KUVEMPU UNIVERSITY

Department of PG Studies and Research in MCA and Computer Science,

Kuvempu University, Jnana Sahyadri,

Shankaraghatta-577451

CBCS SYLLABUS

FOR

MASTER OF COMPUTER APPLICATIONS (MCA)

(w.e.f. Academic year 2016-17)

KUVEMPU UNIVERSITY

SYLLABUS AND SCHEMNE OF EXAMINATION FOR MCA COURSE

FIRST SEMESTER

	PAPER CODE	SUBJECT	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 SYSTEMS	04	75	25	100	04
SOFT CORE	MCA 1.4	DATA COMMUNICATIONS	04	75	25	100	03
	MCA 1.5	COMPUTATIONAL MATHEMATICS	04	75	25	100	03
LAB	MCA 1.6	C PROGRAMMING LAB	03/Batch	40	10	50	02
	MCA 1.7	DBMS LAB	03/Batch	40	10	50	02
		TOTAL				**600**	**22**

SECOND SEMESTER

	PAPER CODE	SUBJECT	HRs/Week	TH/PR	IA	TOTAL	CREDITS
HARD CORE	MCA 2.1	COMPUTER NETWORKS	04	75	25	100	04
	MCA 2.2	OPERATING 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	40	10	50	02
	MCA 2.7	COMPUTER GRAPHICS LAB	03/Batch	40	10	50	02
OPEN ELEC	MCA 2.8	INFORMTION AND COMMUNICATION TECHNOLOGY (ICT)	02	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	OBJECT ORIENTED PROGRAMMING USING JAVA	04	75	25	100	04
SOFT CORE	MCA 3.4	THEORY OF COMPUTATION	04	75	25	100	03
	MCA 3.5	OBJECT-ORIENTED MODELING AND DESIGN PATTERNS	04	75	25	100	03
LAB	MCA 3.6	DESIGN AND ANALYSIS OF ALGORITHMS LAB	03/Batch	40	10	50	02
	MCA 3.7	JAVA LAB	03/Batch	40	10	50	02
OPEN ELEC	MCA 3.8	CYBER SECURITY	02	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 MINING	04	75	25	100	04
	MCA 4.2	DIGITAL IMAGE PROCESSING	04	75	25	100	04
	MCA 4.3	PHP PROGRAMMING	04	75	25	100	04
SOFT CORE	MCA 4.4	WEB PROGRAMMING USING J2EE	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	40	10	50	02
	MCA 4.7	J2EE LAB	03/Batch	40	10	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	CLOUD COMPUTING	04	75	25	100	04
	MCA 5.2	INTERNET OF THINGS (IOT)	04	75	25	100	04
	MCA 5.3	PATTERN RECOGNITION	04	75	25	100	04
LAB	MCA 5.4	DOT NET LAB	03/Batch	40	10	50	04
	MCA 5.5	MINI PROJECT	03/Batch	40	10	50	04
		TOTAL				**400**	**20**

SIXTH SEMESTER

	PAPER CODE	TITLE OF THE PAPER	Hrs/ Week	TH/PR	IA	TOTAL	CREDITS
SOFT CORE	MCA 6.1	MULTIMEDIA DATA ANALYSIS	04	75	25	100	04
	MCA 6.2	LINUX INTERNALS	04	75	25	100	04
	MCA 6.3	PROJECT WORK	03/Batch	200	50	250	12
		TOTAL				**450**	**20**

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	400	20
6.	SIXTH SEMESTER	450	20
	GRAND TOTAL	**3350**	**132**

QUESTION PAPER PATTERN

1. Two questions from each unit and totally each question paper should contain 10 main questions.
2. There should be internal choice between questions related to each unit.
3. Each main question may consist of 2 or 3 sub questions.
4. Student should answer 05 main questions by selecting one main question from each unit
5. Each main question carries 15 marks for regular papers. (15 x 5 = 75)
6. For open elective question paper, each question carries 08 marks (8 x 5 = 40)

1.	a)	
	b)	**UNIT 1**
	OR	
2.	a)	
	b)	
3.	a)	**UNIT 2**
	b)	
	OR	
4.	a)	
	b)	
5.	a)	**UNIT 3**
	b)	
	OR	
6.	a)	
	b)	
7.	a)	**UNIT 4**
	b)	
	OR	
8.	a)	
	b)	
9.	a)	**UNIT 5**
	b)	
	OR	
10.	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, Zvonko Vranesic and Safwat Zaky Mcgraw 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, Yashwant Kanetkar, 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
Introduction **:** Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; when not to use a DBMS. 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.

Unit 2
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; ER Diagrams, Naming Conventions and Design Issues.

Unit 3
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; 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 basic 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; 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 :Elmasri navathe
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: COMPUTATIONAL 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, Introduction to Integration.

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, Some applications like input-output analysis.

Unit 4
Statistics: Introduction, sampling, Measures of Dispersion, Calculation of mean, median, mode & standard deviation of grouped and ungrouped data. Computation of correlation coefficients, Rank correlation, Variance, Covariance.

Unit 5:
Probability**:** Introduction, Probability Models, Sample Space, Events, Algebra of Events, Probability Axioms, Conditional Probability, Discrete and continuous variables, Central Tendency, Probability Distribution, Independence of Events, Baye's Theorem, Discrete Probability Distributions: Binomial Distributions, Examples on Binomial Distributions, Poisson distribution, normal distribution.

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, connecting devices, VLAN, Backbone Networks.

Unit 2:
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:
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: Professional Software Development Attributes of good software, software engineering diversity, IEEE/ ACM code of software engineering ethics, case studies, Software Process & Agile Software Development, Software Process models: waterfall, incremental development, reuses oriented, Process activities; Coping with change, the rational Unified process. Agile methods.

Unit 2
Requirements Engineering: Functional and non-functional requirements, The software requirements document, Requirements specification, Requirements engineering processes, Requirement elicitation and analysis, Requirements validation, Requirements management.

Unit 3
System Modeling, Architectural Design & Design and implementation: Context models, Interaction models, Structural models, Behavioral models, Model-driven engineering, Software architecture: the role of software architecture, architectural views, component and connector view, Architectural styles for C&C view, Documenting architectural design. Design: Design concepts, Function oriented design, detailed design, verification, matrix (Complexity matrix for function oriented design).

Unit 4
Component-based software engineering: Components and component model, CBSE process, Component composition, Distributed Software engineering, Distributed system issues, Client-server computing, Architectural patterns for distributed systems, Software as a service.

Unit 5
Planning a software Project: Process planning, Effort estimation, Project scheduling and staffing, Software configuration, management plan, Quality plan, Risk Management, Project monitoring plan, Software Testing : Testing fundamentals, Black-box testing, White-box testing, Testing process.

References:

1. Ian Sommerville : Software Engineering, 9th edition, Person Education Ltd, 2011.
2. Pankaj Jalote: Software Engineering, 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, Priti sinha
2. Encyclopedia of Information Communication Technology by Antonio Cartelli and Marco 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 Migga Kizza

MCA 3.1 : WIRELESS COMMUNICATIONS
(Max Marks: 75 + 25, Credits: 4)

Unit 1
Mobile Computing Architecture: Types of Networks, Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing, 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 2
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 and WiMAX : Spread Spectrum technology, IS-95, CDMA versus GSM, Wireless Data, Third Generation Networks, Applications on 3G, Introduction to WiMAX.

Unit 3
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 4
Mobile OS and Computing Environment: Smart Client Architecture, The Client: User Interface, Data Storage, Performance, Data Synchronization, Messaging. The Server: Data Synchronization, Enterprise

Data Source, Messaging. Mobile Operating Systems: WinCE, Palm OS, Symbian OS, Linux, Proprietary OS Client Development: The development process, Need analysis phase, Design phase, Implementation and Testing phase, Deployment phase, Development Tools, Device Emulators.

Unit 5

Building, Mobile Internet Applications: Thin client: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Wireless Applications Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, VoiceXML.

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.
4. Iti Saha Misra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009.

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.
5. Design and Analysis of Algorithms : : Goodman, S.E. and Hedetnieml. S.T
6. Data Structures and Algorithms : Aho, A.V., Hopcroft, J.E. & Ullman
7. The Art of Computer Programming : : Knuth D.E

MCA 3.3: OBJECT ORIENTED PROGRAMING USING JAVA
(Max Marks : 75 + 25, Credits : 4)

Unit 1

Object Orientation: History of Java, Java features, Difference between C/C++ and Java, Java program structure, Java tokens, Statements, JVM, Introduction to packages in Java, Operators & Expressions, Data types, Constants and Variables, Type conversions, Control Statements, Class, objects, inheritance, overloading and overriding.

Unit 2

Packages and Interfaces- Creating, Accessing, Using packages, CLASS path, access protection, importing packages, interfaces- defining, implementing and applying an interface, variables in interface. Multithreaded programming: Introduction, Life cycle of Thread, Creating threads by extending classes & implementing run able interface.

Unit 3

Exception Handling: Errors, Type of errors, Exceptions, Use of keywords Try Catch. Networking: Introduction, Socket overview, TCP/IP Client / Server Sockets and Programming. JDBC: Driver types, Connectivity, Statements.

Unit 4

String Handling and the collections framework: String constructors, string operations, character extraction, String comparison, searching strings, modifying strings, string buffer and string builder. Collections framework- Collection interfaces, collection classes, maps.

Unit 5

Applets and Graphics: Applets basics, Life cycle, Life cycle of Applet programming Graphics class, Line, Rectangle, Circle, Ellipse, Arcs and Polygon. AWT components: Components, Container, Panel, Windows, Frame, Dialogue box. AWT Controls: Button, Checkbox, Text field, Text area, Layouts, Menus and Menu bars.

References:

1. The Complete Reference JAVA – 2 : :Herbert Schildt.
2. Sun Certified Programmer for Java 5 : Kathy Sierra, Bert Bates
3. Programming with JAVA : E.Balaguruswamy, BPB Publications.
4. JAVA Programming : Steven Holzner, BPB Publications.

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

Unit 1

Alphabets Strings and Languages, Automata and Grammars Finite Automata (FA)-Its Behavior DFA-Formal Definition Simplifies Notations Language of DFANFA-Formal Definition Language of NFA Equivalence of DFAs and NFAs.

Unit 2

Regular expressions (RE) Definition, FA and RE, RE to FA, FA to RE, Algebraic laws for RE, applications of REs. Regular grammars and FA, FA for regular grammar, Regular grammar for FA Proving languages to be non-regular -Pumping Lemma, applications. Some closure properties of Regular languages -Closure under Boolean operations.

Unit 3

Pushdown Automata Acceptance by final state and empty store, Equivalence to CFG Deterministic and Non-deterministic PDA Problems and Solutions.

Unit 4

Turing Machines: Turing Machines TM -Formal definition and behaviour Transition diagrams, Language of a TM, TM as accepters and deciders TM as a computer of integer functions Programming techniques for TMs -Storage in state, multiple tracks, subroutines, etc. Variants of TMs –Multi tape TMs, Nondeterministic TMs, TMs with semi-infinite tapes, multi stack machines, Equivalence of the various variants with the basic model.

Unit 5

The Chmosky Hierarchy :Languages, Grammars and Machines, Recursively Enumerable Languages, Counting Alphabets, Languages and Computing Machines, The idea of Enumeration, The idea of Diagnoalization, The ideas of Acceptance and Membership, Recursive Languages, Context Sensitive Languages and Grammars, The ideas of context, Other Grammars and Automata, Linear and Deterministic Context-Free Languages.

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. Martin J. C., “Introduction to Languages and Theory of Computations”, TMH 4. Papadimitrou, C. and Lewis, C.L., “Elements of the Theory of Computation”, PHI

MCA 3.5 : OBJECT ORIENTED MODELING AND DESIGN PATTERNS
(Max Marks : 75 + 25, Credits : 3)

Unit 1

Introduction, Modeling Concepts, class Modeling: What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history, Modeling as Design Technique: Modeling; abstraction; The three models. Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips.

Unit 2

Advanced Class Modeling: Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips. State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips., Advanced State Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips. Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models.

Unit 3

Process Overview, System Conception: Process Overview: Development stages; Development life cycle. System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement. Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis. Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.

Unit 4

Class Design, Implementation Modeling, Legacy Systems**:** Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example. Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing. Legacy Systems: Reverse engineering; Building the class models; Building the interaction model; Building the state model; Reverse engineering tips; Wrapping; Maintenance.

Unit 5

Design Patterns, Idioms: What is a pattern and what makes a pattern? Pattern categories; Relationships between patterns; Pattern description. Communication Patterns: Forwarder-Receiver; Client-Dispatcher-Server; Publisher-Subscriber. Management Patterns: Command processor; View handler. Idioms: Introduction; what can idioms provide? Idioms and style; Where to find idioms; Counted Pointer example

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References:

1. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2nd Edition, Pearson Education, 2005.
2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern-Oriented Software Architecture, A System of Patterns, Volume 1, John Wiley and Sons, 2006.
3. Grady Booch et al: Object-Oriented Analysis and Design with Applications, 3rd Edition, Pearson, 2007.
4. Brahma Dathan, Sarnath Ramnath: Object-Oriented Analysis, Design, and Implementation, Universities Press, 2009.
5. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, Wiley-Dreamtech India, 2004.
6. Simon Bennett, Steve McRobb and Ray Farmer: Object-Oriented Systems Analysis and Design Using UML, 2nd Edition, Tata McGraw-Hill, 2002.

MCA 3.6: ADA LAB

MCA 3.7: JAVA 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 Lawerance Pfleeger, "Analysing Computer Security ", Pearson Education India.
2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.
3.Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla ,"Introduction to Information Security and Cyber Law" Willey Dreamtech Press.
4. CHANDER, HARISH," Cyber Laws And It Protection " , PHI Learning Private Limited ,Delhi ,India

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

Unit 1
Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, Data Preprocessing: Needs Preprocessing the Data, Data

Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Some Considerations in Multi-Source, Data Fusion.

Unit 2

Data Mining Primitives, Languages, and System Architectures: Data Mining Primitives, Data Mining Query Languages, Architectures of Data Mining Systems, Concepts Description: Characterization and Comparison: Data Generalization and Summarization-Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases, Granular Nested Causal Complexes.

Unit 3

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Dynamic Itemset Counting Algorithm, FP-Tree Growth Algorithm, From Association Mining to Correlation Analysis, Constraint-Based Association Mining,Mining Association Rules with Rough Sets.

Unit 4

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Other Classification Methods, Prediction, Classifier Accuracy, Uncertain Knowledge Association through Information Gain.

Unit 5

Cluster Analysis Introduction:Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Density-Based Methods, Clustering High-Dimensional data, Constraint-based cluster analysis, Outlier Analysis, Mining Complex Types of Data Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

References:

1. Jiawei Han, MichelineKamber, Jian Pei, Data Mining: Concepts and Techniques, Morgan Kaufmann, 2nd Ed., 2005.
2. Arun K Pujari, Data Mining Techniques, Univerities Press, 2nd Ed., 2010.
3. Da Ruan, Guoqing Chen, Etienne E. Kerre, Geert Wets, Intelligent Data Mining: Techniques and Applications (Studies in Computational Intelligence), Springer, 1st Ed., 2010.
4. Masoud Mohammadian, Intelligent Agents for Data Mining and Information Retrieval, Idea Group Publishing, 2004.

MCA 4.2 : DIGITAL IMAGE PROCESSING
(Max Marks: 75 + 25, Credits: 4)

Unit 1

Introduction: Origins of digital image processing, Electromagnetic spectrum, Applications, Components of image processing system, Image sensing and acquisition, Digitization, Sampling and Quantization.

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

Unit 1
Introduction to is PHP, History of web programming; PHP web environment; installation and configuration; Basic syntax, variables, operators, flow control structures. More language basics; using GET and POST input, working with HTML forms; built-in and user-defined functions; variable scope; using the PHP manual, getting help.

Unit 2
PHP Form handling, PHP GET, PHP POST, PHP Form Validation, PHP Form Sanitization. PHP Strings Handling: Strings and Patterns, Matching, Extracting, Searching Replacing, Formatting, PCRE.

Unit 3
PHP Arrays: PHP Enumerated Arrays, PHP Associative Arrays, Array Iteration, PHP Multi-Dimensional Arrays. PHP Functions: Syntax, Arguments, Variables, References, Pass by Value & Pass by references, Return Values, Variable Scope, PHP include(), PHP require().

Unit 4
HTTP headers and output control functions; HTTP cookies; maintaining state with HTTP sessions; writing simple web clients. Introducing MySQL; database design concepts; the Structured Query Language (SQL); communicating with a MySQL backend via the PHP MySQL API, More MySQL database access; graphic manipulation with the GD library.

Unit 5
Introduction to Objection Oriented Programming; Using PEAR packages, More PEAR packages; more OOP; the Smarty template engine, parsing XML; PHP 5-specific features.

References:

1 Programming PHP. Rasmus Lerdorf, 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 : WEB PROGRAMMING USING J2EE
(Max Marks : 75 + 25, Credits : 3)

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

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: CLOUD COMPUTING
(Max Marks : 75 + 25, Credits : 4)

Unit 1
Introduction to Cloud Computing, The Evolution of Cloud Computing, Hardware Evolution, Internet Software Evolution, Server Virtualization, Web Services Deliver from the Cloud, Communication-as-a-Service, Infrastructure-as-a-Service, Monitoring-as-a-Service, Platform-as-a-Service, Software-as-a-Service, Building Cloud Network.

Unit 2
Federation in the Cloud, Presence in the Cloud, Privacy and its Relation to Cloud-Based Information Systems, Security in the Cloud, Common Standards in the Cloud, End-User Access to the Cloud Computing.

Unit 3
Introduction, Advancing towards a Utility Model, Evolving IT infrastructure, Evolving Software Applications, Continuum of Utilities, Standards and Working Groups, 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, Policy Based Automation, Application Management, Evaluating Utility Management Technology, Virtual Test and development Environment, Data Center Challenges and Solutions, Automating the Data Center.

Unit 4

Software Utility Application Architecture, Characteristics of an SaaS, Software Utility Applications, Cost Versus Value, Software Application Services Framework, Common Enablers, Conceptual view to Reality, Business Profits, - Implementing Database Systems for Multitenant Architecture.

Unit 5

Other Design Considerations - Design of a Web Services Metering Interface – Application Monitoring Implementation - A Design for an Update and Notification Policy - Transforming to Software as a Service - Application Transformation Program - Business Model Scenarios - Virtual Services for Organizations - The Future.

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. Bunker and Darren Thomson, "Delivering Utility Computing", 2006, John Wiley & Sons Ltd.
4. George Reese, "Cloud Application Architectures", O'reilly Publications, 2009.

MCA 5.2: INTERNET OF THINGS (IOT)
(Max Marks: 75+25, Credits: 4)

Unit 1

Introduction: Definition, phases, Foundations, Policy, Challenges and Issues, identification, security, privacy, Components in internet of things**:** Control Units, Sensors, Communication modules, Power Sources, Communication Technologies: RFID, Bluetooth, Zigbee, Wifi, Rflinks, Mobile Internet, Wired Communication.

Unit 2

Programming The Microcontroller For IOT : Basics of Sensors and actuators – examples and working principles of sensors and actuators , Cloud computing and IOT , Arduino/Equivalent Microcontroller platform – Setting up the board -Programming for IOT – Reading from Sensors, Communication**:** Connecting microcontroller with mobile devices – communication through Bluetooth and USB – connection with the internet using Wi-Fi / Ethernet.

Unit 3

Resource Management In The Internet Of Things : Clustering - Software Agents - Data Synchronization - Clustering Principles in an IOT Architecture - The Role of Context - Design Guidelines -Software Agents for Object – Data Synchronization- Types of Network Architectures - Fundamental Concepts of Agility and Autonomy-Enabling Autonomy and Agility by the Internet of Things-Technical Requirements for Satisfying the New Demands in Production - The Evolution from

the RFID-based EPC Network to an Agent based Internet of Things- Agents for the Behaviour of Objects.

Unit 4

Business Models For The Internet Of Things : The Meaning of DiY in the Network Society- Sensor-actuator Technologies and Middleware as a Basis for a DiY Service Creation Framework - Device Integration - Middleware Technologies Needed for a DiY Internet of Things Semantic Interoperability as a Requirement for DiY Creation, Ontology, Value Creation in the Internet of Things, Application of Ontology Engineering in the IOT-Semantic Web-Ontology - The Internet of Things in Context of EURIDICE - Business Impact.

Unit 5

From The Internet Of Things To The Web Of Things: Resource-oriented Architecture and Best Practices- Designing REST ful Smart Things – Web enabling Constrained Devices - The Future Web of Things - Set up cloud environment – send data from microcontroller to cloud – Case studies – Open Source e-Health sensor platform – Be Close Elderly monitoring – Other recent projects.

References:

1. Charalampos Doukas , Building Internet of Things with the Arduino, Create space, April 2002
2. Dieter Uckelmann et.al, "Architecting the Internet of Things", Springer, 2011
3. Luigi Atzor et.al, "The Internet of Things: A survey, ", Journal on Networks, Elsevier Publications, October, 2010

MCA 5.3: PATTERN RECOGNITION
(Max Marks: 75 + 25, Credits: 4)

Unit 1

Introduction: Machine perception, pattern recognition systems, design cycle, learning and adaptation, Applications of pattern recognition. Probability**:** Introduction, probability of events, random variables, Joint distributions and densities, moments of random variables, estimation of parameters from samples, minimum risk estimators.

Unit 2

Statistical Decision Making: Introduction, Baye's Theorem, multiple features, conditionally independent features, decision boundaries, unequal costs of error, estimation of error rates, the leaving one-out technique. Characteristic curves, estimating the composition of populations.

Unit 3

Nonparametric Decision Making**:** Introduction, histograms, Kernel and window estimators, nearest neighbor classification techniques, adaptive decision boundaries, adaptive discriminate Functions, minimum squared error discriminate functions, choosing a decision making technique.

Unit 4

Unsupervised Learning and Clustering: Unsupervised Bayesian learning, data decryption and clustering, criterion functions and clustering, Hierarchical clustering, Online clustering, component analysis.

Unit 5

Artificial Neural Networks: Introduction, nets without hidden layers. Neural networks with hidden layers, the back Propagation algorithms, Hopfield nets, and an application.

References:

1. Pattern Classification Duda R. O., and Hart P E., and Stork D G., Wiley Publishers
2. Pattern Recognition and Image Analysis, Earl Gose, Richard J and Steve J, PHI
3. Pattern recognition (Statistical, structural and Neural Approaches), Robert Schalkoff
4. Pattern Recognition, Sergios Thedoridis & Konstantinos Koutrumbas, Elsevier Academic Press, 4th Edition.

MCA 5.4: DOT NET LAB

MCA 5.5: PROJECT

MCA 6.1: MULTIMEDIA DATA ANALYSIS
(Max Marks: 75 + 25, Credits: 4)

Unit 1

Introduction: Multimedia Elements; Multimedia Applications; Multimedia Systems Architecture; Evolving Technologies for Multimedia Systems; Defining Objects for Multimedia Systems; Multimedia Data Interface Standards; The need for Data Compression; Multimedia Databases. Media: Perception Media, Representation Media, Presentation Media, Storage Media, Transmission Media, Information Exchange Media, Key Properties of a Multimedia System, Characterizing Data Streams, Sound, Speech Signals; Speech Output; Speech Input; Speech Transmission.

Unit 2

Graphics and Images, Video Technology, Computer-Based Animation: Capturing Graphics and Images Computer Assisted Graphics and Image Processing; Reconstructing Images; Graphics and Image Output Options. Basics; Television Systems; Digitalization of Video Signals; Digital Television; Basic Concepts; Specification of Animations; Methods of Controlling Animation; Display of Animation; Transmission of Animation; Virtual Reality Modeling Language.

Unit 3

Data Compression: Storage Space; Coding Requirements; Source, Entropy, and Hybrid Coding; Basic Compression Techniques; JPEG: Image Preparation, Lossy Sequential DCT-based Mode, Expanded Lossy DCT-based Mode, Lossless Mode, Hierarchical Mode. H.261 (Px64) and H.263: Image Preparation, Coding Algorithms, Data Stream, H.263+ and H.263L; MPEG: Video Encoding, Audio Coding, Data Stream, MPEG-2, MPEG-4, MPEG-7; Fractal Compression.

Unit 4

Optical Storage Media: History of Optical Storage; Basic Technology; Video Discs and Other WORMs; Compact Disc Digital Audio; Compact Disc Read Only Memory; CD-ROM Extended Architecture; Further CD-ROM-Based Developments; Compact Disc Recordable; Compact Disc Magneto-Optical; Compact Disc Read/Write; Digital Versatile Disc. Content Analysis : Simple Vs. Complex Features; Analysis of Individual Images; Analysis of Image Sequences; Audio Analysis; Applications.

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. Ralf Steinmetz, Klara Narstedt: Multimedia Fundamentals: Vol 1-Media Coding and Content Processing, 2nd Edition, Pearson Education, 2003.
2. Prabhat K. Andleigh, Kiran Thakrar: Multimedia Systems Design, PHI, 2003.
3. K.R Rao, Zoran S. Bojkovic and Dragorad A. Milovanovic: Multimedia Communication Systems: Techniques, Standards, and Networks, Pearson Education, 2002.
4. Nalin K Sharad: Multimedia information Networking, PHI, 2002.

MCA 6.2: LINUX INTERNALS
(Max Marks: 75 + 25, Credits: 4)

Unit 1

Introduction: The unix operating system, The Unix Architecture, Features of UNIX, POSIX and Single UNIX specification, Locating commands, Internal and External commands, Command Structure, Flexibility of command Usage, man command, cal command, date command, echo, printf, bc, script, passwd, who, uname, tty, stty. The File System : The file, The Parent-Child Relationship, The HOME Variable, pwd, cd, mkdir, rmdir, Absolute Pathname, Relative Pathname, ls.

Unit 2

The Unix File system, cat, cp, rm, mv, more, The lp subsystem: Printing a File, wc, od, cmp, comm, diff, compressing and archiving files, gzip, and gunzip, tar, zip and unzip. Basic File Attributes**:** Listing file attributes, listing directory attributes, File Ownership, File Permissions, changing file permissions, Directory Permissions, Changing File Ownership. Application Program Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links.

Unit 3

The Shell: The shell's Interpretive Cycle, Pattern Matching, Escaping and Quoting, Redirection, /dev/null and /dev/tty, Pipes, tee, Command Substitution, Shell variables, Shell scripts, read, using command line arguments, exit and exit status of command, the logical operators && and ||- conditional execution, the if conditional, using test and [] to evaluate expressions, the case conditional, expr, $0: calling a script by different names, for, while statement. Advanced Shell Programming: The sh command, export, cd, the Command, expr, Conditional Parameter Substitution, Merging Streams, Shell Functions, eval, exec Statement.

Unit 4:

The process: Process basics, process status, system process, Mechanism of process creations, Internal and external commands, process states and zombies, running jobs in background, nice, killing process with signals, job control, at and batch, cron, timing process, wait, waitpid, waited, wait3, wait4**,** Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter**,** Files, system function.

Unit 5

Filters using regular expressions: grep, basic regular expressions, extended regular expressions and egrep, sed, line addressing, using multiple instructions, context addressing, writing selected lines to a file, text editing, substitution, basic regular expressions revisited. Awk-Advanced Filters: Simple awk Filtering, Splitting a Line into Fields, printf, the Logical and Relational Operators, Number Processing, Variables, The –f option, BEGIN and END positional Parameters, get line, Built-in variables, Arrays, Functions, Interface with the Shell, Control Flow.

References:

1. Sumitabha Das, UNIX System V.4, Concepts and Applications, TMH
2. Terrence Chan: Unix System Programming Using C++, Prentice-Hall of India /Pearson Education, 1999.
3. W.Richard Stevens, Stephen A. Rago: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education / Prentice-Hall of India, 2005

MCA 6.3: PROJECT WORK