Solapur University, Solapur

M. C. A. Part - II

(Under Science faculty)

Syllabus (Semester – III and IV)

(Effective from June 2012)

MCA – II Semester III and IV
Syllabus

M. C. A. Part – II Semester-III

Paper Code	Paper No.	Title of the Paper	Contact hours/week	Distribution of Marks for Examination			Credits
				Internal	University	Total	
MCA-301	XI	Computer Communication Network	04	30	70	100	04
MCA-302	XII	Java Programming	04	30	70	100	04
MCA-303	XIII	Software Engineering	04	30	70	100	04
MCA-304	XIV	DBMS	04	30	70	100	04
MCA-305	XV	Computer Oriented Statistics	04	30	70	100	04
MCA-306		Practical - III	12	30	70	100	04
MCA-307		Project -III	02	30	70	100	04
		Total	**34**	**210**	**490**	**700**	**28**

M. C. A. Part – II Semester-IV

Paper Code	Paper No.	Title of the Paper	Contact hours/week	Distribution of Marks for Examination			Credits
				Internal	University	Total	
MCA-401	XVI	Distributed Operating System	04	30	70	100	04
MCA-402	XVII	Data Mining and Warehouse	04	30	70	100	04
MCA-403	XVIII	UML	04	30	70	100	04
MCA-404	XIX	**.**NET	04	30	70	100	04
MCA-405	XX	Finite Automata	04	30	70	100	04
MCA-406		Practical – IV	12	30	70	100	04
MCA-407		Project -IV	02	30	70	100	04
Total			**34**	**210**	**490**	**700**	**28**

MCA 301
Paper No. XI
Computer Communication Network

Unit 1. 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, The Relationship of Services to Protocols; Example of Networks; The Internet, The ARPANET, NSFNET, Internet usage, Architecture of the internet.

(8 L)

Unit 2. 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, Integrates Services, Differentiated Services; 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, The Interior Gateway Routing Protocol; OSPF, The Exterior Gateway Routing Protocol; BGP; Internet Multicasting; Mobile IP; IPV6.

(14L)

Unit 3. 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; The Internet Transport, Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol; The Internet Transport Protocols – TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management TCP Transmission Policy, TCP Congestion Control, TCP Timer Management, Wireless TCP and UDP, Transactional TCP.

(8L)

Unit 4. 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. (8L)

Unit 5. Network Security

Cryptography; Introduction to Cryptography, Substitution Ciphers, Transposition Ciphers, One-Time Pads, Two Fundamental Cryptographic Principles; Symmetric Key Algorithms; DES-The Data Encryption Standards, AES – The Advanced Encryption Standard; Public Key algorithms; RSA, Other Public Key algorithms; Digital Signatures, Symmetric-Key Signature, Public key Signature, Message Digests.

(6L)

Reference Books:

1. Andrew S. Tanenbaum, Computer Networks, 4 th Edition, Pearson Education, Asia, 2002.
2. Alberti Leon – Garcia and Indra Wadjaja, Communication Networks-Fundamental Concepts and Key Architectures, Tata McGraw Hill, Edition-2000.
3. Behrouz A Forouzan, Data Communications and Networking, Tata McGraw Hill, Second Edition, 2001.

MCA 302
Paper No. XII
Java Programming

Unit 1. 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. (6L)

Unit 2. Classes and Objects: defining a class, adding variables and methods, creating objects, constructors, class inheritance. (4L)

Unit3. Arrays and strings: creating an array, one and two dimensional arrays, string array and methods, String and StringBuffer classes, Wrapper classes. (4L)

Unit 4. Inheritance: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages. (6L)

Unit 5. Exception Handling: Fundamentals, exception types, uncaught exceptions, throw, final, built in exception, creating your own exceptions. (4L)

Unit. 6. Multithreaded Programming: Fundamentals of Java thread model, priorities, synchronization, messaging, thread class, Runnable interface, interthread Communication, suspending, resuming and stopping threads. (6L)

Unit 7. 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). (4L)

Unit. 8. 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.(6L)

Unit. 9. JDBC: JDBC API, JDBC Drivers, Products, JDBC Design considerations, Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements (4L)

References:

1. "Java-2 the complete Reference" by Patrick Naughton and Herbertz Schidt.
2. "Programming with Java" by E Balaguruswamy.
3. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.
4. Decker & Hirshfield, "Programming Java", Vikas Publication.

MCA 303
Paper No. XIII
SOFTWARE ENGINEERING

Unit 1. Introduction: Product and Process: Evolving role of software, software characteristic and components, crisis, myths, software engineering – a layered technology, software process, linear sequential model, prototyping model, RAD model, evolutionary software process model. (8L)

Unit 2. Software Process And Project Metrics: Measures, metric indicators, metric in process and the project domains, software measurement, metrics for software quality, software quality assurance. (4L)

Unit 3. Analysis Concepts And Principles: Requirement analysis, communication techniques, analysis principles, software prototyping & Specification. (6L)

Unit 4. Analysis Modeling: Elements of the analysis model, data modeling, functional modeling, behavioral modeling, the mechanics of structured analysis, data dictionary, other classical analysis methods. (6L)

Unit 5. Design Concepts & Principles: Software Design and software Engineering design process, Design principles, Design concepts, Design methods-Data design, Architectural design and process, Transform and Transaction mappings, Design post processing, Architectural design optimization, Interface design, Procedural design. (8L)

Unit 6. Software Testing Methods: Fundamentals, Test case design, White box testing, basis path testing, control structure testing, black box testing, Software testing strategies. (6L)

Unit 7. Object Oriented Software Engineering: Object oriented concepts, Identifying the elements of an object model, Management of object-oriented software projects, Object-oriented analysis, design and testing. (6L)

References:

1. Roger S. Pressman, Software Engineering, McGraw Hill(1997).
2. Shooman, Software Engineering, McGraw Hill(1987).
3. I. Sommerville, Software Engineering, International Computer Science Series(1985).
4. Booch, Object-Oriented Design & Analysis, Benjamin / Commings.
5. Rambaugh J., Bluha M., Premerlani W., Eddly Fand Lorenen W., Object-Oriented Modeling and Design, PHI(1991).
6. Ghezzi, Etal; Fundamentals of Software Engineering, PHI.

MCA 304
Paper No. XIV
DBMS

Unit 1- Introduction to Database Systems: Database – Definition, Limitations of traditional file processing systems, Advantages of DBMS, Users of DBMS (2L)

Unit 2 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. (4L)

Unit 3 Conceptual Database Modelling: 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 (6L)

Unit 4 Relational Database Systems: Characteristics, relation, attribute, tuple, domain, null, Normalization, Functional Dependencies, Multivalued Dependencies, 1NF, 2NF, 3NF, 4NF, 5NF, Boyce codd's normal form. (6L)

Unit 5 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. (6L)

Unit 6 **Transaction Management and Concurrency Control:** Transaction – properties (ACID), states, Concurrency control, locks, two phase locking serialization. (4L)

Unit 7 Distributed Databases: Standalone v/s Distributed databases, Replication, Fragmentation, Client/Server architecture, types of distributed databases. (4L)

Unit 8. 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. (4L)

Unit 9 Query Processing: Steps in query processing, advantages of optimization.(2L)

Unit 10 Object – Relational Databases: Abstract Datatypes, Nested Tables, Varying Arrays, Large Objects, Naming Conventions for Objects. (4L)

References:

1. Database System Concepts by Korth, Silberschatz, Sudarshan - McGraw Hill
2. Fundamentals of Database Systems by Navathe, Elmasari - Addison Wesley
3. Introduction to Database Systems by Date - Addison Wesley
4. Oracle 8i – The Complete Reference, by Kevin Loney, Geroge Koch - Tata McGraw Hill

MCA 305

Paper No. XV

Computer Oriented Statistics

Unit 1. Elementary Concepts: Various types of data, Frequency distribution, Tabulation, Graphical Representation of data.

Descriptive measures: Measures of central tendency, dispersion, skewness and kurtosis. (6L)

Unit 2. Probability and Porbability Distributions: Sample Space, equally likely outcomes, exclusive, exhaustive events. Definition of probability, examples of probability of various events. Addition and multiplication theorems of probability. Conditional probability, Bayes theorem and its applications. (8L)

Unit 3. Discrete probability distributions: Definition of random variable, Probability mass function (pmf) and probability distribution function (pdf),Bernoulli, Binomial, Poisson, Geometric, Hyper Geometric, Negative Binomial Distributions, Computation of mean and variance of these distributions and examples

(8L)

Unit 4. Continuous Distributions: Probability density function (pdf),normal and exponential distributions, computations of mean and variance and their important properties, computation of probabilities of various events, applications of these distributions.

(8L)

Unit 5. Simulation Techniques: Random Number (Uniform [0,1]) generation techniques, Random variate generation, inverse of c.d.f.,relation with uniform variate, rejection method

(8L)

Unit 6. Curve fitting: Regression, Correlation, fitting of exponential and power curves, Interpretation of correlation and Regression. (6L)

Emphasis be given for sampling from these distributions, Sketching the graphs of the p.m.f., Use of packages for the graphical representation, Developing algorithms for computation and their implementation.

References:

1. Bhat B.R., Srivenkatramana T. & Madhava, Rao K.S., Statistics (vol.1,2), (Newage international publiacation -96).
2. Chou Cy A Lin, Statistical analysis for Business and Economic, (Eleservier 1989).
3. Dixit.G. Statistics.
4. Devroye, Non uniform random variate Generation.
5. J.Medhi, Introduction to statistical methods.
6. Levin R.I. Statistics for management (Printice Hall, 1980).
7. Poul New Bold,Statistics for Business and Economics,(Printice Hall, New Jercy).
8. S. Ross, A First course in probability.
9. Kishore Trivedi: Introduction to probability and queuing theory for Engineers.

MCA 306 – Practical – III

The practical course will contain 30 practical assignments covering syllabi of all theory papers

MCA 307 - Project and Viva III

Project work.

MCA 401
Paper No. XVI
Distributed Operating System

Unit 1. Overview of Operating System: Operating System - concept, need and requirements of operating system, Processor, Memory, Device and File management, Virtual memory, Pipes, Deadlocks and Protection issues, Comparative study of Various types of operating systems. (6L)

Unit 2. Introduction to Distributed system: Goal, Hardware Concepts, Software concepts, Design issues. (8L)

Unit 3. Communication in distributed system: Layered protocols, client server model, remote procedure call, group communication, Comparison of Client Server Vs. Distributed operating system. (6L)

Unit 4. Synchronization in distributed system: Clock synchronization, mutual exclusion, election algorithms, automatic transaction, deadlocks in distributed systems. (6L)

Unit 5. Processes and processors in distributed systems: Threads, System models, processor allocation, Scheduling in distributed systems. (6L)

Unit 6. Distributed file system: Distributed file system, Design and Implementation trends in distributed file system. (6L)

Unit 7. Case study: Detail and comparative study of MS-windows NT and Novel Netware, Windows programming concepts. (6L)

References:

1. P. K. Sinha – Distributed Operating System-Concepts and Design.
2. A.S. Tanenbaum - "Modern Operating Systems" (HI).
3. Donovan Madnick, Operating System.
4. Peterson, Operating System.
5. Hansen Per Brinch, Operating systems principles.
6. Cowart, Windows NT 4 - Server and Workstation unleashed(Techmedia).
7. Helen Custer - "Inside Windows NT" (Microsoft ress).
8. Jeffery Richter - "Advanced Windows NT: The Developer's Guide to the WIN32 application Interface.
9. Peter Norton's maximizing Windows NT server 4 (Techmedia).
10. Peter Norton's complete guide to Windows NT workstation (Techmedia).
11. Charles et old - Programming windows 3.1 (Microsoft Press).
12.Novel Netware Manuals.

MCA 402
Paper No. XVII
Data Mining and Warehouse

Unit 1. 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. (6L)

Unit 2. Data Mining Primitives, Languages, And System Archtectures: Data Mining Primitives, Presentation and Visualization of discovered patterns, A Data Mining Query Language. (6L)

Unit 3. 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. (8L)

Unit 4. 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. (8L)

Unit 5. 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 (8L)

Unit 6. 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. (8L)

References:

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

MCA 403
Paper No. XVIII
UML

Unit 1. 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. (6L)

Unit 2. Introduction to UML: Conceptual model of UML, building blocks of UML, Mechanisms in UML, architecture, software development life cycle. (6L)

Unit 3. Basic Structural Modeling: Classes, relationships, common mechanisms, class and object diagrams. (6L)

Unit 4. Advanced structural Modeling: Advanced classes, advanced relationships, Interfaces types and roles, packages, instances and object diagrams. (8L)

Unit 5. 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. (6L)

Unit 6. Basic behavioral modeling: Interactions, use cases, Use Case Diagrams, Interaction Diagrams and activity diagrams. (6L)

Unit 7. Advanced behavioral modeling: Events and signals, state machines, process and threads, time and space, state chart diagrams. (4L)

Unit 8. Architectural Modeling: Terms, Concepts, examples, Modeling techniques for component diagrams and deployment diagrams. (4L)

References:

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

MCA 404
Paper No. XIX
.NET

Unit 1. Microsoft.NET framework: Structure, the common language runtime, JIT, CTS, Metadata. (4L)

Unit 2. 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. (8L)

Unit 3. Introduction to ASP.Net (6L)

- Introduction, difference between ASP & ASP.Net Application, Web Architecture Model, Introduction to Visual Studio for Web Application.

Application and Page Frameworks (6L)

- 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

ASP.NET Server Controls and Validation Controls (6L)

- ASP.Net Server Controls, Understanding Validation, Client-Side versus Server-Side Validation, Turning Off Client-Side Validation.

Working with Master Pages (8L)

- Need and basics of Master Pages, Master Page and Content Page, Programmatically Assigning the Master Page, Nesting Master Pages, Master Page Events.

ASP.Net State Management (6L)

Application State, Session State, Client & server storing, View state, Cache, Hidden Variable, Session object, Profiles, Overview of HTTP Handler & Modules.

References:

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

MCA 405
Paper No. XX
Finite Automata

Unit 1. 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. (4L)

Unit 2. 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. (8L)

Unit 3. Context-Free Grammars and Languages : Context-free grammars, Parse trees, Applications, Ambiguity in grammars and languages. (6L)

Unit 4. Pushdown Automata: Definition of the Pushdown automata, The languages of a PDA, Equivalence of PDA's and CFG's. Deterministic Pushdown Automata. (6L)

Unit 5. Properties of Context Free Languages: Normal forms for CFGs, The pumping lemma for CFGs, Closure properties of CFLs. (6L)

Unit 6. Introduction to Turing Machines: Problems that computers cannot solve, The Turing Machine, Programming techniques for Turing machines, extension to the basic Turing machine, Restricted Turing Machine, Turing Machine and Computers. (8L)

Unit 7. Undecidability: A Language that is not recursively enumerable, AN undecidable problem that is RE, Post's Correspondance problem, other undecidable problems. (6L)

Refernce Books:

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

MCA 406 – Practical – IV

The practical course will contain 30 practical assignments covering syllabi of all theory papers

MCA 407 - Project and Viva IV

Project work.

Chairman
Ad hoc BOS in Computer Science