Education Asia, New Delhi, 2013.
3. WamanS.Jawadekar ,"*Management Information Systems*", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2009.

SEMESTER III

Course Code	Course Name	L	T	P	Total LTP	C
MCA1531	Programming in Java	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To write simple java Programs
2. To write Applets and AWT programs
3. To apply Packages and Multithreading applications

UNIT-I INTRODUCTION TO JAVA

An Overview of Java- Data Types,-Variables-Arrays- Operators- Control Statements. Object Oriented Concepts :Introducing Classes- Overloading Methods- Introducing Access Control- Introducing final- Inheritance Basics- Method Overriding- Using Abstract Classes- The String Constructors- Special String Operations- String Comparison- String Buffer.

UNIT-II PACKAGES INTERFERENCE EXCEPTION HANDLING AND MULTITHREADING

Packages – Interfaces - Exception Handling - The Java Thread Model - The Main Thread - Creating a Thread - Thread Priorities – Synchronization - Interthread Communication.

UNIT-III APPLLET, AWT AND EVENT HANDLING

Applet Basics - Applet Architecture - An Applet Skeleton - Simple Applet Display Methods - Requesting Repainting - The HTML APPLLET Tag - AWT Classes - Window Fundamentals - Working with Graphics – Swing controls (few programs)

Event Handling - The Delegation Event Model - Event Classes - Event Listener Interfaces.

UNIT-IV JAVA CONSOLE INPUT AND OUTPUT AND FILE

Enumerations - I/O Basics - Reading Console Input - Writing Console Output - The Print Writer Class - Reading and Writing Files - Collections Overview - The Java I/O Classes and Interfaces – File - The Stream Classes - The Byte Streams - The Character Streams.

UNIT-V RMI AND JDBC

Java RMI and Networking concepts, JDBC concepts Servlet life cycle and programming

REFERENCE BOOKS:

1. Herbert Schildt ,“Java: The Complete Reference”, The McGraw-Hill, Seventh Edition, New Delhi, 2007.
2. S.Horstmann, Gray Cornell ,“Core Java 2 Volume In, Fundamentals”, Addition Wesley, New York, 2001.
3. Amold and Gosling, J. ,“The Java Programming Language”, Addition Wesley, 2nd Edition, New Delhi, 2001.
4. Art Gittleman ,“Ultimate Java Programming”, Wiley Publications, New York, 2002.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1532	Database Management Systems	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To understand the concepts of database security and reliability.
2. To apply the SQL procedures and queries and extract information
3. To develop Database design of given problem domain

UNIT-I BASIC CONCEPTS

Database and Need for DBMS, Characteristics of DBMS, Database Users, 3-tier architecture of DBMS, Data Models, Views of data-schemas and instances, Data independence, Conventional data models & systems, NDM & HDM Expressing relationships, DBTG set.

UNIT-II DATABASE DESIGN USING ER MODEL

Entities, Relationships, Representation of entities, attributes, relationship attributes, relationship set, Generalization, aggregation, Structure of relational Database and different types of keys, Expressing M: N relation.

UNIT-III RELATIONAL MODEL

Codd's rules, Relational data model & relational algebra, Relational model concept, Relational model constraints, Relational Algebra, Relational calculus, Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate Functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL PLSQL, Triggers and clusters.

UNIT-IV RELATIONAL DATABASE DESIGN

Database Design - ER to Relational, Functional dependencies, Normalization, Normal forms based on primary keys (1 NF, 2 NF, 3 NF, BCNF, 4 NF, 5 NF), Lossless joins and decomposition, Preserving decomposition.

Transaction Processing Concepts :Introduction to transaction processing; transaction and system concepts; desirable properties of transaction; characteristic schedule based on recoverability; characteristic schedule based on serializability.

UNIT-V CONCURRENCY CONTROL AND RECOVERY

Two phase locking techniques for concurrency control; concurrency control based on timestamp ordering; multi-version concurrency control techniques; validation (optimistic) concurrency control techniques; granularity of data items and multi-granularity locking, recovery concepts and recovery techniques.

Security and Privacy :Database security issues, Discretionary access control based on grant & revoking privilege, Mandatory access control and role based access control for multilevel security, Encryption & public key infrastructures.

REFERENCE BOOKS:

1. Abraham Silberschatz, Henry F. Korth, Sudarshan, S , "Database System concepts", Fourth Edition, McGraw Hill, New Delhi , 2015.
2. Kevin Loney, George Koch , "Oracle9i The Complete Reference", McGraw Hill, New Delhi, 2002.
3. Ragu Ramakrishnan , "Database management Systems", WCB / McGraw Hill, New Delhi, 1998.
4. Alexis Leon, Mathews Leon , "Database Management Systems", Vikas Publishing House Pvt. Ltd., New Delhi, 1999.
5. Date C.J , "An Introduction to database", version 2, Addison Wesley, New York., McGraw Hill, International edition -1999.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1533	Software Engineering	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES:

At the end of this course the learner is expected:

1. To demonstrate different software development life cycle models
2. To prepare SRS document
3. To apply Project estimation techniques and testing modules

UNIT-I INTRODUCTION TO SOFTWARE ENGINEERING

Characteristics of software -The Changing Nature of software – Legacy Software and Software myths – A Generic view of process – Software Engineering: A layered Technology and A process framework - Capability Maturity Model Integration, Personal and Team Process Models -Process Models – Prescriptive models and The Waterfall Model - The Incremental Process Models and Evolutionary Process Models -Specialized Process Models and The Unified Process -An agile view of Process.

UNIT-II REQUIREMENTS ANALYSIS AND DESIGN

System Engineering - Requirements Engineering – Requirements Engineering Tasks - Initiating the Requirements Engineering Process-Eliciting Requirements and Developing Use cases – Building the Analysis Model - Analysis Modeling Approaches – Data Modeling Concepts and Scenario based Modeling-Flow Oriented Modeling and Class Based Modeling – Design Engineering - Software Design Concepts- Various Design Models and Pattern Based Software Design.

UNIT-III TESTING STRATEGIES AND TACTICS

Introduction to Testing - Definition of Testing Terminologies-Testing Strategies for Conventional Software-Validation Testing - System Testing - Debugging Process-Testing Tactics – White Box Testing - Black Box Testing - Object Oriented Testing Methods-Testing for Specialized Environments

UNIT-IV PROJECT MANAGEMENT, ESTIMATION AND SCHEDULING

Project Management Spectrum - The People and the Product- The Process and the Project -Metrics for Process and Projects- Estimation - The Project Planning Process – Resources - Decomposition Techniques - Empirical Estimation Models - Project Scheduling Concepts – Timeline charts and Tracking the Scheduling - Earned Value Analysis.

UNIT-V QUALITY, CHANGE AND RISK MANAGEMENT

Reactive and Proactive Risk Strategies – Software Risks –Risk Identification and Risk Projection – Risk refinement and Risk Mitigation, Monitoring and Management -Quality Concepts -Software Quality Assurance -Software Reviews and Formal Technical Reviews -Statistical Quality Assurance and Software Reliability -The Software Configuration Management and the SCM Repository - The Software Configuration Management Process -Business Process Reengineering and Reverse Engineering -Restructuring and Forward Engineering -The Road Ahead -New Modes of Representing Information.

REFERENCE BOOKS:

1. Roger, S. Pressman, “Software Engineering: A Practitioner Approach”, McGraw Hill International Edition, Sixth Edition, New Delhi, 2004.
2. Waman, S Jawadekar, “Software Engineering: Principles and Practice”, McGraw Hill Education Pvt. Limited, New Delh, 2004.
3. Rohit Khurana, “Software Engineering-Principles and Practices”, Vikas Publishing House Pvt. Ltd., Second Edition, New Delhi, 2011.
4. Chairperson, Counting Practices Committee, Valerie Marthaler, EDS, Troy, Michigan, “Function Point Counting Practices Manual Release 4.1.1, The International Function Point User Group, April 2000.
5. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli, “Fundamentals of Software Engineering”, Prentice Hall of India, New Delhi, 1991.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1534	Cloud Computing	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To understand cloud fundamentals and architecture
2. To identify list of cloud services and service providers
3. To demonstrate cloud security

UNIT-I CLOUD FUNDAMENTALS

Cloud computing Definition – Cloud Models such as NIST, Cube, Private, Public, Hybrid and Community clouds – Cloud Characteristics – Benefits, Disadvantages, Challenges and obstacles of Cloud Computing – Cloud Cost Measurement, Capital expenditure, Total cost and SLA – Cloud Architecture – Types of Cloud Services (IaaS, PaaS, SaaS, IaaS).

UNIT-II CLOUD PLATFORMS

Abstraction – Load balancing and virtualization : case study Google cloud – Hypervisors : Case study VMware vSphere - Machine Imaging – Capacity Planning with baseline metrics, measurement, load testing, network capacity and scaling – PaaS services : Case study Force.com – PaaS Frameworks: Case study Drupal, EccenbtexAppBaseSquarespace ,WaveMaker and Wolf.

UNIT-III CLOUD SERVICE PROVIDERS

Google Web Services : Explore and survey Google Application, Google analytics, Google Translate, Google Toolkit, APIs and Google App Engine - Amazon Web services: Components, Elastic Compute Cloud (EC2), Amazon Storage Systems, Amazon Elastic Block Store, and Amazon Database Services – Microsoft Cloud Services : Windows Azure platform and Windows Live.

UNIT-IV CLOUD INFRASTRUCTURE AND SECURITY

Cloud Management: Responsibilities, Lifecycle, Management Products and Standards -Cloud security: CSA Cloud Reference Model – Implement Cloud security for Infrastructure, Data, Network, Storage and Host – Disaster recovery and management.

UNIT-V SOA, STORAGE AND BACKUP

Network service model infrastructure, Communication and Management of SOA – Moving applications to cloud, Service attributes and Cloud bursting – Cloud storage, provisioning, unmanaged and managed storage – Cloud backup, types and features and storage interoperability – Cloud Mail services.

REFERENCE BOOKS:

1. Barrie Sosinsky, *“Cloud Computing Bible”*, Wiley Publishing Inc., New York, 2011.
2. Kris Jamsa, *“Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Security and More”*, Jones and Bartlett Learning LLC, Boston, USA, 2002.
3. George Reese, *“Cloud Application Architectures: Building Applications and Infrastructures in the cloud”*, O'Reilly Media Inc. Cambridge, USA, 2009.
4. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, *“Cloud Computing: A practical approach”*, McGrawHill, New Delhi, 2010.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1535	Personality Development-I	3	2	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. Improve his/her performance in soft skill
2. Solve quantitative and logical reasoning problems
3. Approach interviews and competitive exams with confidence

Soft Skills: Self Analysis, Attitude perceptions- Positive approach to challenges, Change Management- ideas and approach, Goal setting- vision, Time management- planning, Entrepreneurial skills- Leadership Skills, People management- team work, leadership, Decision making- problem identification, Interview Skills- getting familiar with one's CV- presentation and performance- giving and receiving feedback, setting expectations and exhibiting professional behavior,

Job Search- Scope of job opportunities/ higher education for the courses undertaken- Knowledge of all prominent companies/ concerns related to the respective fields/ departments- Employer's expectations

Quantitative Aptitude : Partnership, Simple Interest, Compound Interest, Profit and Loss, Problems on Clock, Calendar and Cubes, Permutation and Combination, Allegation and mixtures

Logical Reasoning: Letter and Symbol series, Number series, Analyzing arguments, Making judgments,

SEMESTER IV

Course Code	Course Name	L	T	P	Total LTP	C
MCA1541	ASP.Net	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To demonstrate .NET architecture
2. To develop ASP.NET programs using simple control, caching, database connectivity and secured applications

UNIT-I INTRODUCTION TO .NET AND ASP.NET

Introduction to .NET & its Benefits – Architecture of .NET Framework – CLR – CTS – Exploring Visual Studio – ASP.NET introduction & Features – Life cycle of ASP.NET – File Types – Exploring ASP.NET web pages – page directives – Application structure – states.

UNIT-II ASP.NET CONTROLS

Standard controls – Validation controls – Rich web controls – Data controls – Navigation controls – Login controls – Web parts controls – HTML controls – Creating web applications – Deployment.

UNIT-III ADO.NET

ADO.Net framework – ADO.NET managed providers – Data set – Data source controls – Data binding – Working with: Grid view – Data list – Form View – Repeater control – Designing web application.

UNIT-IV LINQ QUERIES AND SECURITY

Introduction to LINQ Queries – Standard Query operators – LINQ to objects – LINQ to ADO.NET – LINQ to XML - LINQ Data source control – Lambda Expression – Security in ASP.NET: Login control – Password Recovery – CreateUserWizard.

UNIT-V CACHING, CONFIGURATION AND WEB SERVICES

Caching in ASP.NET – Output caching – Data caching – Globalization – Internationalization – Localization - Authentication- Authorization – Introduction to Web services - Infrastructure of web services – Code model – Properties – creating web services.

REFERENCE BOOKS:

1. Kogent, "ASP.NET 4.0 Black Book – Platinum Edition", Dreamtech Press, New Delhi, 2010.
2. Stephen Walther, Kevin Hoffman, Nate Dudek, "ASP.NET 4 Unleashed", Pearson, New Delhi, 2011.
3. Greg Buczek, "ASP.Net Developer's Guide", Tata McGraw Hill publishing Company Ltd., New Delhi, 2010.
4. Mathew Mac Donald, "ASP.NET Complete Reference", Tata McGraw Hill publishing Company Ltd., New Delhi, 2010.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1542	Android Applications Development	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To develop simple Mobile applications
2. To develop layouts, File handling, Messaging and Location based service applications in Mobile

UNIT-I MOBILE APPLICATION DEVELOPMENT AND TRENDS

Android overview and Versions – Android open stack, features – Setting up Android environment (Eclipse, SDK, AVD)- Simple Android application development – Anatomy of Android applications – Activity and Life cycle – Intents, services and Content Providers

UNIT-II LAYOUTS

Linear, Absolute, Table, Relative, Frame, Scrollview, Resize and reposition - Screen orientation – Views: TextView, EditText, Button, ImageButton, Checkbox, ToggleButton, RadioButton, RadioGroup, ProgressBar, AutocompleteText, Picker, ListView and WebView – Displaying pictures with views: Gallery and ImageView, ImageSwitcher, GridView – Displaying Menus: Helper methods, Option and ContextShared User preferences

UNIT-III FILE HANDLING

File system, System partition, SD card partition, user partition, security, Internal and External Storage – Managing data using SQLite – Content providers: Data sharing with query string, projections, filters and sort and User defined content providers

UNIT-IV SMS MESSAGING

Sending and Receiving – Sending eMail and networking – Downloading binary and text data files – Access Web services – Local and remote services, Asynchronous threading, communication and binding services

UNIT-V LOCATION BASED SERVICES

Display map, zoom control, view and change, Marking, Geocoding, Get location - Publish Android applications and Deployment

REFERENCE BOOKS:

1. WeiMengLee, “*Beginning Android Application Development*”, Wrox Publications (John Wiley, New York, 2012).
2. Ed Burnette, “*Hello Android: Introducing Google’s Mobile Development Platform*”, The Pragmatic Publishers, 3rd edition, North Carolina USA, 2010.
3. RetoMeier, “*Professional Android 4 Application Development*”, Wrox Publications (John Wiley, New York), 2012.
4. ZigurdMednieks, Laird Dornin, G, BlakeMeike, Masumi Nakamura, “*Programming Android: Java Programming for the New Generation of Mobile Devices*”, OReilly Media, USA, 2011.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1543	Unix and Network Programming	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To use Unix simple and Advanced commands
2. To demonstrate process control, inter process communication, socket and daemon process

UNIT-I FILES & DIRECTORIES

Study of Open, Close, Read, Write, Lseek, Dup, stat, fstat, and lstat functions-.File Types -Set user ID and Set Group ID - File Access Permissions -Study of Access, umask, Chmod, Link and Unlink Functions-Mkdir and Rmdir -Reading Directories -chdir, fchdir and getcwd Functions.

UNIT-II PROCESS CONTROL & SIGNALS

Time and Date Routines-Setjmp and Longjmp Functions -Fork, Vfork -Exec -wait and waitpid -Signal concepts, signal function -kill and raise – alarm and pause – abort and sleep –signal sets: sigprocmask – sigpending – sigaction.

UNIT-III INTER PROCESS COMMUNICATION

Pipes –popen and pclose-FIFOs-System V IPC – Introduction – co-processes-Message Queue- – Example Program -Semaphores - Example Program -Shared Memory- Example Program.

UNIT-IV SOCKET PROGRAMMING

Sockets – Introduction -Elementary TCP Sockets -TCP Echo Client/ Server -Elementary UDP Sockets -UDP Echo Client/ Server-gethostbyname&gethostbyaddr, getservbyname&getservbyport – getaddrinfo.

UNIT-V DAEMON PROCESS & DATA TRANSMISSION

Syslogd Daemon -syslog function -inetd Daemon -Broadcast Addresses – Unicast Versus Broadcast -Multicast Addresses - Multicasting Versus Broadcasting on LAN, Multicasting on WAN -Raw Socket : Creation – Input – Output -Data link Access : BPF – DLP -SOCK_PACKET.

REFERENCE BOOKS:

1. Richard Stevens .W & Stephen Rago ,“Advanced Programming in the UNIX Environment”, 2nd Edition, Pearson Education, New Delhi, 2005.
2. Richard Stevens .W ,“UNIX Network Programming”, Volume II, Prentice Hall, New Delhi , 1999.
3. Stephen A.Rago, “Unix System V Network Programming”, Addison Wesley, New York, 1993.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1544	Object Oriented Analysis and Design	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To understand various OO methodologies
2. To apply UML diagrams and Develop OOAD life cycle for the problem statement
3. To write OO test cases

UNIT-I OO BASICS & METHODOLOGIES

Object Oriented Approach and its Benefits – Object Oriented Concepts – Object Oriented Life Cycle and Quality Attributes – Object Oriented Methodologies such as Rumbaugh OMT, Booch OOD and Jacobson OOSE with a Case study - The Unified Approach: Layered Architecture – Component Based Development – Patterns and Frameworks

UNIT-IIUML DIAGRAMS

UML Architecture – UML Diagrams: UseCase Diagram, Class Diagram, Sequence Diagram, Collaboration Diagram, Activity Diagram, State chart diagram, Object Diagram and relationships, Component Diagram and Deployment Diagram, Packages and UML extensibility mechanisms with suitable examples and Case studies

UNIT-III OO ANALYSIS

Business Process Analysis- OOA steps- Identify Actors, Business Process Model - Identify UseCase, Usecase Documentation- Identify classes using Classification theorems: Noun phrase approach, Class pattern approach, Usecase driven sequence diagram approach, and CRC approach – Case study on Identifying object Relationships Attributes, Methods: Case study approach

UNIT-IV OO DESIGN

OOD steps – Axioms and Corollaries - Design Business layer classes — Design Access layer classes – Compare Relational, Distributed and Object Oriented Database – Various Table Class Mapping – Design View layer classes – User Interface Design rules – Guidelines for designing User Interface Controls

UNIT-VOO TESTING

Testing strategies -Impact of OO testing – Myths of OO testing – OO testing techniques such as class testing, state based testing, polymorphism testing, inheritance testing and integration testing – Usability and User satisfaction testing – Debugging principles – OO Metrics (Develop test cases with real time examples)

REFERENCE BOOKS:

1. Ali Bahrami ,*“Object Oriented Systems Development”*, Tata McGraw-Hill Edition, New Delhi, 2008.
2. Srimathi.H, Srirarm. H & Krishanmoorthy .A, *“Object Oriented Analysis and Design using UML”*, ScitechPublications , 2nd edition, India, 2006.
3. Stephen R. Schach , *“Object-Oriented Software Engineering”*, McGraw- Hill, Education, 8th Edition, New Delhi, 2010.
4. Grady Booch , Ivar Jacobson, James Rumbaugh, *“The Unified Modeling Language User Guide”* Pearson Education, 2nd edition, New Delhi, 2005.
5. Craig Larman, *“Applying UML & Patterns: An Introduction to Object oriented analysis and design”*, Addison Wesley Professional, 3rd Edition, New York, 2005.
6. Timothy C. Lethbridge, Robert Laganieri, *“Object-Oriented Software Engineering – A practical software development using UML and Java”*, McGraw-Hill Education, New Delhi, 2014.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1545	Information Storage and Management	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES:

At the end of this course the learner is expected:

1. To analyze various storage technologies
2. To understand the developments of data availability, virtualization and security for the stored data

UNIT-I INTRODUCTION TO STORAGE TECHNOLOGY

Information storage, evolution of storage technology and architecture, data center infrastructure, information life cycle; Storage System Environment – storage system environment components, disk drive components, logical components of Host; Data Protection – implementation of RAID, RAID Array components, RAID levels, and performance comparisons.

UNIT-II DAS, SCSI, AND STORAGE NETWORKING

Direct Addressed Storage – Type of DAS, benefits and limitations, Disk Drive Interfaces, Parallel SCSI; Storage Area Networks – evolution, components of SAN, Fibre Channel(FC) connectivity, FC architecture, FC Topologies; Network Attached Storage – Benefits of NAS, components of NAS, protocols, i/o operations.

UNIT-III IP SAN, CAS AND STORAGE VIRTUALIZATION

IP SAN-introduction, components of iSCSI, FCIP; Content Addressed Storage(CAS) – fixed content and archives, types of archives, CAS Architecture; Storage Virtualization – forms of virtualization, taxonomy, Storage Virtualization Challenges, types of storage virtualization.

UNIT-IV BUSINESS CONTINUITY

Introduction - Information Availability, BC terminology, BC planning lifecycle, Business impact analysis- Backup and recovery – purpose and considerations, topology , technologies; local replication - Uses of Local Replicas, Data Consistency, Replication Technologies.

UNIT-V STORAGE SECURITY AND MANAGEMENT

Storage Security - Storage security framework, Risk Triad, Storage security domains, security implementations in storage Networking; Managing the Storage Infrastructure - Monitoring the Storage Infrastructure, Storage Management Activities, Storage Infrastructure Management Challenges.

REFERENCE BOOKS:

1. EMC Corporation, “*Information Storage and Management*”, Wiley India, New Delhi
2. Robert Spalding , “*Storage Networks: The Complete Reference*”, Tata McGraw Hill, New Delhi, 2013.
3. Meeta Gupta, “*Storage Area Network Fundamentals*”, Pearson Education Limited, New Delhi, 2002.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1546	TCP/IP Networks	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To understand TCP/IP layers and architecture
2. To demonstrate Messaging, Routing, Multicasting and Transmission Control

UNIT-I A BRIEF HISTORY

Protocols and standards – Standard organization – Internet standards Internet administration. The OSI model and the TCP/IP Protocol Suite – The OSI model – Layers in OSI model – TCP/IP protocol suite – addressing – IP versions - IP addresses : Class addressing - Sub netting and super netting - Class less addressing - Various length blocks – subnetting - Address allocation.

UNIT-II ARP

ARP package – RARP - Internet Protocol (IP) – Datagram – Fragmentation – checksum - IP package - Internet Control Message Protocol(ICMP) – Types of messages – Message format – Error reporting – query – checksum – ICMP Package - Internet Group Management Protocol(IGMP) - Group management - IGMP messages – IGMP operation – Encapsulation - IGMP Package.Process to Process communication – Checksum - UDP operation - Uses of UDP – UDP package

UNIT-III TRANSMISSION CONTROL PROTOCOL (TCP)

TCP services – TCP features – Segment – A TCP connection – State Transition Diagram – Flow Control - Error control – Congestion Control TCP timers – SCTP – SCTP services - Process – to process communication – Multiple streams – Multihoming – Full duplex communication – connection oriented service – reliable service

UNIT-IV DISTANCE VECTOR ROUTING

Initialization – Sharing – Updating – When to share – Two-Node Loop Instability – Three Node Instability -RIP – RIP message Format – Request and responses Timer in RIP – RIP versions – Encapsulations – Link State Routing – Building routing tables – OSPF – areas – metric – types of links graphical Representation OSPF packets – Encapsulation – Path Vector Routing – BGP.

UNIT-V MULTICASTING

Unicasting – Multicasting – Broadcasting – Multicasting versus Multiple Unicasting – multicast applications– multicast routing – Optimal routing: Shortest path trees – Routing protocols – Multicast link state routing: MOSPF: Multicast distance vector-distance vector: DVMRP –DVMRP - CBT.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, "TCP/IP Protocol Suite", McGraw Hill, Third edition, New Delhi, 2002.
2. Douglas Comer, "Internet Working with TCP/IP –Vol.1", Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
Richard Stevens W, "TCP/IP Illustrated Vol.1 Version 3", Addison Wesley Publications, New York, 2000.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1547	Database Administration	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To understand Oracle server architecture
2. To create database users and maintain log files
3. To apply backup and recovery mechanisms

UNIT-I Oracle Server Architecture - Connect Users to Servers and Processing queries, changes and commits - Oracle Universal Installer - Setting up OS and Password File Authentication Oracle Enterprise Manager Components - Creating Parameter File - Starting and Shutting an Instance - Opening and Closing a Database - Getting and Setting Parameter Values -Managing Sessions - Monitoring ALERT and Trace Files - Creating an Oracle Database

UNIT-IIManaging Control Files - Maintaining Redo Log Files – Planning - Troubleshooting and Archive Redo Log Files - Logical Structure of the Database - Creating and Changing Tablespace - Temporary Segments - Changing and Relocating Tablespaces - Storage Structures and Relationships - Obtaining Storage Structures Information

UNIT-IIIPlanning and Creating Rollback Segments - Maintaining Rollback Segments - Managing Tables - Oracle Datatypes Creating and Controlling Tables - Analyzing and Retrieving Information about Tables - Creating Different Indexes - Reorganizing Indexes - Dropping Indexes of database directory - Integrity Constraints and Triggers - Implementing Integrity Constraints and Triggers - Maintaining Integrity Constraints and Triggers

UNIT-IVCreating Database Users - Altering and Monitoring Existing Users - Administering Profiles -Controlling Resource Use and Administering Passwords - System Privileges - Object Privileges - Granting and Revoking Privileges - Controlling OS and Auditing

UNIT-VBackup Considerations – Recovery Considerations - Components for Backup and Recovery -Redo Logs - Checkpoints and Achieves - Multiplexing Control Files & Redo Logs - Types of Failures - Configuring Redo Log Archiving - Multiplexing and Archiving Redo Log Files - Recovery Implications and Performing Offline, Online Backups

REFERENCE BOOKS:

1. Jason Couchman and Ulrike Schwinn, “*DBA Certification Exam Guide*”, Osborne/McGraw-Hill, New York, 2011.
2. Donald K.Burleson, “*Oracle Tuning The Definitive Reference*”, 2nd Edition, Rampant Tech. Press, North Carolina, 2006.
3. Craig S.Mullins, “*Database Administration: The Complete Guide to DBA Practices and Procedures*”, Addison Wesley, 2nd Edition, New York, 2002.
4. Kevin Loney, “*Oracle Database 11G: The Complete Reference*”, McGraw Hill, New Delhi, 2008.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1548	Personality Development-II	3	2	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. Improve knowledge in verbal aptitude
2. Solve quantitative and logical reasoning problems
3. Approach interviews and recruitments with confidence

Verbal Aptitude: Synonyms, Antonyms, Idioms and Phrases, Sentence completion, Spotting errors, Selecting words, Ordering of Words/ sentences, Change of voice, Sentence improvement, One word substitute, Change of speech, Closet test, Error correction, Sentence correction, Picture comprehension, Reading comprehension, Creative writing, Verbal analogies, Writing Curriculum Vitae

Group Discussion

QUANTITATIVE APTITUDE :Time and Distance, Height and Distance, Problems on Ages, Trains, Pipes and Cistern Boats and Streams, Probability

LOGICAL REASONING: Direction Sense test, Venn diagrams, Seating arrangements, Cause and effect, Blood relation test, Dice, Logical verbal puzzles

SEMESTER – V

Course Code	Course Name	L	T	P	Total LTP	C
MCA1551	Software Testing and Quality Assurance	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To understand various levels of testing strategies
2. To write test cases and scripts for the problem domain
3. To apply automated test tools for the applications

UNIT-I TESTING FUNDAMENTALS

The Psychology of Testing-Software Testing Principles-Code Inspections-An Error checklist for Inspections-Walkthroughs-Desk Checking-Peer ratings. Definition of bug-Reasons for bug occurrence-Cost of bugs-Role of a software tester-Software tester traits-Software Development life cycle models-Testing axioms-Software testing terms and definitions.

UNIT-II TESTING METHODOLOGIES

White box testing: Statement coverage-Decision coverage-Condition coverage-Decision-condition coverage-Multiple-condition coverage. Black box testing: Equivalence Partitioning-Boundary-value analysis-Cause-effect graphing-Error guessing.

UNIT-III LEVELS OF TESTING

Unit testing-Incremental testing: Top-down testing-Bottom-up testing. System testing: Facility-Volume-Stress-Usability-Security-Performance-Storage-Configuration-Compatibility-Installability-Reliability-Recovery-Serviceability-Documentation-Procedure.Acceptance testing-Case study: Test case design.

UNIT-IV APPLYING TESTING SKILLS

Configuration Testing -Compatibility Testing-Usability Testing-Testing the Documentation- Web Site Testing –Testing for Software Security.

UNIT-V AUTOMATED TESTING, TEST TOOLS & BUG REPORTING

Automated Testing and Test Tools: -Benefits-Test Tools-Software Test Automation-Bug Bashes and Beta Testing-Writing and Tracking Test Cases: Goals-Test Case Planning Overview-Bug's Life cycle-Bug Tracking System-Software Quality Assurance-Case study: Usage of open source test tool like Selenium and Sikuli for Functional/Regression testing.

REFERENCE BOOKS:

1. Glenford J. Myers, *"The Art of Software Testing"* - John Wiley & Sons, Second Edition, New Delhi, 2008.
2. Ron Patton, *"Software Testing"* – Pearson Education, Second Edition, New Delhi, 2007.
3. William E. Perry, *"Effective Methods for Software Testing"*, John Wiley & Sons, Second Edition, New York, 2000.
4. Boris Beizer, *"Black-Box Testing: -Techniques for Functional Testing of Software and Systems"*, John Wiley & Sons, New York, 1995.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1552	XML and Web Services	3	0	3	6	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To develop simple programs using XML
2. To create web services
3. To understand Semantic Web architecture

UNIT-I Introduction to XML :Introduction to XML and its need-XML Revolution – Data Revolution - XML Revolution – Architectural and Software revolution-The XML Technology family-Structure and data typing-The XML Technology family- Presentation Technologies-The XML Technology family- Manipulation Technologies.

UNIT-IIXML Presentation, Manipulation Technologies :XML Document rule-XML structuring rule and Related Data type-XML presentation – CSS – XSL- XSLT (operations) –XPath, Xlink and XQuery-Introduction to XSL-FO-XML – Forms-Uses of Voice XML with a block diagram.

UNIT-IIIAsynchronous Javascript and XML – AJAX :Introduction and Need for AJAX-AJAX Basics - AJAX Architecture-Ajax Web Application Model-Ajax Patterns - Ajax control Toolkit - Ajax controls

UNIT-IVSOAP Protocol & Web Services: Purpose of SOAP - SOAP Protocol-Approaches to SOAP-SOAP Architecture-XML-RPC-Structure of HTTP Request-Introduction to SOAP faults-Concepts of SOAP Attachments-Introduction to Web Services-UDDI Model & Security on XML.

UNIT-VSemantic Web :Introduction to Semantic Web: Needs, Evolution. Types of Data etc.,-Levels of Semantics-The layered Architecture: URI, UNICODE, XML NS, RDF-The layered Architecture: Ontology, logic, proof, trust and Digital signature-Un-Resource Description Framework (RDF)-Web Ontology Language (OWL).

REFERENCE BOOKS:

1. Frank. P. Coyle, “XML, Web Services and the data revolution” - Pearson Education, New Delhi , 2002
2. Ajax – Black Book New Edition – Kogent Solutions Inc - Dreamtech Press , 2008.
3. Grigoris Antoniou and Frank Van Harmelen, “A Semantic Web Primer” - The MIT Press, Cambridge, Massachusetts London, England, 2014.
4. Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh, - “Developing Java Web Services”- Wiley Publishing Inc., New Delhi, 2004.
5. SandeepChatterjee, James Webber, “Developing Enterprise Web Services”-, Pearson Education, New Delhi, 2004.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1553	Big Data and its applications	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To Identify the Big data platform and analytic tools
2. To demonstrate data streaming
3. To understand hadoop architecture, framework and environment

UNIT-I INTRODUCTION TO BIG DATA PLATFORM

Challenges of Conventional Systems - Intelligent data analysis Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT-II MINING DATA STREAMS

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT-III HADOOP

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS- Java interfaces to HDFS- Basics- Developing a Map Reduce Application- How Map Reduce Works- Anatomy of a Map Reduce Job run- Failures- Job Scheduling- Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features

UNIT-IV HADOOP ENVIRONMENT

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration- Security in Hadoop - Administering Hadoop – HDFS - Monitoring- Maintenance- Hadoop benchmarks- Hadoop in the cloud

UNIT-V FRAMEWORKS

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

REFERENCE BOOKS:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007 .
2. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012
3. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1554	Wireless Application Protocols	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES:

1. To impart knowledge on Wireless Technology, WML Script functions, Wireless Application Protocol and its application areas.
2. To enable the learner for aspiring careers in WAP related specialized software field.

UNIT-I MOBILE INTERNET STANDARD

Key services: Productivity Applications – Information and transactional services – Life Enhancing management – Characteristics of the mobile Internet – Current web Technologies – Origins of WAP – WAP architecture – Components of WAP standard – Network Infrastructure services – Design principle – other standards.

UNIT-IIWML

Introduction to WML – Document model – WML Authoring – URL Identify – Markup Basics – Basic content – Events , tasks & Bindings – Variables – Images, tables and links - controls – miscellaneous markup – Application security.

UNIT-IIIWML Script and WTAI

WML Script overview – Language Basics : Variables – operators – statements – Functions – Pragmas – standard libraries – WTAI overview – WML Script development – Binary WML script.

UNIT-IVUSER INTERFACE DESIGN

Web site design – structure usability methods – design guidelines – selected WML elements – navigation and user input – Appearance and presentation – standard HTTP Header – CC/PP document – End to End communication – profile composition.

UNIT-VPUSH MESSAGING AND WTA

Push messaging: overview – Access protocol – Addressing – MIME media types – Proxy gateway – WTA: Architecture – Client Framework – WTA server and security – Design consideration – Application creation.

REFERENCE BOOKS:

1. Singhal .S,Bridgman.T, Suryanarayana.L, Mauney.D, Alvinen.J, Bevis.D, Chan.J, Hild.S (2011), WAP- The Wireless Application Protocol, Pearson publications, New Delhi
2. Steve Mann & Scott Sbihli (20000), Wireless Application Protocols, Wiley Computer Publishing, New York.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1555	Open Source Technologies	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

1. To install Linux and Apache server
2. To develop programs using MySQL and PHP /Perl

UNIT-I DEFINITION OF TERMS

Open Source – Free Software – Public Domain Software, Uses of open source : Internet – Linux – Open source appliances – New business use – adopted to many systems, Examples of open source systems, Issues of open source : Advantages of open source – Major elements of open source – Choosing open source.

UNIT-II LINUX OPERATING SYSTEM

Open source software and GNU – GNU public license – Difference between Windows and Linux, Installing Linux : Hardware and environmental considerations – Server design Dual booting issues – Methods of Installation, Managing Users : User management tools – User and access permissions, The command line : Introduction to BASH – Command line shortcuts – Documentation tools – Files Types – File permissions – File management and manipulation – Editors.

UNIT-III BASIC CONCEPTS

Installing Apache – Configuring Apache – Starting and Stopping Apache – Hosting Multiple sites – Proxy servers and caching – Logs and monitoring – Security – Dynamic Content – URL rewriting – Module construction.

UNIT-IV INTRODUCING MYSQL

Prerequisites for MySQL – MySQL versions – MySQL Linux Installation – MySQL Server administration and security – MySQL database functions – Command line interface basics – MySQL CLI environment variables – Using CLI in interactive and non-interactive mode – Creating CLI environment – Utility and administrative statements – commands – Data Definition Language – Data Markup Language.

UNIT-V PERL

Installing the Perl DBI and MySQL DBD – Introducing the DBI – Functions with DBI – Building basic applications – Building web applications with DBI. PHP: PHP Installation – PHP essentials – PHP MySQL Configuration – PHP MySQL functions – Building MySQL enabled applications with PHP.

REFERENCE BOOKS:

1. Paul Kavanagh, "Open Source Software", Elsevier Digital Press, New Delhi , 2004.
2. Steve Shah, Wale Soyinka, "Linux Administration – A beginners Guide", TataMcGraw-Hill, Fourth Edition, New Delhi , 2005.
3. Scott Hawkins, "Apache Webserver Administration and e-commerce Handbook", Pearson Education Asia, New Delhi , 2001
4. Linda McKinnon, Al McKinnon, "Installing and Adminstrating Linux", Wiley Dream Tech India Pvt. Ltd., 2nd Edition, New Delhi, 2002.
5. Timothy Boronczyk et al., "Beginning PHP6", Apache, Mysql Web Development, Wiley Dream Tech India Pvt. Ltd, New Delhi, 2009.
6. Jason Gerner et al., "Professional LAMP: Linux, Apache, MySQL and PHP5 Web Development", Wiley Dream Tech India Pvt. Ltd, New Delhi, 2005.
7. James Lee, Brent Ware , "Open Source Web Development with LAMP", Addison-WesleyProfessional, New York, 2013.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1556	Network Security	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES:

At the end of this course the learner is expected:

1. To identify and assess current and anticipated security risks and vulnerabilities
2. To develop a network security plan and policies
3. To design, implement and monitor a network security plan.
4. To identify elements of firewall design, types of Intruders, Viruses and security threats and responses to security attacks.

UNIT-I Services, Mechanisms and Attacks - Security attacks and types of attacks - Security mechanisms – A model for Network security.

UNIT-II Conventional Encryption-Classical and Modern techniques: DES-IDEA-Modes of operation. Public Key Encryption systems: RSA Algorithm- Diffie Hellman Key exchange algorithm-Digital signature algorithms-Key Escrow and clipper. Key Distribution techniques: Hash algorithms-MD5 and SHA-1.

UNIT-III Kerberos and X.509-Electronic mail security-PGP and S/ MIME.
IP Security overview- Architecture - Authentication header and Encapsulating Security Payload.

UNIT-IV Web Security: Secure socket layer and secure electronic transaction protocols.

UNIT-V Viruses and Worms-Intrusion Detection systems: Principles and design-Firewalls: Principles and design.

REFERENCE BOOKS:

1. William Stallings, "*Cryptography and Network Security*", Pearson Education, 2nd Edition. ,(For Units I to V)2000.
2. Network Security: Private Communication in a Public World Charlie Kaufman.2005.
3. Jaydipen, "*Applied Crptography and Network Security*",In tech.Network Security (2005) "A Practical Approach " Harrington Academic Press2012

Course Code	Course Name	L	T	P	Total LTP	C
MCA1557	Mini Project	0	1	4	5	4

I

INSTRUCTIONAL OBJECTIVES:

At the end of this course the learner is expected:

1. To develop Software Applications and Projects on emerging technologies
2. Adopt the software development life cycle
3. Prepare Software Requirement Analysis Document
4. Improve presentation skills

Course Code	Course Name	L	T	P	Total LTP	C
MCA1558	Term Paper and Seminar	0	1	4	5	4

INSTRUCTIONAL OBJECTIVES:

At the end of this course the learner is expected:

1. Identify the problem statement / evolving concepts of IT
2. Review the literature survey of chosen topic
3. Develop suggestions / enhancement required in the field
4. Prepare, Present and Document the work done

SEMESTER – VI

Course Code	Course Name	L	T	P	Total LTP	C
MCA1561	Data Warehousing and Data Mining	3	0	2	5	4

INSTRUCTIONAL OBJECTIVES:

At the end of this course the learner is expected:

- To list and select appropriate data mining tool
- To apply Data mining techniques for the real-time scenario
- To demonstrate Data warehousing schema for the Database application

UNIT-I Data Mining Concepts & Architecture: Introduction – Data Mining Definitions - k-nearest neighbor - Data Mining Tools- Applications of Data Mining - Anatomy of Data Mining - Learning: types of learning -Machine learning-Knowledge: types of Knowledge-Knowledge discovery process- Architecture of Data Mining

UNIT-II Data Mining Techniques: Visualization Techniques – Likelihood & distance-Neural Networks-Decision Tree technique- Constructing decision trees-ID3 algorithm-Genetic algorithms: Crossover & mutation Mining frequent patterns – Association – Classification Bayesian, rule based and predictions --Clustering: Distance function-K-means algorithm -Hierarchical Clustering - Applications

UNIT-III Data Warehousing Concepts & Architecture :Introduction - Goals- data warehouse users - Types of Data Warehouse-Data warehouse objects: fact table & Dimension table-Load Manager-Warehouse Manager-Query Manager

UNIT-IV Data Warehouse Schemas: Star schemas-Snowflake Schemas. Building the data warehouse to a multiprocessor DBMS schemas – Data extraction and transformation tools

UNIT-V Data Warehouse Partitioning & Aggregation :Horizontal Partitioning-vertical Partitioning-Hardware Partitioning-Software partitioning Methods-Aggregation-Designing Summary tables -Reporting and querying tools –OLAP model

REFERENCE BOOKS:

1. Alex Berson, Stephen J. Smith, "Data Warehousing, Data mining & OLAP" – Tata McGraw Hill Publications, New Delhi, 2007.
2. Jia and wel Han and Micheline Kamber, "Data Mining Concepts and Techniques", 2nd edition, Elsevier, 2007.
3. Sam Anahory , Dennis Murray, "Data Warehousing in real world" – Pearson Education, New Delhi , 2004.
4. Pieter Adriaans ,Dolf Zantinge, "Data Mining" – Pearson education, New Delhi, 2005.
5. S. Prabhu , N. Venkatesan, "Data Mining & Warehousing" – New Age International – First Edition, New Delhi , 2006.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1562	Python Programming	3	0	2	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected

- To install and execute python
- To Develop applications in Python
- To know the database connectivity and GUI techniques of Python

UNIT-I Why python – How is Python Different - Installing Python – Identifiers and operators – Numeric types - Assigning values to variables – Expressions – Strings – Converting between data types – Advanced data types : Lists – Tuples – Dictionaries – Objects.

UNIT-II If statements – For loops – While loops – Throwing and catching Exceptions – Defining functions – Grouping code with modules – Importing and Locating modules - Scope rules.

UNIT-III Classes and Objects – Deriving new classes from other classes – Hiding Private Data – Identifying class membership – Overloading – Weak references. Input-Output : Printing – Keyboard input – Opening, closing and positioning files – Reading and Writing files – Standard I/O – File Like Object.

UNIT-IV Data storage overview – Loading and saving objects – Database like storage – Converting to and from C structures – Converting data to standard formats – compressing data – Disk based dictionaries – Accessing relational databases – Relational meta data – Features of the DB API

UNIT-V Creating a GUI – Laying out widgets – Common options – Gathering user input – Using text widgets – Building menus – Dialogs – Handling colors and fonts – Drawing graphics – Using Timers – Sound file Basics – Playing sounds – Examining audio files – Reading and writing audio files – Handling audio files

REFERENCE BOOKS:

1. Dave Brueck, Stephen Tanner – “Python 2.1 Bible” – Hungry Minds Inc – 2001
2. Martin C. Brown – “Python – The complete Reference” – Tata McGraw Hill – 2001.
3. Magnus Lie Hetland – “Beginning Python” – a press – 2009
4. Mark Lutz – “Programming Python” – O’reilly Publishers – 2011.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1563	Data Analytics	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

- To analyse voluminous data
- To understand analytics techniques and forecasting

UNIT-I Multivariate Analysis :Review of Fundamentals : Computation of Mean, Standard Deviation, Coefficient of Variation, Median, Mode and Coefficient of Skewness and Kurtosis, Computation of Correlation Matrix, simple regression and multiple regression equations

UNIT-IIMeaning of Multivariate Analysis - Measurements Scales - Metric measurement scales - Non-metric measurement scales – Measurement Error - Type I error and Type II error - Classification of Multivariate Techniques: Dependence Techniques and Interdependence Techniques – Guidelines for Multivariate Analysis and Interpretation - Application of Multivariate Techniques in different disciplines.

UNIT-IIIFactor Analysis:Meanings, Objectives and Assumptions - Designing a factor analysis - Deriving factors - Assessing overall factors – Partitioning the variance of a variable (common variance, specific variance, error variance) – Criteria for the number of factors to extract - Interpreting the factors – Choosing the Factor Rotation Methods – Interpreting a factor matrix - Validation of Factor Analysis.

UNIT-IVCluster Analysis : Meanings, Objectives and Assumptions – Forming clusters – Determination of number of clusters – Meaning heterogeneity – Measuring Similarity (Correlation Measures, Distance Measures, Association Measures) - Hierarchical cluster procedure – Clustering algorithms – Non-Hierarchical clustering procedure - Interpretation of clusters - Validation and profiling of the clusters.

UNIT-V Multiple Regression Analysis: Meanings, Objectives and assumptions– Selection of Dependent and Independent variables– Interpreting the Simple Regression Model– Multiple Regression Equation– Prediction with multiple regression– Representing linear effects with polynomials– Estimating the regression model and assessing overall fit

Basics of Forecasting : Basics of Forecasting - Basic steps in forecasting task – Time series and cross sectional Data – The forecasting Scenario: Analyzing methods – Exponential Smoothing Methods – Single Exponential Smoothing – Holt's linear method – Holt-winter's trend – Seasonality method – A comparison of methods.

REFERENCE BOOKS:

1. Joseph F. Hair, William C. Black, Barry J. Babin, Rolph E. Anderson and Ronald L. Tatham. "*Multivariate Data Analysis*", 6th Edition, Pearson Education, Inc., New Delhi, 2006.
2. Spyros Makridakis, Steven C. Wheelwright and Rob J. Hyndman, "*Forecasting methods and Applications*", Third Edition, John Wiley & Sons Inc., New York, 2005.
3. Rummel R.J., "*Applied Factor Analysis*", Evanston, First Edition, North Western, Western University Press, Illinois, USA, 1970.
4. Johnson, R.A., and Wichern, D.W. ; "*Applied Multivariate Statistical Analysis*", 5th Edition, Prentice Hall, Upper Saddle Rier, New Jersey, USA, 2002.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1564	Cyber Crime and Laws	4	1	0	5	4

INSTRUCTIONAL OBJECTIVES

At the end of this course the learner is expected:

- To understand Cyber crime categories and jurisdiction
- To list cyber crime codification in India
- To analyse IP issues
- To demonstrate Cyber Attacks and Information Theft

UNIT-I Information Age and Cyber Crime: Cyber Space - Relationship between Computers Crime and Law - Brief Historical Perspective of Criminal Law - Classification of Crimes - Criminal Responsibility - Theories of Aetiology of Crime - Theories and objectives of Punishment - The Organized Crime - The "White-Collar" Crime - Cyber Crime - Cyber Crime : Definition of "Computer Crime" - Computer Crime categories - Types of Computer Crimes -Classification of Computer Crime - Crime on Web - Indian Scenario - Cyber Jurisdiction - Definition of Cyber Jurisdiction - Model for Jurisdictional Analysis

UNIT-IICyber Crime and Criminal Codification in India : Indian Penal Code : I to III - Indian Penal Code : IV to VI - Indian Penal Code : VII to IX - Indian Penal Code : X to XII - Indian Penal Code : XIII to XV - Indian Penal Code : XVI to XVIII - Protection of Intellectual Property –I – Patents - Indian Patent Law - Trade Marks – Databases

UNIT-IIIProtection of Intellectual Property – II:Copyrights - Digital Signature - Working of Digital Technology - Privacy Issues in the Information Age - Privacy and Surveillance - Privacy: Meaning - Legal Perspective and Framework - Kind and Pattern Intrusions Motive - Methods of Attack - Topology of Intruders - Global Differences - Future Issues

UNIT-IVCommunication Network as Surveillance Tool : The Web – Intelligence- Tool – Espionage - The Interlude - Data and Information Processing - The operations - The Tradecraft - The armament - Economic Intelligence and Attacks - Web or Net Crimes - Information Warfare - Hackers Psychology and Laws Related To Hacking - Genesis of the term Hacker - Theories of Delinquency

UNIT-VIdentity and Information Theft :Identity Theft case Files - Avoid being an Easy Target - Cyber Fraud and Electronic Misuse - Definition of Computer Fraud or cyber Fraud - Characteristics Cyber Fraud Offence - How the Victims and Cyber Fraud are Deceived? - The legal Issues - Fraud-Related Offenses - Protection of Cyber Crimes - Encryption in Crime and Terrorism - Law Enforcement Options - Other Technologies for Hiding Evidence - Concealing Crimes through Anonymity

REFERENCE BOOKS:

1. Prof.ParagDiwan, Dr.R.K.Suri and Dr.SanjayKaushik, "Cyber Crime (Volume : 11,IT Encyclopaedia.com)", Pentagon Press, New Delhi, 4th Edition , 2003.
2. Johnson, Thomas A., "Forensic Computer Crime Investigation Boca Raton-Fla": CRC –Press, New York, 2006.

Course Code	Course Name	L	T	P	Total LTP	C
MCA1565	Project Work	0	2	18	20	12

INSTRUCTIONAL OBJECTIVES:

At the end of this course the learner is expected:

- to develop Software Products / Applications on emerging technologies
- adopt the software development life cycle.
- Improve presentation skills