DR. A P J ABDUL KALAM UNIVERSITY, INDORE

SYLLABUS

of

MASTER OF TECHNOLOGY (COMPUTER TECHNOLOGY & APPLICATION)

Department of Computer Application

(First Year)

(Session July- December 2016)

College of Engineering

Dr. A P J Abdul Kalam University, Indore

DR. A P J ABDUL KALAM UNIVERSITY, INDORE

Syllabus for Master of Technology (Computer Technology & Application)

Department of Computer Application

List of Subject (First Year)

S. No.	Subject Code	Subject name	Page No.
1	MTCTA 101	Mathematical Foundation of Computer Application	3
2	MTCTA 102	Programming System	4
3	MTCTA 103	Object Oriented Modeling &UML	5
4	MTCTA 104	Advanced D.B.M.S.	6
5	MTCTA 105	Computer Graphics and Multimedia	7
6	MTCTA 106	Lab-I (103,104)	8
7	MTCTA 107	Lab-II (102,105)	9
8	MTCTA 201	Advance Soft Computing	11
9	MTCTA 202	Advance Computer Network	12
10	MTCTA 203	Advance Programming with J2EE	13
11	MTCTA 204	Software Engineering & Project Management	15
12	MTCTA 205	Distributed System	17
13	MTCTA 206	Lab-III (201, 202)	19
14	MTCTA 207	Lab-IV (203, 204)	20

Unit 1: Sets: Relationship between sets, Operations on sets, set identity, principle of inclusion and exclusion, Min-sets, Cut-sets. Relations, properties of binary relations, equivalence relations and partitions, partial ordering relations, functions, inverse functions, composition of functions and lattices, chains and anti-chains, complemented & distributive lattices, Boolean algebra, canonical forms

Unit 2: Prepositional logic, conjunction, disjunction and negation, interpretation of formulas in prepositional logic, Validity and consistency, normal form in prepositional logic and logic consequences, first order predicate logic

Unit 3: Introduction to finite state machine, finite state machine as models of physical system, equivalence machines, finite state machine as language recognizers.

Unit 4: Introduction to discrete numeric functions and generating functions, introduction to combinaric problems, introduction to recurrence relational and recursive algorithms, linear recurrence, relations with constant coefficients, Homogeneous solutions, particular solutions, total solutions.

Unit 5: Graph: Finite graphs, incidence and degree, isomorphism, sub graphs and union of graphs, connectedness, reachability, paths, and circuits, Eulerian graphs, tree: properties of trees, pendant vertices in tree, center of tree ,spanning trees and cut vertices, binary tree ,matrix representation of graph, incidence and adjacency matrix and their propertices, applications of graphs in computer science.

References:

1. Discrete structure, Schaum series

2. C.L. Liu, Elements of Discrete mathematics

3. Sahni S., Concepts in Discrete Mathematics

4. Levy L.S., Discrete Structure of Computer Science

Unit 1 : Introduction: Introduction to software design principles, modularity abstract data types, data structures and algorithms, Linear data structures-Stacks, arrays, lists, queues and linked representations; Pre-fix, in-fix and post-fix expressions; Recursion; Set operations; Hashing and hash functions; Binary and other trees, traversal algorithms, Huffman codes; Search trees, priority queues, heaps and balanced trees.

Unit 2 :Models: Models of computation. Algorithm analysis, order arithmetic, time and space complexities and average and worst case analysis, lower bounds.

Unit 3: Algorithm design techniques: divide and conquer, search and traversals. Dynamic programming. backtracking. branch and bound.

Unit 4 :**Sorting and searching algorithms**, combinatorial algorithms, string processing algorithms. Algebraic algorithms, set algorithms. Hard problems and approximation algorithms.

Unit 5: Problems: Problem classes P, NP, NP-hard and NP-complete, deterministic and nondeterministic polynomial time algorithms., Approximation algorithms for some NP complete problems.

References

[1] D.E.Knuth, The Art of Computer Programming, Vols. 1 and 3, Addison Wesley

[2]V Aho, JE Hopcroft, JD Ullman, Design & Analysis of Algorithms, Addison Wesley

[3] Horowitz, S. Sahni, Fundamentals of Computer Algorithms, Galgotia Publishers

[4] K.Mehlhorn, Data Structures and Algorithms, Vols. 1 and 2, Springer Verlag,

[5]Purdom Jr. and C. A. Brown, Analyses of Algorithms, Holt Rinechart and Winston

Sub Code : MTCTA 103 Sub Name : Object Oriented Modeling and UML 4 Credits

Unit 1: Object Oriented Concepts: Objects and classes, methods messages, encapsulation, interface, implementation, reuse, inheritance and polymorphism, object oriented development life cycle.

Unit 2: UML: Class relationships in UML, use cases, sequence diagrams, state models and activity diagrams.

Unit 3: Structural Modelling: Classes, Advance Classes, Relationships, class diagrams, interfaces, packages, instances and object diagrams.

Unit 4: Behavioral Modelling: modelling interaction, use cases, interaction diagrams, activity diagrams, events, signals, state machines, process, threads, time, space, state chart diagrams.

Unit 5: Architectural Modelling: Components, deployment, collaborations, pattern, frameworks, component & deployment diagram. An overview of CORBA, Java beans and NET.

References:

[1] G Booch, J Rambaugh. Ivar Jacobson, The UML User guide, Pearson Education.

[2] Eric Brande, Software Design, John Wiley & Sons.

[3] David William Brown, An Introduction to Object Oriented Analysis", John Wiley

[4] Booch, Object Oriented Analysis and Design with Applications, Addision Wesley.

[5] Schach, Stephen R., An introduction to Object Oriented Systems Analysis and Design with UML and unified process, 2003, TMH.

Unit 1 : DBMS Concept introduction, data models, E-R diagram, Keys, Relational database schemas, integrity constraints, relational algebra and calculus, normalization, normal form.

Unit 2 : Indexing, Query processing and optimization, concurrency control. Distributed database: fragmentation transparency, distributed query processing and optimization, distributed transaction model and concurrency control, distributed deadlock and commit protocol.

Unit 3: Object oriented and object relational databases: specialization generalization, aggregation and association, object, object identity, architecture of object oriented and object relational databases.

Unit 4 : Web databases: accessing databases through web, web server, XML database.

Unit 5 : Introduction to image and multimedia database and data structure. Data structure R Tree, K-D tree, Quad tree, content based retrieval: color histogram.

References:

[1] R. Elmasri, S. Navathe, Benjamin Cumming, Fundamentals of Database system

[2] H.F. Korth and A. Silberschatz, Database concept, (II ed) McGraw Hill, 1991

[3] C.J. Date, An Introduction to Database System Volume I (V ed), Addision Wesley

[4] Narang, Object Oriented Database, Prentice – Hall of India, New Delhi. 5. W. Kim "Modern Database System", 1995, Acin Press, Addision – Wesley.

Sub Code : MTCTA 105 Sub Name : Computer Graphics & Multimedia 4 Credits

Unit 1: Graphics Hardware: Basic of Computer Graphics, display technology, Raster Scan & Random scan display systems, Input devices.

Unit 2: Basic Raster Graphics for drawing 2_D primitives: Scan converting lines, circles, ellipse; filling rectangles, polygons, generating characters; antialiasing. Matrix representation and Homogeneous coordinates, two dimensional transformations, 2D line clipping, polygon clipping algorithms, window to viewport transformation.

Unit 3: Viewing in 3D: Three dimensional transformation, projections : Parallel, prospective, viewpoints.

Unit 4: Representation of curves & surfaces, Bezier method, B-spline methods. Visible surface determination: Z-buffer, Algos, List priority algorithms, Scan line algorithms. Light and shading models: Illumination models, shading models for polygons, shading algorithms, Gouraud & Phong, color models like RGB, YIU, copy, HSV etc.

Unit 5: Introduction to multimedia, multimedia components; multimedia hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia tools, presentations tools, Authoring tools, presentations. Graphics animation : Tweeking, Morphing simulating accelerator, motion specification.

References:

[1] Foley, Van Dam, Fundamentals of Interactive Computer Graphics, Addison Wesly

[2] Hearn and Baker Computer Graphics, Prentice Hall of India

[3] Rogers D.F. Procedural Elements of Computer Graphics, McGraw Hill

[4] Prabhat K. And leigh and Kiran Thakkar, Multimedia System Design, PHI.

[5] Roger S. David Mathematical Elements for Computer Graphics, McGraw Hill

[6] R Steimnetz, K Nashtet, Multimedia Computing Communications & Appl., PHI

[7] John F.K. Buford, Multimedia System, Addision Wesley

Object Oriented Technology

1. Program of bubble sort
2. Program of sequential sort
3. Program of Binary search
4. Program of template to stack & single array
5. Program of template queue in a single array
6. Program of template a singly linked list
7. Program of template priority queue
8. Program of queue as array template
9. Program to find minimum maximum element in linked list
10. Program to sort given list of names in ascending order
11. Program for single inheritance
12. Program for multiplication of two matrix in Java
13. Program for hybrid inheritance
14. Program for different type of signature overloaded
15. Program for multiple inheritance

Advance Database Management System

1. Study of DBMS, RDBMS and ORDBMS.
2. To study data definition language system.
3. To study data manipulation statements.
4. Study of SELECT commands with different clauses.
5. Study of SINGLE ROW function (character, numeric, data functions).
6. Study of GROUP functions (avg, count, max, min, sum).
7. Study of various type of SET-OPERATORS (Union, intersect, minus).
8. Study of various type of Integrity constraints.
9. Study of various types of JOINS.
10. To study views and indices

System Programming

1. Write a Program to create ,read , and write into a file having record of students.
2. Write a program to generate Machine Op-Code Table , Symbol Table and Pseudo Op-Code table during First Pass Assembler.
3. Write a program to generate Machine Op- code table using Two pass Assembler.
4. Write a program to Generate Macro Name Table , Macro definition Table and Argument List Array during Pass One of Two Pass Macro.
5. Write a program to generate Expanded Source in Pass Two of Two Pass Macro.
6. Study of Lexical Analyzer.
7. Study of Device Drivers.
8. Study and implement general purpose commands in UNIX . (Date ,Who , Who am I, Cal, Echo , Clear, Mesg, Mail, and Login Command)
9. To Study and implement all the directory oriented Commands of UNIX(Cd , MKdir , rmdir, And Pwd Command)
10. To Study and implement all the File oriented Commands of UNIX(ls-list files, Cat, cp, rm commands)
11. To study implement HEAD, TAIL , CUT and PASTE commands.
12. To Study Common Object File Format(COFF)

Computer graphics and Multimedia

1. To plot a point (pixel) on the screen.

2. To draw a straight line using DDA Algorithm.

3. To draw a straight line using Bresenham's Algorithm.

4. Implementation of mid-point circle generating Algorithm.

5. Implementation of ellipse generating Algorithm.

6. To translate an object with translation parameters in X and Y directions.

7. To scale an object with scaling factors along X and Y directions.

8. To rotate an object with a certain angle about origin.

9. Perform the rotation of an object with certain angle about an arbitrary point.

10. To perform composite transformations of an object.

11. To perform the reflection of an object about major axis.

UNIT-1 Fundamental Concepts: - Introduction to Artificial Neural Networks (ANN). Learning Process: - error–correction learning, Hebbian learning, competitive learning, Boltzmann learning, the credit-assignment problem, supervised learning, and other learning techniques.

UNIT-2 Single neuron/ Perceptron networks: - training methodology, typical application to linearly separable problems. Multilayer Perceptron: - Back propagation algorithm, virtues and limitation of BP algorithm, modifications to back-propagation.

UNIT-3 Radial-basis function Networks – interpolation problem, Covers theorem, regularization networks, applications. Recurrent Networks.

UNIT-4 Introduction to Fuzzy systems, Membership function, Fuzzy relational operation, fuzzy IF THEN rules, Sugeno and Mamdani type systems, Adaptive Neuro-Fuzzy sytems, training methods.

UNIT-5 Application of ANN and Fuzzy systems to non-stationary time series prediction; pattern classification; control; communication engineering; system identification and pattern classification.

Text Books and References:

[1] S. Haykin, Neural Networks, A Comprehensive Foundation; Pearson Education, India 2008 (ISBN- 81-203-2373-4).

[2] M. T. Hagan, Howard B. Demuth, Mark H. Beale, Neural Network Design; (ISBN: 0-9717321-0 8); Thomson 2002

[3] Jang, Sun and Mizutani, Neuro-Fuzzy and Soft-Computing – A computational approach to learning and machine intelligence; Prentice Hall of India; ISBN-81-203-2243-6

UNIT 1 Review of Networking and O.S. Fundamentals, ISO-OSI Model, different layers and their functions, LAN, MAN, WAN, Communication media & principles IEEE standards etc.

UNIT 2 Internetworking with TCP/IP, Basic concepts, Principles, Protocols and Architecture, Address handling Internet protocols and protocol layering. DNS, Applications: TELNET, RLOGN, FTP, TFTP, NFS, SMTP, POPL, IMAP, MIME, HTTP,STTP,DHCP, VOIP, SNMP.

UNIT 3 Introduction to Router, Configuring a Router, Interior & Exterior Routing, RIP, Distance Vector Routing, OSPF, BGP, Uni-cast, Multicast and Broadcast. Multicast routing protocols: DVMRP, MOSPF, CBT, PIM, MBONE, EIGRP, CIDR, Multicast Trees, Comparative study of IPv6 and IPv4.

UNIT 4 VPN addressing and routing, VPN Host management, ATM Concepts, Services Architecture, Equipments and Implementation

UNIT 5 Introduction to wireless transmission and medium access control, wireless LAN: IEEE 802.11, Hiper LAN , Bluetooth Mobile Network and Transport layer, WAP GSM and CDMA: Network architecture and management

References:

[1] Computer Networks: Tanenbaum.

[2] Internetworking with TCP/IP: Comer.

[3] Data Communications, Computer Networks and Open Systems: Hallsall.

[4] Data Communications, Stalling.

[5] Mobile Communication: Schiller, Pearson Education

[6] Computer Communications and network Technology, Gallo, Cengage (Thomson)

[7] Wireless and Mobile Network Architecture: Yi Bing Lin, Wiley

Unit 1: Collections : Collection Interfaces, Concrete Collections, The Collections Framework **Multithreading :** Creating thread and running it, Multiple Thread acting on single object, Synchronization, Thread communication, Thread group, Thread priorities, Daemon Thread, Life Cycle of Thread.

Unit 2: Networking : Internet Addressing, Internet Address, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets, Datagrams. **Enterprise Java Bean:** Preparing a Class to be a JavaBean, Creating a JavaBean, JavaBean Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean.

Unit 3: Java Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining, Manipulating Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures C. **Servlets:** Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with Http Session

Unit 4: Java Server Pages (JSP): Introduction, Java Server Pages Overview, A First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries

Remote Method Invocation: Defining the Remote Interface, Implementing the Remote Interface, Compiling and Executing the Server and the Client

Unit 5: Common Object Request Broker Architecture (CORBA): Technical/Architectural Overview, CORBA, Basics, CORBA services **Introduction Smart Phone Application Development:** Introduction to android platform, Creating application template, adding activity, intent, services to application, using Google map API.

References:

1. “Advanced Java 2 Platform HOW TO PROGRAM” by H. M.Deitel, P. J. Deitel, S. E. Santry – Prentice Hall

2. “Beginning Java™ EE 6 Platform with GlassFish 3 From Novice to Professional” by Antonio Goncalves– Apress publication

Unit 1: Software Project Management: Software Project Planning and its characteristics, Types of metrics, Effort Estimation- FP, LOC, FP vs. LOC, Schedule & Cost Estimation Models- Activity Networks-PERT/CPM, COCOMO-I, COCOMO-II, Risk Assessment- Probability Matrix, Risk Management.

Unit 2: Agile Methodology- Scrum and XP. Formal Methods: Basic concepts, mathematical preliminaries, Applying mathematical notions for formal specification, Formal specification languages, using Z to represent an example software component, the ten commandments Of formal methods, Formal methods- the road ahead.

Unit 3: Component-Based Software Engineering: CBSE process, Domain engineering, Component based development, Classifying and retrieving components and economics of CBSE. Client/Server Software Engineering: Structure of client/server systems, Software engineering for Client/Server systems, Analysis modeling issues, Design for Client/Server systems, Testing issues

Unit 4: Web Engineering: Attributes Of web-based applications, the WebE process, a framework for WebE. Formulating, Analysing web-based systems, design and testing for web-based applications, Management issues. Reengineering: Business process reengineering, Software reengineering, Reverse reengineering, Restructuring, Forward reengineering, economics of reengineering.

Unit 5: Software Quality: CASE tools, metrics, Standards, Certification and Assessment. TQM, Bootstrap methodology, The SPICE project, ISO-IEC 15504, Six Sigma Concept for Software Quality. Computer-Aided Software Engineering: Building Blocks for CASE, taxonomy Of CASE tools, integrated CASE environments, Integration architecture, and CASE repository

References:

[1] Software Engineering a Practitioners Approach, Roger S. Pressman, McGraw-Hill 8thEdition, 2014

[2] Formal Specification and Documentation testing - A Case Study Approach, J.Bowan ,

International Thomson Computer Press, 2003

[3] Software Engineering for Embedded Systems: Methods, Practical and Applications, Robert Oshana, Mark Kraeling, Newnes Publisher, 2013

[4] Software engineering an engineering approach, James S. Peters, WitoldPedrycz, Wiley India, 2011.

[5] Software Engineering Principles and Practice, Hans Van Vliet, Yded, 2015

Unit 1: introduction: Characterization of Distributed Systems - Examples - Resource Sharing and the Web -Challenges - System Models - Architectural and Fundamental Models - Networking and Internetworking - Types of Networks - Network Principles - Internet Protocols – Case Studies.

Unit 2: processes and distributed objects: Interprocess Communication - The API for the Internet Protocols - External Data Representation and Marshalling - Client-Server Communication - Group Communication- Case Study - Distributed Objects and Remote Invocation - Communication Between Distributed Objects - Remote Procedure Call - Events and Notifications - Java RMI -Case Study.

Unit 3: Operating system issues – I : The OS Layer - Protection - Processes and Threads - Communication and Invocation –OS Architecture - Security - Overview - Cryptographic Algorithms - Digital Signatures -Cryptography Pragmatics - Case Studies - Distributed File Systems - File Service Architecture - Sun Network File System - The Andrew File System

Unit 4: Operating system issues – II: Name Services -Domain Name System - Directory and Discovery Services – Global Name Service - X.500 Directory Service - Clocks, Events and Process States -Synchronizing Physical Clocks - Logical Time And Logical Clocks - Global States -Distributed Debugging - Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems.

Unit 5: Distributed transaction processing: Transactions - Nested Transactions - Locks - Optimistic Concurrency Control -Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions – Atomic Commit Protocols - Concurrency Control in Distributed Transactions – Distributed Deadlocks - Transaction Recovery - Overview of Replication And Distributed Multimedia Systems

References:

1. G Coulouris, J Dollimore, T Kindberg, Distributed Sys Concept- Design, Pearson
2. Sape Mullender, Distributed Systems, Addison Wesley,
3. A Fleishman, Distributed Systems- Software Design and Implementation, S Verlag
4. M.L.Liu, Distributed Computing Principles and Applications, Pearson Education
5. AS Tanenbaum, Maartenvan, ,Distributed System Principles Paradigms, Pearson
6. M Singhal, Niranjan, Shivaratri, Advanced Concept in Operating System, TMH
7. Flynn, Understanding Operating System, Cengage (Thomson)

Advance Soft Computing:

1. Write a program for A* algorithm, AO* Algorithms
2. Write a program for Breadth first search, Depth first search techniques.
3. Write a program for Adaline , Madaline.
4. Explain Adaptive resonance theory
5. Write a program for Fuzzy set theory and operations, Fuzzy set versus Crisps set.

Advance Computer Network

1. Bluetooth mobile network
2. Explain GSM and CDMA
3. Explain ATM concepts
4. Define FTP, SMTP, NFS, TFTP
5. Explain AD-HOC network

Java Programming

1.Write a Java program that reads a file and displays the file on the screen with a line number before each line.

2. Write a Java program that reads a file and displays the no of lines and words in that file.

3. Write a Java program that reads to copy source seat. File and display on the console

4. Write a program to identify the accessibility of a variable by means of different access specifiers with in and outside package.

5. Write a java program to generate multiple threads of creating clock pulses. (using runnable interface)

6. Write a java program to identify the use of synchronized blocks to synchronized methods

7. Write an applet to display a moving banner showing the status of it.

8. Write an applet to draw a simple and beautiful landscape.

9. Write an applet that computes the payment of a loan based on the amount of the loan, interest rate and the number of months.

10.Write an applet to perform the 4 basic arithmatic operations as buttons in a form accepting two integers in texboxes and display their result.

11. Write a java program to design a registration form for creating a new eMail account

12. Write a java program that implements a simple client server application. The client sends data to server. The server receives the data uses it to produce a result and then sends the result back to the client then the client displays the result on the console.

Software Engineering (Testing Lab)

1. Write programs in 'C' Language to demonstrate the working of the following constructs:
i) do...while ii) while….do iii) if…else iv) switch v) for
2. "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.
3. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
4. Write the test cases for any known application (e.g. Banking application)
5. Create a test plan document for any application (e.g. Library Management System)
6. Study of any testing tool (e.g. Win runner)
7. Study of any web testing tool (e.g. Selenium)
8. Study of any bug tracking tool (e.g. Bugzilla, bugbit)
9. Study of any test management tool (e.g. Test Director)
10. Study of any open source-testing tool (e.g. Test Link)
11. Take a mini project (e.g. University admission, Placement Portal) and execute it. During the Life cycle of the mini project create the various testing documents* and final test report document.