Solapur University, Solapur

M. C. A. (Science Faculty)

Syllabus (Semester – III and IV)

(Choice Based Credit System)

With Effect from June 2017

MASTER OF COMPUTER APPLICATIONS (SCIENCE FACULTY)
DETAIL SYLLABUS OF SEMESTERS III AND IV

1. Introduction: The Master of Computer Applications (M.C.A.) Programme has been designed with a semester approach in mind. It is a three years course and in each year there are two semesters. Courses in semester-I to semester-V are aimed at skills development in computers using various technologies. Also in each semester student has to develop a software project so that a student can become more expert in handling the programming language and the programming logic is also improved.

2. Objective: The M.C.A. program prepares students to take up positions as systems analysts, systems designers, programmers, and managers in any field related to information technology. The program, therefore, aims at imparting comprehensive knowledge with equal emphasis on theory and practice. However, the course curriculum will have enough flexibility to enable a student to undertake advance studies in Computer Science later on.

3. Intake Capacity: 60

4. Ordinances and regulations

ELIGIBILIY: Admission to the course is open to any graduate of this University or graduate of any other University recognized by UGC, New Delhi, satisfying the following conditions:

a) The candidate should have secured at least FIFTY PERCENT marks (45% in case of candidates of reserved categories) at the aggregate of all years of Graduation Examination.
b) The student must have taken Mathematics at XII std. or at least one of the subjects from Mathematics/ statistics / Computer Science/ Computer Applications/ Computer Programming in first year of Bachelors Degree.
c) *The candidate should not be employed at the time of admission and should not take employment during the tenure of course.*
d) The candidate should not be above TWENTY-EIGHT years of age as on 30th June of the year of his admission.
e) Subject to the above conditions, the final admission is based solely on the merit at the entrance test. Every candidate has to appear for the entrance test conducted during the year in which he/she is seeking admission.
f) Seats are allocated as per the reservation policy of the State Government. However, 10% of the seats are reserved for the candidates from the other University. The entrance test score of the student admitted from other University should not be less than that of the last candidate admitted from Solapur University, Solapur.

FEES STRUCTURE: The tuition fees or laboratory fees and other fees have to be paid at the beginning of every semester. At present a student has to pay tuition fees Rs.7000/- per semester, laboratory fee Rs.14000/- per semester and laboratory deposit of Rs.500/- together with other fees. These fees may be revised from time to time. The fees once paid will not be refunded.

COURSE STRUCTURE: The MCA course is a SIX semester course. The teaching for the semesters I, III and V will be during the first half of the academic year and for the semesters II and IV will be during the second half the academic year. During the sixth semester the student has to work for the project and the project will be evaluated at the end of that semester.

a) A student has to clear all the heads of passing of first and second semesters to be eligible for the admission to the fifth semester.
b) A candidate will be awarded a class or distinction as per the rules of other science subjects.
c) The Regulations/ Ordinance not covered in this shall be followed from the Regulations/ Ordinance laid down for the science faculty.

5. Structure of the Syllabus:

M. C. A. Part – II, Semester – III

Paper Code	Title of the Paper	Contact hours/ week	Distribution of Marks for Examination			Credits
			Internal	University	Total	
Hard Core – Theory						
HCT 3.1	System Software	04	30	70	100	04
HCT 3.2	DBMS	04	30	70	100	04
HCT 3.3	Java Programming	04	30	70	100	04
Soft Core – Theory (Any One)						
SCT 3.1	Computer Communication Network	04	30	70	100	04
SCT 3.2	Computer Architecture	04				
SCT 3.3	Programming with PHP	04				
Open Elective (Any One)						
OET 3.1	Fundamentals of Web Designing	04	30	70	100	04
OET 3.2	Internet of Things	04				
Hard Core – Practical						
HCP 3.1	Practical based on HCT 3.2	04	15	35	50	02
HCP 3.2	Practical based on HCT 3.3	04	15	35	50	02
HCP 3.3	Project –III	02	15	35	50	02
Open Elective (Any One)						
OEP 3.1	Practical based on OET 3.1	02	15	35	50	02
OEP 3.2	Practical based on OET 3.2	02				
Total		**-**	**210**	**490**	**700**	**28**

M. C. A. Part – II, Semester – IV

Paper Code	Title of the Paper	Contact hours/ week	Distribution of Marks for Examination			Credits
			Internal	University	Total	
Hard Core – Theory						
HCT 4.1	.NET	04	30	70	100	04
HCT 4.2	Data Mining and Warehouse	04	30	70	100	04
HCT 4.3	UML	04	30	70	100	04
HCT 4.4	Finite Automata	04	30	70	100	04
Soft Core – Theory (Any One)						
SCT 4.1	Distributed Operating System	04	30	70	100	04
SCT 4.2	Computer Graphics	04				
Hard Core – Practical						
HCP 4.1	Practical based on HCT 4.1	04	15	35	50	02
HCP 4.2	Practical based on HCT 4.2	04	15	35	50	02
HCP 4.3	Practical based on HCT 4.4	04	15	35	50	02
HCP 4.2	Project –IV	02	15	35	50	02
Total		**-**	**210**	**490**	**700**	**28**

6. Passing Standard: Passing standard is same as that of other M.Sc. courses in the Solapur University. The candidate has to appear for internal evaluation of 30 marks and external evaluation (university exam) for 70 marks for each paper / practical / project. In case of theory papers internal examinations will be conducted by the school / department. The nature of internal evaluation of practical and project will be decided by the respective schools / departments. The internal evaluation is a process of continuous assessment.

A student who failed in Term End examination (theory) and passed in internal assessment of a paper (subject) shall be given FC (Failed in Term End Exam) Grade. Such student will have to appear for Term End examination only. A student who fails in internal assessment and passed in Term End examination (Theory) shall be given FR (Failed in Internal Assessment) Grade. Such student will have to appear for Term End examination as well as internal assessment.

In case of year down candidates from the mark scheme the candidates shall appear for the same 70 marks paper of the external examination and his performance shall be scaled to 100 marks.

7. Nature of theory question paper

a) Duration of each theory paper is 2 hours and 30 minutes.
b) Each paper contains 7 questions each carrying 14 marks.
c) Students have to attempt five questions.
d) Question No.1 is compulsory and contains 14 objective type sub-questions each carrying 1 mark.
e) Question No. 2 is compulsory and contains 3 short answers / short note type sub-questions each carrying 5 or 4 marks.
f) Students have to attempt any three questions from Question No. 3 to Question No. 7.
g) Question No. 3 to Question No. 7 contains 2 sub-questions

MASTER OF COMPUTER APPLICATIONS (SCIENCE)

SEMESTER III

HCT 3.1: System Software

Unit I

Introduction: System software and machine architecture, traditional (CISC) machines, RISC machines. [06]

Assemblers: Basic assembler functions, machine dependent and machine independent assembler features, one-pass assemblers, multi-pass assemblers, MASM and SPARC assembler. [09]

Unit II

Loaders and Linkers: Basic loader functions, machine dependent and machine independent loader features, linkage editors, dynamic linking, bootstrap loaders, MS-DOS and SunOS Linkers. [15]

Unit III

Macro Processors: Basic macro processor functions, machine independent macro processor features, macro processor design options, MSAM macro processor, ANSI C macro language. [15]

Unit IV

Compilers: Basic compiler functions, machine-dependent compiler features, machine-independent compiler features, compiler design options, the YACC compiler-compiler. [15]

Reference Books:

1. System Software – An Introduction to System Programming: Leland L. Beck, 3/e, Pearson Education.
2. Compilers – Principles, techniques and tools: A. V. Aho, R. Semi, J.D. Ullman, Pearson Education.
3. Systems Programming and Operating Systems: D.M. Dhamdhere, Tata McGraw Hill.
4. Compiler Design: Santanu Chattopadhyay, Prentice Hall India.

HCT 3.2: DBMS

Unit – I

Introduction to Database Systems: Database – Definition, Limitations of traditional file processing systems, Advantages of DBMS, Users of DBMS. [04]

Database Architecture and Environment: Components of DBMS, Architecture, Physical, logical and view, DDL, DML, DCL, schemas, life cycle of Database System Development, Functions of DBMS. [05]

Conceptual Database Modeling: Data Model – Concept, types of data models, ER model, concepts of entity, entity set, attributes, domains, existence dependency, Keys: candidate, primary, composite, strong and weak entities, cardinality, specialization, generalization, aggregation, Relational Algebra, Relational Calculus. [06]

Unit – II

Relational Database Systems: Characteristics, relation, attribute, tuple, domain, null, Normalization, Functional Dependencies, Multivalued Dependencies, 1NF, 2NF, 3NF, 4NF, 5NF, Boyce Codd's normal form. [07]

SQL and PL/SQL: DDL, DML, DCL, Select: From, Where, Order by, Group by, Having, Intersect, Union, Distinct, Between, In, Between, Different types of functions, Delete, Update, Insert, Nested queries, joins, create, alter and drop, constrains, index, views, Triggers, Grant, Revoke, Commit, RollBack, Savepoint, PL/SQL: %Type, %Rowtype, Exception, Cursor etc. [08]

Unit – III

Transaction Management and Concurrency Control: Transaction – properties (ACID), states, Concurrency control, locks, two phase locking serialization. [07]

Distributed Databases: Standalone v/s Distributed databases, Replication, Fragmentation, Client/Server architecture, types of distributed databases. [08]

Unit – IV

Database Recovery: Need for recovery, techniques – log based recovery, check point, differed and immediate updates, shadowing, Catastrophic and non-catastrophic failures, Recovery in multi-database environments, Two phase commit protocol. [07]

Query Processing: Steps in query processing, advantages of optimization. [03]

Object – Relational Databases: Abstract Datatypes, Nested Tables, Varying Arrays, Large Objects, Naming Conventions for Objects. [05]

Reference Books:

1. Database System Concepts: Korth, Silberschatz, Sudarshan, McGraw Hill, 6th edition, 2006.
2. Fundamentals of Database Systems: Navathe, Elmasari, Addison Wesley, Pearson Education, 5th Edition, 2010.
3. Introduction to Database Systems: C. J. Date, Addison Wesley, 8th edition, 2003.
4. Oracle 8i – The Complete Reference: Loney, Koch, Tata McGraw Hill, 2002.

HCT 3.3: Java Programming

Unit – I

Introduction to Java: Importance and features of java, keywords, constants, variables and data types, Operators and expressions, Decision making, branching and looping: if..else, switch, ?: operator, while, do, for statements, labeled loops, jump statements: break, continue, return. [09]

Classes and Objects: defining a class, adding variables and methods, creating objects, constructors, class inheritance. [06]

Unit – II

Arrays and strings: creating an array, one and two dimensional arrays, string array and methods, String and StringBuffer classes, Wrapper classes. [05]

Inheritance: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages. [06]

Exception Handling: Fundamentals, exception types, uncaught exceptions, throw, final, built in exception, creating your own exceptions. [04]

Unit – III

Multithreaded Programming: Fundamentals of Java thread model, priorities, synchronization, messaging, thread class, Runnable interface, interthread Communication, suspending, resuming and stopping threads. [08]

Input/Output: Basics, Streams, Byte and Character stream, predefined streams, Reading and writing from console and files. Using Standard Java Packages (lang, util, io, net). [07]

Unit – IV

Event Handling: Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, graphics and text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet. [08]

JDBC: JDBC API, JDBC Drivers, Products, JDBC Design considerations, Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements. [07]

Reference Books:

1. Java-2 the complete Reference: Patrick Naughton and Herbertz Schidt, Tata McGraw-Hill Education, 2002.
2. Programming with Java: Balaguruswamy, Tata McGraw-Hill Edn., 4th edition, 2006.
3. Computing Concepts with Java 2 E Essentials: Horstmann, John Wiley, 2nd edition, 1999.
4. Programming Java: Decker and Hirshfield, Vikas Publication, 2000.

SCT 3.1: Computer Communication Network

Unit – I

Introduction: Uses of Computer networks: Business Applications, Home Applications, Mobile Users, Social Issues; Network Hardware: Local Area Networks, Metropolitan Networks, Wide Area Networks, Wireless Networks, Home Networks, Internetworks; Network Software: Protocol Hierarchies, Design Issues for the Layers, Connection-Oriented and Connectionless Service Primitives, Relationship of Services to Protocols; Example of Networks: The Internet, The ARPANET, NSFNET, Internet usage, Architecture of the internet. [07]

Data Link Layer: Data Link Layer Design Issues: Services Provided to the Network Layer, Framing, Error Control, Flow Control; Error Detection and Correction: Error-Correcting Codes, Error-Detecting Codes; Elementary Data Link Protocols: An Unrestricted Simplex Protocol, A Simplex Stop-and-Wait Protocol, A Simplex Protocol for a Noisy Channel; Sliding Window Protocols: A One-Bit Sliding Window Protocol, A Protocol Using Go Back N, A Protocol Using Selective Repeat; Example Data Link Protocols: HDLC—High-Level Data Link Control, The Data Link Layer in the Internet. [08]

Unit – II

Network Layer: Network Layer Design issues: Store and Forward packet Switching, Services provided to the Transport Layer, implementation of Connectionless Service, Implementation of Connection-oriented Services, Comparison of Virtual Circuit and Datagram subnets; Routing algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link state Routing, Hierarchical Routing, Broadcast Routing, Routing for Mobile Hosts; Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnet, Load Shedding, Jitter Control; Quality of Service: Requirements, Techniques for Achieving Good Quality of Service, Internetworking: Differences in Networks, Network Connection, Concatenated Virtual Circuits, Connectionless Internetworking; Tunneling; Internetwork Routing, Fragmentation; The Network Layer in the Internet: The IP Protocol, IP Addresses, Internet Control Protocols, Mobile IP; IPV6. [15]

Unit – III

The Transport Layer: The Transport Service: Services Provided to the Upper Layers, Transport Service Primitives, Berkeley Sockets; Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release Flow Control and Buffering, Multiplexing, Crash Recovery; The Internet Transport Protocol – UDP: Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol; The Internet Transport Protocols – TCP: Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management TCP Transmission Policy, TCP Congestion Control, Wireless TCP

and UDP. [15]

Unit – IV

The Application Layer: DNS – The Domain Name System: The DNS Name Space, Resource Records, Name Servers; Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery; The World Wide Web: Architectural Overview, Static Web Documents, Dynamic Web Documents, HTTP, Performance Enhancements, The Wireless Web. [15]

Reference Books:

1. Computer Networks: Andrew S. Tanenbaum, 4th Edition, Pearson Education, Asia, 2002.
2. Communication Networks: Fundamental Concepts and Key Architectures, Alberto Leon-Garcia, Indra Widjaja, Tata McGraw Hill, 2006.
3. Data Communications and Networking: Behrouz A. Forouzan, Tata McGraw Hill, Second Edition, 2001.

SCT 3.2: Computer Architecture

Unit – I

Fundamentals of Computer System: Functional Units of a Digital Computer, Hardware, Software Interface, Translation from a High Level Language to the Hardware Language, Instruction Set Architecture, Styles and features, RISC and CISC Architectures, Performance Metrics, Amdahl's Law, Case Studies of ISA. [15]

Unit – II

Basic Processing Unit: Components of the Processor, Datapath and Control, Execution of a Complete Instruction, Hardwired and Micro programmed Control, Instruction Level Parallelism, Basic Concepts of Pipelining, Pipelined Implementation of Datapath and Control, Hazards, Structural, Data and Control Hazards –Exception handling. [15]

Unit – III

Advanced Concept in ILP and Current Trends: Exploitation of more ILP, Hardware and Software Approaches, Dynamic Scheduling, Speculation, Compiler Approaches – Multiple Issue Processors. – ILP and Thread Level Parallelism, Current Trends, Multicore Processors, Graphics and Computing GPUs. [12]

Unit – IV

Arithmetic for Computers: Addition and Subtraction, Fast Adders, Binary Multiplication, Binary Division, Floating Point Numbers, Representation, Arithmetic Operations.

Memory and I/O: Need for a hierarchical memory system, Types and characteristics of memories, Cache memories, Improving cache performance, Virtual memory, Memory management techniques, Associative memories. Accessing I/O devices, Programmed Input/Output, Interrupts, Direct Memory Access, Interface circuits, Need for Standard I/O Interfaces like PCI, SCSI, USB. [18]

Reference Books:

1. Computer Organization and Design - The Hardware/Software Interface: D. A. Patterson and J. L. Hennessy, 4th Edn., Morgan Kaufmann / Elsevier, 2009.
2. Computer Organization and Embedded Systems: C. Hamacher, Z. Vranesic, S. Zaky and N. Manjikian, 6th Edition, Tata McGraw Hill, 2012.
3. Computer Organization and Architecture – Designing for Performance: William Stallings, Sixth Edition, Pearson Education, 2003.
4. Computer Architecture and Organization: John P. Hayes, Third Edition, Tata McGraw Hill, 1998.
5. Computer Architecture – A Quantitative Approach: J. L. Hennessey and D. A. Patterson, Morgan Kaufmann/Elsevier Pub., 5th Edition, 2012.
6. Computer Systems Design and Architecture: V.P. Heuring, H.F. Jordan, Second Edition, Pearson Education, 2004.
7. Computer Architecture: Behrooz Parhami, Oxford University Press, 2007.

SCT 3.3: Programming with PHP

Unit – I

Introduction to PHP: Basic Syntax, Sending Data to the Web Browser, Understanding PHP, HTML, and White Space, Writing Comments.

Programming with PHP: Creating an HTML Form, Handling an HTML Form, Managing Magic Quotes, Conditionals and Operators, Validating Form Data. [15]

Unit – II

Creating Dynamic Web Sites: Including Multiple Files, Making Sticky Forms, Creating and Calling Your Own Functions, Variable Scope, Date and Time Functions Sending Email. [15]

Unit – III

Error Handling and Debugging: General Error Types and Debugging, Displaying PHP Errors, Adjusting Error Reporting in PHP, Creating Custom Error Handlers, Logging PHP Errors, PHP Debugging Techniques. [15]

Unit – IV

Using PHP with MySQL: Modifying the Template, Connecting to MySQL and Selecting the Database, Executing Simple Queries, Retrieving Query Results, Ensuring Secure SQL, Counting Returned Records, Updating Records with PHP.

Cookies and Sessions: Using Cookies, Using Sessions, Sessions and Cookies, Improving Session Security. [15]

Reference Books:

1. PHP and MySQL for Dynamic Web Sites: Visual Quickpro Guide: Larry Ullman, Second Edition.
2. Programming PHP: Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre.

OET 3.1: Fundamentals of Web Designing

UNIT – I [15]

Web Design Principles: Basic principles involved in developing a web site, planning process, Five Golden rules of web, designing, Designing navigation bar, Page design, Home Page Layout, Design Concept.

Basics in Web Design: Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards.

UNIT – II [15]

Introduction to HTML: What is HTML, HTML Documents, Basic structure of an HTML document, creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, and HTML Tags.

UNIT – III [15]

Elements of HTML: Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

UNIT – IV [15]

Introduction to Google Applications: What is Google Forms, components of form design, Google Docs, Google Sheets, Google Slides, Google Drive, Gmail, and Google Search.

What is Google Site, Use of template, theme, to design sites, components of Google Site, edit pages in Google Site, practice of menus- Insert, Format, Table, Layout etc. Use and design of Google Classroom, Google Translator.

Reference Books:

1. HTML, XHTML and CSS Bible (5th Edn.): Steven M. Schafer, Wiley India.
2. Beginning HTML, XHTML, CSS and JavaScript: John Duckett, Wiley India.
3. My Google Apps (2nd Edn.): Patrice-Anne Rutledge, Sherry Kinkoph Gunter.
4. The Teacher's Guide to Google Classroom eBook: Kasey Bell, Kindle Edition.
5. Google Apps Meets Common Core (1st Edition) by Michael J. Graham
6. Google Apps Script: Web Application Development Essentials (2nd Edition): James Ferreira.

OET 3.2: Internet of Things

Unit – I

Building IoT: Characterization of IoT, Physical design, IoT protocols, Functional blocks, Communication model, Communication APIs, Enabling technologies, Wireless sensor networks, Cloud Computing, Big data analytics, Communication Protocols, Embedded Systems, M2M, Difference between IoT and M2M. [15]

Unit – II

Architecture for IoT: Domain model specification, Information Model Specification, Service specification, IoT Level specification, Functional view specification, Operational view specification, Device and Component Integration, User centered design, Open source development, End user programming, Tools for IoT. [15]

Unit – III

IoT to web of things: Platform design methodologies, Servicing through uniform interface, Syndicating things, Web enabling, Constrained devices, Future Web of things.

IoT physical devices and End points: IoT devices, Examples, Raspberry PI interfaces, Arduino interfaces, programming Raspberry Pi with Python, Other IoT devices, Domain specific IoTs. [18]

Unit – IV

Data analytics for IoT: MapReduce Programming model, Ozie workflow for IoT data analysis, Setting up a Strong, Cluster, REST - based approach, Web Socket - based approach, Case studies. [12]

Reference Books:

1. Internet of Things - A Hands-on Approach: Arshdeep Bahga, Vijay Madisetti, Arshdeep Bahga and Vijay Madisetti, First Edition, September 2014.
2. Architecting the Internet of things: Dieter Uckelmann, Mark Harrison Florian, Michahelles, Springer-Verlag Berlin Heidelberg, First Edition, April 2011.

SEMESTER IV

HCT 4.1: .NET

Unit – I

Microsoft .NET framework: Structure, the common language runtime, JIT, CTS, Metadata. [05]

C#: Introduction to C#, Programming structure of C#, editing, compiling & executing C# programs, namespace, comments, using aliases for namespace classes, using command line argument, math functions, scope of variables, boxing & unboxing, file operations, indexes, delegates, events, preprocessor, attributes, creating winform applications, COM interoperability, using COM / COM+, reflection, components in C#, Handling databases using ADO.net. [10]

Unit – II

Introduction to ASP.Net: Introduction, difference between ASP & ASP.Net Application, Web Architecture Model, Introduction to Visual Studio for Web Application. [07]

Application and Page Frameworks: Application Location Options, The ASP.NET Page Life Cycle, The ASP.NET Page Structure Options, ASP.NET Page Directives, ASP.NET Page Events, Dealing with PostBacks, ASP.NET Application Folders, Global.asax [08]

Unit – III

ASP.NET Server Controls and Validation Controls: ASP.Net Server Controls, Understanding Validation, Client-Side versus Server-Side Validation, Turning Off Client-Side Validation. [07]

Working with Master Pages: Need and basics of Master Pages, Master Page and Content Page, Programmatically Assigning the Master Page, Nesting Master Pages, Master Page Events. [08]

Unit – IV

ASP.Net State Management: Application State, Session State, Client & server storing, View state, Cache, Hidden Variable, Session object, Profiles, Overview of HTTP Handler & Modules. [15]

References

1. Microsoft Visual C# .NET Step-By-Step, Version 2003: Sharp, Jagger, Publisher: Microsoft Press (Published: 3/2003).
2. Programming in C#: E. Balagurusamy, TMH, 2nd edition, 2008.
3. C# a beginners guide: Herbert Schildt, TMH, 4th edition, 2001.
4. Professional ASP.NET 2.0: Bill Evjen, Scott Hanselman, Farhan Muhammed, Sirnivasa Sivakumar, Devin Rader, Wrox Publication, 2005.
5. Microsoft ASP.NET 2.0 Step by Step: George Shepherd, Microsoft Press, 2010.

HCT 4.2: Data Mining and Warehouse

Unit – I

Introduction: What is Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data cube Technology, From Data Warehousing to Data Mining, Data Mining, Functionalities, Data Cleaning, Data Integration and Transformation, Data Reduction. [08]

Data Mining Primitives, Languages, And System Architectures: Data Mining Primitives, Presentation and Visualization of discovered patterns, A Data Mining Query Language. [07]

Unit – II

Mining Association Rules In Large Data Bases Translation: Association Rule Mining Single-Dimensional Boolean, Association Rules from Transactional Databases, Mining Multilevel Association Rules From Transactional Databases. [15]

Unit – III

Classification And Predication: Issues regarding Classification and Predication, Classification by Decision tree induction, Bayesian Classification, Classification by Back propagation, Classification Based on the concepts from association rule mining, Other classification methods, Prediction. [15]

Unit – IV

Clustering: What is Cluster Analysis? Types of data in Cluster Analysis: A Categorization of Major Clustering Methods. Partitioning Methods, Hierarchical Methods, Density-Based Methods, Model-Based Clustering Methods: Statistical Approach, Neural Network Approach. Outlier Analysis [10]

Applications and Trends in Data Mining: Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining, Data Mining and Intelligent Query Answering, Trends in Data Mining. [05]

Reference Books:

1. Data Mining Concepts and Techniques: Jiawei Micheline Kamber, Morgan Kauf Mann Publishers, 3rd edition, 2011.
2. Modern Data Warehousing, Mining and Visualization: George M. Marakas, Pearson Education, 2003.
3. Building the Data Warehouse: W. H. Inmon, Wiley Dreamtech, Third Edition, 2002.

HCT 4.3: UML

Unit – I

Object Oriented Design and Modeling: Object Oriented Fundamentals, Objects and object classes, object oriented design process, importance of modeling, principles of modeling, object oriented modeling. [08]

Introduction to UML: Conceptual model of UML, building blocks of UML, Mechanisms in UML, architecture, software development life cycle. [07]

Unit – II

Basic Structural Modeling: Classes, relationships, common mechanisms, class and object diagrams. [07]

Advanced structural Modeling: Advanced classes, advanced relationships, Interfaces types and roles, packages, instances and object diagrams. [08]

Unit – III

Collaboration Diagrams and Sequence Diagrams: Terms, concepts and depicting a message in collaboration diagrams, Terms and concepts in sequence diagrams, Difference between collaboration and sequence diagram, Depicting synchronous messages with/without priority call back mechanism. [08]

Basic behavioral modeling: Interactions, use cases, Use Case Diagrams, Interaction Diagrams and activity diagrams. [07]

Unit – IV

Advanced behavioral modeling: Events and signals, state machines, process and threads, time and space, state chart diagrams. [07]

Architectural Modeling: Terms, Concepts, examples, Modeling techniques for component diagrams and deployment diagrams. [08]

Reference Books:

1. The Unified Modeling Language User Guide: Grandy Booch, James Rumbough, Ivar Jacobson, Pearson Education 2002.
2. Software Engineering: Ian Sommerville, Sixth Edition, 2003.
3. Fundamentals of Object Oriented Design in UML: Meilir Page Jones, Addison Wesley, 2000.

HCT 4.4: Finite Automata

Unit – I

Introduction to Finite Automata: Introduction to Finite Automata, the central concepts of Automata theory, deterministic finite automata, non-deterministic finite automata, and application, Finite automata with Epsilon-transition. [07]

Regular Expressions and Languages, Properties of Regular Languages: Regular Expression, Finite Automate and Regular Expressions, Applications of Regular Expressions, Proving languages not to be regular, Closure Properties of Regular Languages, Decision Properties of Regular Languages, Equivalence and minimization of automata. [08]

Unit – II

Context-Free Grammars and Languages: Context-free grammars, Parse trees, Applications, Ambiguity in grammars and languages. [07]

Pushdown Automata: Definition of the Pushdown automata, the languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata. [08]

Unit – III

Properties of Context Free Languages: Normal forms for CFGs, The pumping lemma for CFGs, Closure properties of CFLs. [06]

Introduction to Turing Machines: Problems those computers cannot solve, The Turing Machine, Programming techniques for Turing machines, extension to the basic Turing machine, Restricted Turing Machine, Turing Machine and Computers. [09]

Unit – IV

Undecidability: A Language that is not recursively enumerable, AN undecidable problem that is RE, Post's Correspondence problem, other undecidable problems. [15]

Reference Books:

1. Introduction to Automata Theory: J. P. Hopcroft, Rajeev Motwani, J.D. Ullman, Languages and Computation, II Edition, Pearson Education, 2001.
2. Introduction to Languages and Theory of Computation: John Martin, Tata McGraw Hill, 2003.
3. Introduction to Computer Theory: Daniel I. A., Cohen, 2nd Edition, John Wiley and Sons, Inc, 2000.
4. An Introduction to Formal Languages and Automata: Peter Linz, II Edition, Narosa Publishing House, 1997.

SCT 4.1: Distributed Computing

Unit – I

Structures and Models: The evolution of distributed information systems. Centralized and distributed systems, Characteristics of distributed systems.

Software structure: Modeling, architecting and engineering distributed software. Issues of scale and trust. [12]

Unit – II

Processing and Communication: Time – Theoretical Aspects: Logical clocks, Vector clocks, Global state, Physical and logical time, Event ordering. Clock synchronization. Message delivery ordering.

Algorithms and application protocols: Replication management. Strong and weak consistency, Asynchronous and synchronous algorithms, Atomic commitment. Process groups, Election Mutual exclusion.

Distributed Processing: Processes and threads, Synchronization, Inter-process communication, RPC.

Communication: Communication Models: Client server, Peer-to-peer.

Middleware: Overview of synchronous, asynchronous and event based middleware. [18]

Unit – III

Naming: Design of names, pure or hierarchical, Interpretation of names in context, Binding. Long term consistency.

Access control: Access Control Lists and capabilities in distributed systems, Role based access control, Policy expression and enforcement.

Security: Mechanisms, technology and security levels, Intrusion Detection and Tolerance. [12]

Unit – IV

Storage and Performance Issues: Distributed Object Technology: CORBA, COM and .net.

Storage: Design issues for networkbased storage services, Distributed Storage Systems.

Building distributed services: Scalability, performance, reliability, Load Balancing on the Internet, Distributed Multimedia Systems and QoS, Overlay and PeertoPeer Networks, Key Management, Group Communication, Web.

Issues and challenges: Wireless Computing, Pervasive/Ubiquitous Computing, Grid Computing. [18]

Reference Books:

1. Distributed systems: Tanenbaum, A.S. and van Steen M., PHI, 2002.
2. Distributed systems, concepts and design: Coulouris, G.F., Dollimore, J.B. and Kind berg, T., Addison Wesley, Fourth edition, 2005.
3. Pervasive Computing: Burkhart, Henn, Hepper, Rintdorff and Schaeck, Addison Wesley, 2002.
4. Distributed Systems and Networks: William Buchanan, McGraw Hill, 2000.

SCT 4.2: Computer Graphics

Unit – I

Introduction: Computer graphics and its applications in various fields. Hardware system for graphics working of different input devices, visual display devices and hard copy device. Introduction to different coordinate systems.

Raster Scan display: Concepts of resolution, aspect ratio refresh rate and frame buffer.

Random scan displays: Concepts of display file and display file interpreted comparison between raster scan and random scan. Implementation of graphics in 'C' language and study of various graphics functions. [15]

Unit – II

Line drawing methods: DDA algorithm and Bresenham's algorithm for different scope conditions, midpoint method for line generation.

Two-dimensional transformation: Mathematical treatment of basic transformation such as translation scaling and rotation. Development of composite transformation matrices using homogeneous coordinates. General fixed point scaling and pivot point rotation.

Clipping: Study of Cohen Sutherland line clipping procedure and Sutherland hodgmen polygon clipping procedure.

Windows and view ports: Derivation of generalized window to view port transformation matrix. Introduction to Interrupt driven programming in 'C' and interacting with the mouse. [15]

Unit – III

Three-dimensional Computer Graphics: Introduction to left and right hand coordinate systems. Basic 3D transformation. Hidden line removal.

Projection: Study of orthographic and oblique parallel transformation equations for them.

Graphic software standards: GKS and PHIGS. Study of various attributes of output primitives such as line attributes, area fill attributes and character attributes. Graphics Software Study: DirectX and Open GL [15]

Unit – IV

Segments: Concepts and advantages. Segment table various operations on segments. Data structures for the display file arrays on segment, linked list and paging schemes. Miscellaneous topics – Brief introduction to Bezier curves and their application, fractal morphing and animation. [15]

Reference Books:

1. Computer Graphics C Version: Donald Hearn and M. Pauline Baker, Pearson Education, 2nd Edition.
2. Principles of interactive computer graphics: Newman and Sproull, McGraw Hill, 1996.
3. Computer graphics: S. Harrington, McGraw Hill, 1997.
4. Graphics Under "C": Yeshwant Kanetkar, BPB, 1995.
5. Computer Graphics: Hearn Donald Pauling Baker M., EEE PHI, 1998.

Chairman
Ad hoc BOS in Computer Science