KUVEMPU UNIVERSITY

Department of P.G. Studies and Research in Computer Science,

Kuvempu University, Jnana Sahyadri, Shankaraghatta-577451

CBCS SYLLABUS

FOR

MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. Academic year 2020-21)

KUVEMPU UNIVERSITY

SYLLABUS AND SCHEMNE OF EXAMINATION FOR MCA COURSE

FIRST SEMESTER

	PAPER CODE	TITLE OF THE PAPER	HRS/ WEEK	TH/PR	IA	TOTAL	CREDITS
HARD CORE	MCA 1.1	COMPUTER ORGANIZATION AND ARCHITECTURE	04	75	25	100	04
	MCA 1.2	C PROGRAMMING	04	75	25	100	04
	MCA 1.3	DATABASE MANAGEMENT SYSTEM	04	75	25	100	04
SOFT CORE	MCA 1.4	DATACOMMUNICATIONS	04	75	25	100	03
	MCA 1.5	APPLIED MATHEMATICS	04	75	25	100	03
LAB	MCA 1.6	C PROGRAMMING LAB	03/Batch	50	-	50	02
	MCA 1.7	DBMS LAB	03/Batch	50	-	50	02
		TOTAL				**600**	**22**

SECOND SEMESTER

	PAPER CODE	TITLE OF THE PAPER	HRS/ WEEK	TH/PR	IA	TOTAL	CREDITS
HARD CORE	MCA 2.1	COMPUTER NETWORKS	04	75	25	100	04
	MCA 2.2	OPERTAING SYSTEM	04	75	25	100	04
	MCA 2.3	DATA STRUCTURES	04	75	25	100	04
SOFT CORE	MCA 2.4	COMPUTER GRAPHICS	04	75	25	100	03
	MCA 2.5	SOFTWARE ENGINEERING	04	75	25	100	03
LAB	MCA 2.6	DATA STRUCTURES LAB	03/Batch	50	-	50	02
	MCA 2.7	COMPUTER GRAPHICS LAB	03/Batch	50	-	50	02
	MCA 2.8	INFORMATION COMMUNICATION TECHNOLOGY(ICT)	04	40	10	50	02
		TOTAL				**650**	**24**

THIRD SEMESTER

	PAPER CODE	TITLE OF THE PAPER	HRS/ WEEK	TH/PR	IA	TOTAL	CREDITS
HARD CORE	MCA 3.1	WIRELESS COMMUNIATIONS	04	75	25	100	04
	MCA 3.2	ANALYSIS AND DESIGN OF ALGORITHMS	04	75	25	100	04
	MCA 3.3	WEB PROGRAMMING USING J2EE	04	75	25	100	04
SOFT CORE	MCA 3.4	THEORY OF COMPUTATION	04	75	25	100	03
	MCA 3.5	DIGITAL IMAGE PROCESSING	04	75	25	100	03
LAB	MCA 3.6	ALGORITHMS LAB	03/Batch	50	-	50	02
	MCA 3.7	IMAGE PROCESSING LAB	03/Batch	50	-	50	02
	MCA 3.8	CYBER SECURITY	04	40	10	50	02
		TOTAL				**650**	**24**

FOURTH SEMESTER

	PAPER CODE	TITLE OF THE PAPER	HRS/ WEEK	TH/PR	IA	TOTAL	CREDITS
HARD CORE	MCA 4.1	DATA SCIENCE	04	75	25	100	04
	MCA 4.2	PYTHON PROGRAMMING	04	75	25	100	04
	MCA 4.3	PHP PROGRAMMING	04	75	25	100	04
SOFT CORE	MCA 4.4	CLOUD COMPUTING	04	75	25	100	03
	MCA 4.5	NETWORK SECURITY & CRYPTOGRAPHY	04	75	25	100	03
LAB	MCA 4.6	PHP PROGRAMMING LAB	03/Batch	50	-	50	02
	MCA 4.7	J2EE LAB	03/Batch	50	-	50	02
		TOTAL				**600**	**22**

FIFTH SEMESTER

	PAPER CODE	TITLE OF THE PAPER	HRS/ WEEK	TH/PR	IA	TOTAL	CREDITS
HARD CORE	MCA 5.1	SOFTWARE TESTING AND QUALITY ASSURANCE	04	75	25	100	04
	MCA 5.2	MULTIMEDIA COMMUNICATIONS	04	75	25	100	04
	MCA 5.3	DOT NET PROGRAMMING	04	75	25	100	04
LAB	MCA 5.4	DOT NET LAB	03/Batch	50	-	50	02
	MCA 5.5	MINI PROJECT	03/Batch	75	25	100	06
		TOTAL				**450**	**20**

SIXTH SEMESTER

	PAPER CODE	TITLE OF THE PAPER	HRS/ WEEK	TH/PR	IA	TOTAL	CREDITS
HARD CORE	MCA 6.1	ARTIFICIAL INTELLLIGENCE	04	75	25	100	04
	MCA 6.2	MACHINE LEARNING	04	75	25	100	04
	MCA 6.3	PROJECT WORK	03/Batch	150	50	200	10
		TOTAL				**400**	**18**

TOTAL MARKS AND CREDITS

Sl. No.	SEMESTER	MARKS	CREDITS
1.	FIRST SEMESTER	600	22
2.	SECOND SEMESTER	650	24
3.	THIRD SEMESTER	650	24
4.	FOURTH SEMESTER	600	22
5.	FIFTH SEMESTER	450	20
6.	SIXTH SEMESTER	400	18
	GRAND TOTAL	**3350**	**124**

QUESTION PAPER PATTERN

1. Each main question may consist of 2 or 3 sub questions.
2. Student should answer 05 main questions
3. Each main question carries 15 marks for regular papers. (15 x 5 = 75)
4. For open elective question paper, each question carries 08 marks (8 x 5 = 40)

1.	a)
	b)
2.	a)
	b)
3.	a)
	b)
4.	a)
	b)
5.	a)
	b)
6.	a)
	b)
7.	a)
	b)
8.	a)
	b)

MCA 1.1: COMPUTER ORGANIZATION AND ARCHITECTURE
(Max Marks: 75 + 25, Credits: 4)

Unit 1
Basic Structure of Computers: Computer Types, Functional units, Basic Operational Concepts, Bus Structures, Performance, Multiprocessors and Multi-computers. Machine Instructions: Memory Locations and Addresses, Memory Operations, Instruction and Instruction Sequencing, Addressing Modes, Assembly Language.

Unit 2
Number Systems and Boolean algebra: Number Systems, Character Codes, Axiomatic definition of Boolean algebra, Basic Theorems and Properties, Boolean Functions, Canonical and Standard Forms, Logic Functions using Gates and Design of Combinational Circuits, K-map, POS, SOP Simplification.

Unit 3
Combinational & Sequential Logic Circuit: Adders, Subtractors, Code Converters, Decoder Multiplexer, Flip-flops, Types of flip-flops, Registers, Shift Registers, Counters.

Unit 4
Input/output and Memory Unit: Accessing I/O Devices, Interrupts, Direct Memory Access, Buses, Interface Circuits, The memory system: Basic Concepts, Semiconductor RAM memories, Read-only Memories, Cache memories, Virtual Memories.

Unit 5
Arithmetic & Processing Unit: Addition and subtraction of signed numbers, Design of fast adders, Multiplication of positive numbers, Signed operand multiplication, Fast multiplication. Execution of complete instruction, Multiple-bus organization, Hardwired Control and Micro Programmed Control; Embedded systems - Embedded systems, Processor chips for embedded application, A simple microcontroller.

References:
1. Computer Organization : Carl Hamacher, ZvonkoVranesic and SafwatZakyMcgraw Hill, Chapters
2. Digital Logic and computer design Morris Mano, M.
3. Computer Architecture and Organization : Hayes, J.P
4. Introduction to Microprocessors :Gaonkar

MCA 1.2: C PROGRAMMING
(Max Marks: 75 + 25, Credits: 4)

Unit 1
Introduction: Algorithms, Flow Charts, C Structure, C Character Set, Identifiers & Keywords Variables, Data Types, Constants, Declarations, Operators and Expressions: Arithmetic operators, Unary operators, Relational and Logical operators, Assignment operators, Conditional operators, Library functions, Precedence, Associativity, Order of evaluation, Type conversion.

Unit 2
Program Structure: Storage Classes, Automatic Variables, Global Variables, Static Variables. Input And Output Statements :scanf, getchar, gets, printf, putchar, puts; Branching, Looping, Nested control structures, switch, break, continue statements, comma operator, goto statement.

Unit 3
Defining an Array, Processing an Array, Passing Arrays to Functions, Multidimensional Arrays, Strings: String Variables, Declaring & Initializing String Variables, Reading & Writing Strings, String Functions – Concatenation, Comparison, Copy, Length, Implementing the above functions without using built-in String Functions, Arithmetic Operations on Characters.

Unit 4
Functions: Fundamentals, Declaration, Categories of Functions, Call by value, Pointers, Pointer Arithmetic, Pointer Expression, Call by reference, Pointers and Arrays, Passing Functions to other Functions, Recursion, Passing Arrays to Functions, Passing Strings to Functions, Functions Returning Pointers. Preprocessor – Definition, Macro Substitution, File Inclusion, Compiler Control Directives.

Unit 5
Structures and Unions: Defining a Structure, Processing a Structure, User Defined Data Types (typedef), Structures and Pointers, Passing Structures to Functions, Self-referential Structures, Unions. Files – Defining, Opening, Closing, Input and Output Operations, Error Handling, Random Access; Command Line Arguments; Dynamic Memory Allocation –Definition, Malloc, Calloc, Realloc, Free, Dynamic Arrays.

References

1. Let us C, YashwantKanetkar, BPB Publications
2. Programming with C, Balaguruswamy
3. The C Programming Language, Brian W Kernighan, Dennis M Rtchie, PHI, 2nd Edition

MCA 1.3: DATABASE MANAGEMENT SYSTEMS
(Max Marks: 75 + 25, Credits: 4)

Unit 1

Databases and Database Users: Introduction , An example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS. Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client-Server Architectures, Classification of Database Management Systems.

Unit2

Data Modeling Using Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design Company Database Diagrams, Naming Conventions and Design Issues, Specialization and Generalization.

Unit3

Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from SET Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra.

Unit 4

SQL : SQL Data Definition and Data Types, Specifying Constraints in SQL,Schema Change Statements in SQL,Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL,Specifying Constraints as Assertion and Trigger, Views(Virtual Tables) in SQL,EmbeddedSQL,Dynamic SQL. PL/SQL: Introduction, Language Fundamentals, Conditional and Sequential Control, Iterative Processing and Loops, Exception Handlers, Triggers, Functions, Procedures, Creating and Planning PL/SQL.

Unit 5

Database Design: Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form. Transaction Management: The ACID Properties, Transactions and Schedules; Concurrent Execution of Transactions, Lock Based Concurrency Control, Performance of Locking, Transaction Support in SQL, Introduction to Crash Recovery.

References

1. Database System concepts : Silberchatz-korth-sudarshan
2. Fundamentals of Database systems : Elmasrinavathe
3. Database Management Systems :Raghu Ramakrishnan and Johannes Gehrke: , 3rd Edition, McGraw-Hill, 2003

MCA 1.4: DATA COMMUNICATIONS
(Max Marks: 75 + 25, Credits: 3)

Unit 1

Introduction: Data Communications, Data Representation, Direction of data flow, Networks, Physical Structures, Physical topology, Categories of networks, Protocol and Standards; Signals Analog and Digital : Analog Signals, Period and Frequency, Phase, Time and Frequency domain, Composite Signals, Frequency Spectrum, Band width, Digital Signals, Analog verses Digital, Data Rate limits, Transmission impairments.

Unit 2

Digital Transmission: Line coding, Uni-polar Polar, Bipolar, Block Coding Steps in transmission, Sampling, Pulse Amplitude Modulation (PAM).Transmission mode: Parallel, Serial; Analog Transmission: Modulation of digital data, ASK, FSK, PSK, QAM, Modulation of analog Signals, AM, FM, PM.

Unit 3

Multiplexing: FDM, WDM, and TDM; Transmission Media: Guided Media, Unguided Media. Circuit Switching and Telephone Network: Circuit Switching, Space Division Switch, Time-Division Switch, Telephone networks.

Unit 4

Error detection and Correction: Types of errors, Error Detection: Parity check, CRC, Error correction. Data Link Control and Protocols: Flow and error control, Stop and wait ARQ, GO-BACK-N ARQ, HDLC, and PPP.

Unit 5

Multiple Accesses: Random Access, Multiple Access, CSMA, CSMA/CD, CSMA/CA, Channelization. Cellular Telephone and Satellite Networks : Cellular Telephony, First Generation, Second Generation, GSM, Satellite Networks, Orbits, Foot print, GEO, MEO, LEO.

References:

1. Data Communications & Networking : Forouzan
2. Understanding Local area Network : Neil Jenkins
3. Computer Networks :Tanenbaum, Andrew S, Prentice Hall of India,

MCA 1.5: APPLIED MATHEMATICS
(Max Marks: 75 + 25, Credits: 3)

Unit 1

Permutations and Combinations: Principle of counting, permutation as an arrangement and combination as selection, Meaning of P (n,r) and C (n,r), simple applications. Matrix Algebra: Definition, Types of matrix, Transpose of matrix, Determinants, Properties of determinants, Co-factor matrix, Adjoint matrix, Inverse of matrix, Singular and Non-singular matrix.

Unit 2

Limits and Continuity: Limits: Definition and examples, Theorems of limit. Continuity: Continuous and Discontinuous functions. Differentiation: Rules of differentiation, Maxima and Minima functions of two variables, Applications of Maxima and Minima functions, Difference equations.

Unit 3

The Solution of a System of Equations: The solution of a system of equations using Matrix inversion method, Gauss elimination method, Gauss Jordan method, Triangularisation method/Choleskey method, LU-Decomposition method.

Unit 4

Probability Distributions: Introduction, Sample Space, Events, Algebra of Events, Types of Events, Probability Axioms, Conditional Probability, Discrete and Continuous variables, Probability Distribution, Discrete Probability Distributions: Binomial Distributions, Examples on Binomial Distributions, Poisson Distribution, Normal Distribution.

Unit 5:

Statistics: Introduction, Measures of Dispersion, Central Tendency, Calculation of Mean, Median, Mode and Standard Deviation of grouped and ungrouped data. Computation of Correlation Coefficients, Rank Correlation, Variance, Covariances

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References:

1 Permutation and Combinations : Ramesh Chandra
2 Mathematical Analysis : J.E. Weber
3 Probability And Statistics, Murray R. Spiegel, John Schiller & R. Alu Srinivasan, 2nd Edition
4 Linear Algebra And Its Applicatins : Gilbert Strang
5 Elemtary Linear Algebra : Stanley I. Grossman

MCA 1.6: C PROGRAMMING LAB

MCA 1.7: DBMS LAB

MCA 2.1: COMPUTER NETWORKS
(Max Marks: 75 + 25, Credits: 4)

Unit 1:
Introduction to Computer Networks: Networking Devices, Classification of Computer Networks, Layered tasks, OSI Reference Model, TCP/IP Protocol, Addressing. SONET / SDH: Architecture; SONET layers; SONET frames; STS multiplexing; SONET networks; Virtual tributaries.

Unit 2:
Frame Relay and ATM: Frame relay; ATM and ATM LANs. Network Layer: Introduction, Logical Addressing, IPv4 Addresses, IPv6 Addresses, Internetworking basics, IPv4, IPv6, Comparison of IPv4 and IPv6 Headers, ARP, ICMP, IGMP.

Unit 3:
Introduction to Routing: Forwarding, Routing Table, Unicast Routing Protocols, Distance Vector Routing, Link State Routing, Path Vector Routing, Multicast Routing Protocols.

Unit 4:
Transport Layer: Process-to-Process Delivery, Client-Server Architecture, UDP, TCP, SCTP, Congestion Control, QoS.

Unit 5:
World Wide Web(WWW) : URL , Domain Name Space, TELNET, E-mail, SMTP, POP, IMAP, FTP, HTTP

References:

1.Behrouz A. Forouzan: Data Communications and Networking, 4th Edition, Tata McGraw-Hill.
2.William Stallings: Data and Computer Communication, 8th Edition, Pearson Education.

MCA 2.2 : OPERATING SYSTEM
(Max Marks : 75 + 25, Credits : 4)

Unit 1
Operating System Introduction: Operating System, Types of Operating Systems, System Components, Operating System Services, Process Management: Process, Process Control Block, Process Scheduling, Scheduler, Operations on Processes, Inter Process Communication.

Unit 2
Threads: Threads concepts, Multithreading Models, Threading issues. CPU Scheduling: Basic Concepts, CPU-I/O Burst Cycle, Preemptive Scheduling, Scheduling Criteria, and Scheduling Algorithms.

Unit 3
Process Synchronization: Background, The Critical-Section problem, Two-Process Solution, Semaphores, Deadlocks: System Models, Deadlock Characterization, Resource-Allocation graph, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection.

Unit 4
Memory Management: Background, Logical v/s Physical-Address Span, Overlays, Swapping, Memory Protection, Memory allocation Fragmentation Paging, Segmentation, Virtual Memory: Background, Demand Paging, Page Replacement, Page Replacement algorithms.

Unit 5
Mass-Storage Structure: Disk Structure, Disk Scheduling, Disk Attachment, Disk Management, Swap-space Management Protection and Security: Goals of Protection, Domain of Protection, Access Matrix.

References:

1. Operating System Concepts: Silberschatz, Galvin, Gagne

MCA 2.3: DATA STRUCTURES
(Max Marks : 75 + 25, Credits : 4)

Unit 1

Introduction**:** Structures and Problem Solving, Data Structures, arithmetic Operations and Expressions, Strings and String, Operations, Relations and Relational Operations, Logical Operations and Expressions. Linear Data Structures**:** Concepts and Terminology, Storage Structures for arrays.

Unit 2

Stacks**:** Definition and concepts, Operations on Stacks, Applications of Stacks**:** Recursion - Factorial of n, Fibonacci Sequence, Binary Search, The tower of Hanoi Problem, Evaluation of Postfix expression, Conversion from infix to postfix, infix to prefix expressions.

Unit 3

Queues**:** Definition and concepts, Operations on Queues, Types of Queues: Ordinary queues, Double Ended Queues, Circular Queue, Priority Queues. Linked Lists**:** Definition and concepts, Operations on Linked Lists, Singly Linked Linear Lists, Circular singly Linked Linear Lists, Doubly Linked Linear Lists, Applications of Linked Linear Lists**:** Polynomial Manipulation, Linked Dictionary.

Unit 4

Non Linear Data Structures: Trees**:** Definition and concepts, Operations on Binary Trees, Tree Traversal, Applications of Trees, Sparse Matrices, Graphs and their representation**:** Matrix representation of Graphs, Breadth First Search and Depth First Search, Introduction to AVL Tree, Red-Black Tree, Threaded binary trees.

Unit 5

Bubble sort, Quick sort, Selection sort, Insertion Sorts, Shell Sort, Radix Sort. Searching: Basic Search Techniques, Sequential searching, Binary search, Interpolation search, Hashing : Resolving hash clashes by open addressing, Choosing a hash Function.

References:

1. An Introduction to Data Structures with Applications : Trembley and Paul G.Sorenson
2. Data Structures Using C and C++ : Y Langsam, M.J Augenstein and A.M. Tenenbaum,
3. Systematic Approach to Data Structures : A Padma Reddy

MCA 2.4: COMPUTER GRAPHICS
(Max Marks : 75 + 25, Credits :3)

Unit 1

Graphics Output Primitives and Attributes : Coordinate reference frames, Specifying two dimensional world coordinate reference, Video Display Devices(CRT), Raster Scan Display, Random Scan Display, Color CRT Monitors, LED, Flat Panel Displays, Line drawing algorithms: DDA algorithm, Bresenham's Line Algorithm, Midpoint Circle Algorithm..

Unit 2

Two Dimensional and Three Dimensional Geometric Transformations : Basic two dimensional geometric transformations, Matrix representations and homogeneous coordinates, Inverse transformations, Two dimensional composite transformations, Other two dimensional transformations, Three dimensional Translation, Rotation, Scaling, Other three dimensional transformations, Affine transformations.

Unit 3

Two Dimensional Viewing : The two dimensional viewing, Clipping window, Normalization and viewport transformations, Clipping algorithms, Two dimensional point clipping: Cohen Sutherland line clipping, Polygon Clipping Sutherland- Hodgeman polygon Clipping, Two dimensional line clipping algorithms, Polygon fill area clipping, Curve clipping.

Unit 4

Three Dimensional Viewing : The three dimensional viewing concepts, Three dimensional viewing pipeline, Three dimensional viewing coordinate parameters, Transformation from world to viewing coordinates, Projection transformations, Orthogonal projections, Oblique parallel projections, Perspective projections, The viewport transformation and three dimensional screen coordinates.

Unit 5

Visible- Surface Detection Method: Back face detection, Depth Buffer Method, A-Buffer Method, Scan-Line Method, Depth-Sorting Method, BSP-Tree Method, Area-Subdivision Method, Octree Methods, Ray-Casting Method.

References:

1. Donald Hearn, M.Pauline Baker, Computer Graphics with Open GL, Pearson (Indian Edition), 3rd Edition.
2. Edward Angel, 'Interactive Computer Graphics' – A top down approach using Open GL, Pearson, 5th Edition
3. Peter Shirley, Steve Marschner, 'Computer Graphics, Cengage Learning (Indian edition), 2009.

MCA 2.5: SOFTWARE ENGINEERING
(Max Marks : 75 + 25, Credits :3)

Unit 1

Introduction: The Software Problem, Software Engineering Problem, Software Engineering approach, SOFTWARE PROCESSS: Software Process, Characteristics of a Software Process, Software Development Process models: waterfall model, spiral model, iterative enhancement model, prototyping process model, CMM Model

Unit 2

Software requirements analysis and specification: Software Requirements, Problem Analysis, Requirements Specification, Validation. SOFTWARE ARCHITECTURE: Role, Architecture views, Architecture styles for C&C view

Unit 3

Planning: Cost Estimation, COCOMO Model, Project Scheduling, Staffing and Personnel Planning, Software configuration management plans, Quality Assurance Plans, Project Monitoring Plans, Risk Management.

Unit 4

Design: Function oriented design: Design principles, Module level concepts, Design notation and Specification, Structured design methodology Detailed design: Module specifications, Detailed Design and PDL, Verification.

Unit 5

Coding: Programming Principles and guidelines, coding process, Refactoring, Verification, Testing: Testing Fundamentals, Black box testing, White box testing, Testing Process. Defect analysis and prevention

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References:

1. Ian Sommerville : Software Engineering, 9th edition, Person Education Ltd, 2011.
2. Pankaj Jalote: Software Engineering, Third edition Wiley India Pvt
3. Roger S Pressman: Software Engineering-A Practitioners approach, 6th edition, McGraw-Hill, 2010
4. Hans Van Vliet: Software Engineering Principles and Practices, 3rd Edition, Wiley India, 2010

MCA 2.6: DATA STRUCTURES LAB

MCA 2.7: COMPUTER GRAPHICS LAB

MCA 2.8 : INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)
(Max Marks : 40+10, Credits :2)

Unit 1
Introduction: Early history of computing. Generations of Computer, Characteristics of computers, Classification of computers, Basic components and organization of a computer, Representation of information in a computer, Concept of programming and programming languages, Language translation.

Unit 2
Application software: Basic features of application software, word processing, spreadsheets, Database Management system, Power point, Software suites, etc. Operating system and its functions, The need for an operating system, Types of operating systems, The features of the MS-DOS/Windows XP operating system, Linux, Utility programs, Utility packages.

Unit 3
Peripherals: Input devices and its functions, Output devices and its functions, Processing and memory hardware, Secondary Storage and Communication Devices.

Unit 4
Internet Security: Virus, Worms, Trojans and Anti-Virus Software, Spyware, Malware, Spams, Internet and Its Applications, Basics of Information Security, Need of the Information Security, Challenges to Information Security, Benefits.

Unit 5
Web Services: World Wide Web, Web servers, Web sites, Web Pages, Web Browsers, Blogs, Chat, email, Video Conferencing, e-Learning, e-Banking, e-Shopping, e-Reservation, Social Networking. Social issues: Ethics and standards in computing, copyright, Intellectual property right, piracy, etc.

References

1. Computer fundamentals by Pradeep k. sinha, Pritisinha
2. Encyclopedia of Information Communication Technology by Antonio CartelliandMarco Palma
3. ICT literacy by Ilene F. Rockman
4. Information And Communication Technology by Kiran PrasadEthical and social issues in the information age by Joseph MiggaKizza

MCS 3.1 : WIRELESS COMMUNICATION
(Max Marks: 75 + 25, Credits: 4)

Unit 1

Mobile computing: introduction, network types, middleware gateways, application and services, Multiple access procedures, Mobile Computing Architecture: Characteristics and functions of Mobile Computing, Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing,

Unit 2

Wireless Networks – 1: GSM and SMS : Global Systems for Mobile Communication (GSM and Short Service Messages (SMS): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Introduction to SMS, SMS Architecture, SM MT, SM MO, SMS as Information bearer, applications

Unit 3

Wireless Networks – 2: GPRS : GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRS

Wireless Networks – 3: CDMA, 3G : Spread Spectrum technology, IS-95, CDMA versus GSM, Wireless Data, Third Generation Networks, Applications on 3G,

Unit 4

Introduction to WiMAX, Mobile Client: Moving beyond desktop, Mobile handset overview, Mobile phones and their features, PDA, Design Constraints in applications for handheld devices. Mobile IP: Introduction, discovery, Registration, Tunneling, Cellular IP, Mobile IP with IPv6.

Unit 5

Mobile OS and Computing Environment: Smart Client Architecture, Data Synchronization, Mobile Operating Systems: WinCE, Palm OS, Symbian OS, Linux, Proprietary OS Client Development, Device Emulators, Wireless Applications Protocol (WAP), Wireless Languages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, Voice XML

References:

1. Dr. Ashok Talukder, Ms Roopa Yavagal, Mr. Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2d Edition, Tata McGraw Hill, 2010.
2. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley, 2003.
3. Raj kamal: Mobile Computing, Oxford University Press, 2007.

MCA 3.2 ANALYSIS AND DESIGN OF ALGORITHMS
(Max Marks: 75 + 25, Credits: 4)

Unit 1
Notion of algorithm, Fundamentals of algorithmic problem solving, linear data structures, graphs, trees, sets and dictionaries. Analysis of algorithm efficiency: Analysis frame-work, asymptotic notations and basic efficiency classes, mathematical analysis of non recursive and recursive algorithms, empirical analysis of algorithms.

Unit 2
Brute Force and Divide and Conquer- General method, Binary Search, Finding the maximum and minimum, merge sort, quick sort, Strassen's matrix multiplication, Decrease-and-Conquer and Transform-and-Conquer: Insertion sort, depth first search, topological sorting, presorting, Gaussian elimination, balanced search trees, heap sort, Horner's rule.

Unit 3
Greedy Method: General method, optimal storage on tapes, knapsack problem, job sequencing, Minimum Cost Spanning Trees- Prims's algorithm and Kruskal's algorithm, optimal storage on tapes, optimal merge patterns, single source shortest paths, Huffman trees.

Unit 4
Dynamic Programming: General method, principle of optimality, multistage graphs, all pairs shortest paths, 0/1 knapsack, traveling salesman problem, Warshall's and Floyd's algorithms.

Unit 5
Backtracking: General method, 8-queen problem, sum of subsets, Hamiltonian cycles, traveling salesman problem, Branch and Bound: Introduction FIFO solution , LC branch and bound, Rat in maze, TSP, Np completeness and approximation algorithm : Introduction, polynomial time, NP completeness and reducibility, approximation of algorithms.

References:

1 Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahani, Sanguthevar Rajashekaran

2 Fundamentals of Computer Algorithms: Horowitz, E. and Sahani, S

3 The Design and Analysis of Computer Algorithms : Aho A.V., Hopcroft, J.E. and Ullaman 4 Computer Algorithms – An Introduction to Design and Analysis Sara Baase.

MCA 3.3: WEB PROGRAMMING USING J2EE
(Max Marks : 75 + 25, Credits : 4)

Unit 1
J2EE Overview : J2EE Architecture, Introduction to J2EE Components, Containers and Connectors, J2EE Modules (Web App, EJB JAR, App Client), Structure of J2EE Application (Enterprise Archive), Packaging and Deploying J2EE Applications.

Unit 2
Java Servlet API : Java Servlets, Servlet as an improved CGI, Servlet Fundamentals/API, Generic Servlet & HTTP Servlet, Responding to HTTP, POST/GET, Interacting with internet, Storing User data, Developing and Deploying Servlets, State Management using Cookies, Session and Application, Processing Form Data- Servlet Chaining.

Unit 3
Jsp Servlet API - JSP (Java Server Pages), JSP Overview, JSP Architecture, Basics & Syntax, JSP Directive, Tags, JSP Scriptlet Tags, JSP Action Tags, Using Java Beans from JSP, JSP Tag Library.

Unit 4
Web Servers & Application Servers - Tomcat Server, Introduction to Web & Application Servers, Architecture, Deploying Procedures, Server Configuration and development, JSF (Java Server Faces), MVC Overview, EJB (Enterprise Java Beans).

Unit 5
Introduction to EJB - Introduction to Server-Side Components, EJB Architecture, Types of EJB, EJB Container Services, Session Beans, Entity Beans. Introduction to XML.

References:

1. Ed Roman, Scott Ambler, Tyler Jewell, Second Edition; Mastering Enterprise Java Beans
2. Ajax, the Complete Reference Tata McGraw Hill Publishing, 2008.

MCA 3.4: **THEORY OF COMPUTATION**
(Max Marks : 75 + 25, Credits : 3)

Unit 1:

Introduction: Alphabets, Strings, Languages, Grammars, Finite Automata, State transition graph, Transition table, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NDFA), Finite Automata with ε - moves, Equivalence of NFA and DFA, Minimization of Finite Automata, Moore and Mealy machines, Applications of Finite Automata.

Unit 2

Regular Expressions: Definition, Operators of Regular Expressions and their precedence, Algebraic laws for Regular Expressions, Regular Expressions to Finite Automata, Finite Automata to Regular Expressions, Applications of Regular Expressions, Regular Languages, Pumping Lemma for Regular Languages, Non-Regular Languages.

Unit 3

Grammars: Types of Grammars, Context Free Grammars (CFG) and Context Free Languages (CFL), Derivation, Derivation Trees, Ambiguity in Grammars, Useless Symbols, Simplification of CFGs, Normal forms for CFGs, Greiback Normal Form (GNF), Chomsky Normal Form (CNF), Problems related to CNF and GNF.

Unit 4

Pushdown Automata (PDA): Definition, Instantaneous Descriptions, Acceptance by Final State, Acceptance by empty Stack, Deterministic Pushdown Automata (DPDA), Non-Deterministic Pushdown Automata (NPDA), Equivalence of Pushdown Automata and CFG, CFG to PDA, PDA to CFG, Two Stack PDA.

Unit 5

Turing Machines (TM): Introduction, Definition and Representation, Instantaneous Description, Languages accepted by Turing Machine, Turing Machine as acceptors, Turing Machine as Computer of Integer Functions, Universal Turing Machines, Church's Thesis, Recursive and Recursively Enumerable Languages, Halting problem, Introduction to Undecidability, Post Correspondence Problem (PCP), Modified PCP.

References

1. Hopcroft, Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education.
2. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science: Automata, Languages and Computation", PHI.
3. P. K. Srimani and Nasir S.F.B., "A Textbook on Automata Theory", Foundations Books.
4. Martin J. C., "Introduction to Languages and Theory of Computations", TMH.

MCA 3.5 : DIGITAL IMAGE PROCESSING
(Max Marks : 75 + 25, Credits : 3)

Unit 1

Introduction: Origins of digital image processing, Electromagnetic spectrum, Applications, Components of image processing system, Image sensing and acquisition, Digitization, Sampling and Quantization. Basic relationships: Neighbors, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

Unit 2

Image Enhancement: Basic gray level transformations, histogram processing, enhancement using arithmetic/ logic operations, basics of spatial filtering, smoothing and sharpening spatial filters, Frequency domain: introduction to the Fourier transform and the Frequency domain, smoothing and sharpening frequency domain filters, Discrete Fourier transforms, Properties of DFT, FFT.

Unit 3

Image Restoration and Color image processing. A model of the image degradation/restoration process, noise models, Spatial Filtering- mean filters, order static filters, adaptive filters, Color models, pseudo color image processing, smoothing and sharpening.

Unit 4

Morphological image processing: introduction, structuring elements, dilation and erosion, opening and closing, Hit-or-Miss transformation, basic morphological algorithms.

Unit 5

Image segmentation : detection of discontinuities, edge linking and boundary detection, thresholding, Region based approach, segmentation by morphological watersheds.

References:

1. Digital Image Processing : Rafael C.Gonzaleze & Richard E. Woods
2. Digital Image Processing and Analysis : B. Chanda, D. Mutta Majumder
3. Digital Image Processing : Anil K Jain

MCA 3.6: ALGORITHMS LAB

MCA 3.7: IMAGE PROCESSING LAB

MCA 3.8: CYBER SECURITY
(Max Marks: 40+10, Credits: 2)

Unit 1

Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

Unit 2

Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control.

Unit 3

Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce-Electronic Payment System, e-Cash, Credit/Debit Cards. Digital Signature, public Key Cryptography.

Unit 4

Developing Secure Information Systems, Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control, CCTV and intrusion Detection Systems, Backup Security Measures.

Unit 5

Security Policies, WWW policies, Email Security policies, Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License.

References:

1. Charles P. Pfleeger, Shari LawerancePfleeger, “Analysing Computer Security ”, Pearson
2. Education India.
3. V.K. Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India.
4. Dr. Surya Prakash Tripathi, RitendraGoyal, Praveen kumar Shukla ,”Introduction to Information Security and Cyber Law” Willey Dreamtech Press.

MCS 4.1: DATA SCIENCE
(Max Marks: 75 + 25, Credits : 4)

Unit 1
Introduction to Data Science: Definition – Big Data and Data Science Hype – Why data science – Getting Past the Hype – The Current Landscape – Who is Data Scientist? - Data Science Process Overview – Defining goals – Retrieving data – Data preparation – Data exploration – Data modeling – Presentation.

Unit 2
Big Data : Problems when handling large data – General techniques for handling large data – Case study – Steps in big data – Distributing data storage and processing with Frameworks – Case study.

Unit 3
Deep Learning : Introduction – Deep Feedforward Networks – Regularization – Optimization of Deep Learning – Convolutional Networks – Recurrent and Recursive Nets – Applications of Deep Learning.

Unit 4
Data Visualization : Introduction to data visualization – Data visualization options – Filters – MapReduce – Dashboard development tools – Creating an interactive dashboard with dc.js-summary.

Unit 5
Ethics and Recent Trends : Data Science Ethics – Doing good data science – Owners of the data - Valuing different aspects of privacy - Getting informed consent - The Five Cs – Diversity – Inclusion – Future Trends.

References:

1. Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., 1st edition, 2016.
2. An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 1st edition, 2013.
3. Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press, 1st edition, 2016.
4. Ethics and Data Science, D J Patil, Hilary Mason, Mike Loukides, O' Reilly, 1st edition, 2018.

MCA 4.2 PYTHON PROGRAMMING
(Max Marks: 75 + 25, Credits: 4)

Unit 1
Introduction to Python : Introduction, what is python, Characteristics of python, Application of python, History of python, Python feature, Environment set up, Python syntax, Python comment, Python variable, Python data types, Python numbers, Python casting, Python Operators, Python Boolean, Python string, String method, Python list, List method, Python tuples, Python sets, Python dictionaries.

Unit 2
Python Decision making and looping : Python condition, if statements, elif, else, Indentations, Shorthand if, Shorthand if else, and, or, Nested if, pass statement, Python while loop, for loop, Looping through a string, Range function, else in for loop, Loop control statements.

Unit 3
Python Arrays, Functions and File Handling: Array- what is an array, Access the element of an array, Length of an array, looping array element, adding array elements, Removing array elements and array methods. Functions-Creating a function, calling a function, Parameters, Default parameter values, Passing a list as a parameter, Return values, Arbitrary arguments, The Pass statement and recursion, Function arguments, Anonymous function, Built in function, Regular expression, Python scope and Iterators. File Handling-Introduction, Syntax, open a file on the server, read only a part of the file, read lines, Closing a files, Raw input function, File object attributes.

Unit 4
Python classes, objects, modules and Inheritance : Create a class, create an object, accessing attributes, built in class attributes, Object method, self-parameter, modify object properties, Delete object properties, Pass statements. What is module, create a module, use a module, Variable in module, Naming and Renaming a module, built in module, using the dir function, Import from module.
Introduction to inheritance, create a parent class, create a child class, Use the super property, Add methods.

Unit 5
Mysql Database access and Networking : Introduction, what is Mysqldb, Database connection, creating database table, Insert operation, read operation, Update operation, Delete operation, performing transaction, Commit operation, rollback operation, Disconnecting database, Handling errors. Introduction to Network Programming, what is sockets, Socket module, Server socket methods, Client socket methods, A Simple server, Simple client, Python internet module.

References

1. Chun, J Wesley, Core Python Programming, Second Edition, Pearson, 2007 Reprint 2010
2. Barry, Paul, Head First Python, 2nd Edition, O Rielly, 2010
3. Lutz, Mark, Learning Python, 4th Edition, O Rielly, 2009

MCA 4.3 PHP PROGRAMMING
(Max Marks: 75 + 25, Credits: 4)

Unit 1
Introduction to PHP and Web technology : Introduction to web application, Web server, Client and Server, HTML, CSS, JavaScript. Introduction to php, Basic syntax, Defining variable and constants, Php data types, Operators and Expressions.

Unit 2
PHP Array, String and Function : Anatomy of an array, creating index based and associative array, accessing array element, looping with indexed based array, Some useful library function. Creating and accessing string, String handling function, Regular expression. What is function, defining a function, Recursive function, User defined function, System defined function, Date and Time, Hash function, Mail function.

Unit 3
Working with File, Directories, Image and Form: Understanding file and directory, Opening and Closing a file, Coping, Renaming and Deleting a file, Working with directories, File uploading and downloading, File inclusion include() and require(). Generating image with php- Creating image, manipulating image, using text in image and image uploading and saving. PHP Form handling, PHP GET, PHP POST, PHP Form Validation, PHP Form Sanitization.

Unit 4
Working with Mysql admin and Mysql function in PHP : Working with php my admin, Data Types, Creating Databases and Tables, adding fields, Selecting tables, Dropping Databases and Tables. Mysql Function in php:-Database connections, Managing Database connections, Performing Queries, Closing connections.

Unit 5
Php Sessions and Cookies : Session – Introduction, Start a php session, Session variables, Modify session, and Destroy session. Cookies – Introduction, Start a php cookies, Cookies variables, Modify cookies, Destroy cookies. Introduction to Object Oriented Programming, Using PEAR packages, Smarty template engine, Parsing XML.

References:

1 Programming PHP. RasmusLerdorf, Kevin Tatroe. (O'Reilly, ISBN 1565926102) 2. Learning PHP 5. David Sklar (O'Reilly, ISBN 0596005601)
3. Core PHP Programming. Leon Atkinson (Prentice Hall, ISBN 0130463469)

MCA 4.4 CLOUD COMPUTING
(Max Marks : 75 + 25, Credits : 3)

Unit 1
Introduction to Cloud Computing, why cloud computing used, Benefits and Characteristics of cloud computing, History of CC, Architecture of CC, working of CC, Basic concepts of CC, types of cloud with advantages and disadvantages, grid computing v/s CC, grid computing v/s utility computing.

Unit 2
Introduction to Virtualization and its types, how virtualization works in CC, Different Web Services used in Cloud: Communication-as-a-Service, Infrastructure-as-a-Service, Monitoring-as-a-Service, Platform-as-a-Service, Software-as-a-Service, advantages and disadvantages of web service models.

Unit 3
Federation in the Cloud, four levels of federation, Privacy and its Relation to Cloud-Based Information Systems, cloud security controls, Common Standards in the Cloud, End-User Access to the Cloud Computing.

Unit 4
Introduction, advancing towards a Utility Model, Evolving IT infrastructure and types of managed infrastructure, Continuum of Utilities and its different levels, Standards Bodies and Working Groups, Service Oriented Architecture, Business Process Execution Language, Interoperability Standards for Data Center Management, Utility Computing Technology, Virtualization, Hyper Threading, Blade Servers, Automated Provisioning, Data Center and its components.

Unit 5:
Software Utility Application Architecture, Characteristics of an SaaS, Software Utility Applications, types of attributes, Cost Versus Value, Software Application Services Framework, Common Enablers, Designing Multitenant Applications from a Database Perspective, implementing database systems for multitenant architecture.

References:

1. John W. Rittinghouse and james F. Ransome, “Cloud Computing Implementation, Management and Security”, 2010, CRC Press, Taylor & Francis Group, Boca Raton London New York. [Unit -I and Unit II]
2. Alfredo Mendoza, “Utility Computing Technologies, Standards, and Strategies”, Artech House INC, 2007. [Unit III to Unit V]
3. Cloud Computing “ A practical Approach” Anthony T. Velte,Toby J Velte, Robert Elsenpeter. McGraw-Hill.

MCA 4.5 : NETWORK SECURITY AND CRYPTOGRAPHY
(Max Marks : 75 + 25, Credits : 3)

Unit 1

Introduction : OSI Security Architecture, Security Attacks, Security Services, Security Mechanism, Model for Network Security. Classical Encryption Technique: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques.

Unit 2

Block Ciphers, Data Encryption Standard and Advanced Encryption Standard: Block Cipher Principles, The Data Encryption Standard, Block Cipher Design Principles and Modes of operation, Evaluation Criteria for AES, AES Cipher-Encryption and Decryption, Data Structure, Encryption Round.

Unit 3

Public Key Cryptography and Key Management: Principles of Public Key Cryptosystem, RSA algorithm, Key management, Diffie Hellman Key exchange Message Authentication and Hash Function: Authentication Requirement, Authentication Functions, Message Authentication Code, Hash Functions, Digital Signatures, Digital Signature Standard. Authentication Applications : Kerberos, X.509 Authentication Service.

Unit 4

Electronic Mail Security : Pretty Good Privacy (PGP), S/MIME; IP Security: IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating Security Payload; Combining Security Associations; Key Management.

Unit 5

Web Security : Web security Considerations; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET) System Security: Intruders, Intrusion Detection, Firewall Design Principles- Characteristics, Types of Firewall and Firewall Configuration.

References:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", 4th Edition, Pearson Education, 2009.

MCA 4.6: PHP PROGRAMMING LAB

MCA 4.7: J2EE LAB

MCA 5.1: SOFTWARE TESTING AND QUALITY ASSURANCE
(Max Marks : 75 + 25, Credits : 4)

Unit 1

Introduction to Software Testing: Introduction, Role of Testing, Verification and Validation, Failure, Error, Fault, and Defect, Objectives of Testing, Types of Testing, Testing Activities, Test Levels, Sources of Information for Test Case Selection, Test planning and design, Monitoring and Measuring Test Execution.

Unit 2

Software Quality Assurance and Reviews: Software Quality, Quality Assurance, Quality Control, Software Quality Assurance (SQA), Objectives of SQA Activities, McCall's Quality Factors. Reviews: Formal Technical Reviews, Walkthroughs, Inspections, Code Inspections, An Error Checklist for Inspection, Desk checking.

Unit 3

Software Quality Metrics and Standards: Classification of Software Quality metrics, Process metrics, Product metrics, Limitations of Software metrics, ISO 9126 Quality Characteristics, Quality Control, Quality Assurance, ISO 9000:2000 Software Quality Standard, CMM, Six Sigma.

Unit 4

Software Testing Strategies: Definition, Objectives, Software testing strategies, Software Test Classification, Unit Testing, Control Flow Testing, Data Flow Testing, System Integration Testing, White Box Testing, Basis Path Testing, Cyclomatic Complexity, Black Box Testing, Equivalence Class Partitioning, Boundary value Analysis.

Unit 5

Test Case Design: The testing process, Test Case Design, Automated Testing, Types of Automated Tests, Automated Testing Tools, Case studies based on Web based, GUI testing, Manual testing Vs Automated testing, Software Reliability, Factors Influencing Software Reliability, Applications of Software Reliability.

References:

1. Daniel Galin, "Software Quality Assurance: From Theory to Implementation", Addison Wesley.
2. Kshirasagara Naik, Priyadarshi Tripathy, "Software Testing and Quality Assurance", Wiley India.
3. GlenfordJ.Myers, The Art of Software Testing" John Wiley and Sons publications.
4. Aditya P Mathur, "Foundations of Software Testing", Pearson.
5. Software Engineering, A practitioner's Approach: Fourth Edition, by Roger S. Pressman, McGraw Hill.
6. M.G.Limaye: Software Testing-Principles, Techniques and Tools –McGraw Hill.

MCA 5.2: MULTIMEDIA COMMUNICATIONS
(Max Marks: 75+25, Credits: 4)

Unit 1

Multimedia Fundamentals: Define the concept of multimedia, fundamental criteria for the design of a multimedia presentation, multimedia application goals &objectives, opportunities in multimedia production, Role of multimedia development team members, avoiding problems in planning a multimedia application.

Unit 2

Multimedia Building Blocks: Text, Graphics, video capturing, Sound capturing, editing. Basic design principle: proximity, visual hierarchy, Symmetry / Asymmetry, Repetition, unity, Contrast, dynamics, Emphasis, Multimedia Authoring tools.

Unit 3

Design, Development and evaluation of multimedia a system: The development of user interface design, Design Process.

Unit 4

Multimedia & the Internet, Multimedia conferencing, Multimedia file sharing, Multimedia broadcasting, Multimedia file handling: Compression & Decompression.

Unit 5

Data and File Format Standards: Rich-Text Format; TIFF File Format; Resource Interchange File Format (RIFF); MIDI File Format; JPEG DIB File Format for Still and Motion Images; AVI Indeo File Format; MPEG Standards; TWAIN; Multimedia Application Design: Multimedia Application Classes; Types of Multimedia Systems; Virtual Reality Design; Components of Multimedia Systems; Organizing Multimedia Databases; Application Workflow Design Issues; Distributed Application Design Issues.

References:

1. John Villamil-Casanova, Louis Molina, An introduction to multimedia
2. Mohammad Dastbaz, Desgning Interactive Multimedia Systems
3. Bohdan O. Szuprowicz, Multimedia Networking
4. Stephen McGloughlin, Multimedia on the web

MCA 5.3: DOT NET PROGRAMMING
(Max Marks: 75+25, Credits: 4)

Unit 1

Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.

Unit 2

Exceptions and Object Lifetime: Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handing, the System. Exception Base Class, throwing a Generic Exception, Catching Exception, CLR System – Level exception (System. System Exception), Custom Application-Level exception (System. System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying Application – and System Level Exception Debugging System Exception Using VS. NET, Understanding Object Lifetime.

Unit 3

Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (IComparable), Exploring the system. Collections Namespace.

Unit 4

Class, Objects, Constructors and its types, inheritance, properties, overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, Threading.

Unit 5

Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, validating controls, windows application configuration.

References:

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.
3. Andrew Troelsen , "Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.
4. Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition, O"Reilly, 2010.

MCA 5.4: DOT NET LAB

MCA 5.5: MINI PROJECT

MCA 6.1: ARTIFICIAL INTELLLIGENCE (Max Marks: 75 + 25, Credits: 4)

Unit 1

Artificial Intelligence and Intelligent Agents: Artificial Intelligence: - Introduction, what is artificial intelligence, Application of artificial intelligence, History of artificial intelligence, Types of artificial intelligence, Artificial intelligence technique. Intelligent Agent: - Agents and Environment, Structure of Agents, Types of Agents, Multi Agent System, Agent communication, Agent development tools.

Unit 2

Problem Solving and Adversarial Search: Search algorithms, Uninformed search strategies, Hill climbing algorithms, Min max search, Heuristic search techniques, Alpha beta pruning. Adversarial Search: - Games, Optimal decisions in game, Optimal strategies, Minmax algorithms, Optimal decisions in multiplayer games.

Unit 3

Knowledge Representations and Natural Language Processing: Definition, Approaches to knowledge representation, Technique for knowledge representation, Handling uncertain knowledge and reasoning, Advanced knowledge representation technique, Frames, Semantic network, Conceptual graphs, Conceptual dependencies, Script. Natural Language Processing- Introduction, History of natural language processing, Significance of natural language processing, Role of knowledge in natural language processing, Phases of natural language processing, parsing techniques, Expert system.

Unit 4

Fuzzy Logic System and Genetic Algorithms: Introduction, Crisp sets, Fuzzy sets, Fuzzy logic control, Sugeno style of fuzzy inference processing, Planning. Genetic Algorithms:-Introduction, Search space, Operators of genetic algorithms, Application of Genetic algorithm, Genetic algorithm cycle, Problem solving using genetic algorithm.

Unit 5

Artificial Neural Network: History of neural network, Neuron model for artificial neural network, feed forward and feedback artificial neural network, neural processing, Learning processing, Single layer and Multi layer perceptron.

References:

1. Artificial Intelligence- A modern approach, second edition by STUART RUSSEL PETER NORVING
2. Artificial Intelligence- Third Edition by Elain Rich, Kevin Knight, Shivashankar B Nair.
3. Artificial Intelligence – ELA Kumar
4. Neural Network –Second Edition by SIMON HAYLEIN

MCA 6.2: MACHINE LEARNING
(Max Marks: 75 + 25, Credits: 4)

Unit 1
Introduction to Machine Learning: Introduction, Types of Machine Learning Algorithms, Issues in Machine Learning, Applications of Machine Learning, Examples of Machine Learning Applications: Learning Associations, Classification, Regression, Unsupervised Learning, Reinforcement Learning.

Unit 2
Dimensionality Reduction: Introduction, Feature Generation, Feature Subset Selection, Principal Component Analysis (PCA), Factor Analysis, Multidimensional Scaling, Linear Discriminant Analysis (LDA), Isomap, Locally Linear Embedding.

Unit 3
Supervised Learning: Learning a Class from Examples, Noise, Learning Multiple Classes, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithms, Decision Trees, Rule based classifiers, Nearest Neighbors Classifiers, Bayesian Classifiers, Support Vector Machines, Artificial Neural Networks, Performance Evaluation of Classifiers.

Unit 4
Clustering: Basic Concepts, Proximity Measures, Partitional Clustering methods, Hierarchical Clustering methods, Density based methods, Choosing the number of clusters, Cluster Validity.

Unit 5
Reinforcement Learning: Introduction, Single State Case, Elements of reinforcement learning, Model-Based Learning, Temporal Difference Learning, Generalization, Guidelines for Machine Learning Experiments, Cross-Validation and Resampling Methods.

References:

1. Introduction to Machine Learning, Ethem Alpaydin, Second Edition, MIT Press.
2. Machine Learning, Tom M. Mitchell, Mc Graw Hill Publishers.
3. Pattern Recognition and Machine Learning, Christopher M. Bishop, Springer Publishers.
4. Pattern Recognition, Sergios Theodoridis and Konstantinos Koutroumbas, Fourth Edition, Academic Press Publisher.

MCA 6.3: PROJECT WORK