



B

Accredited By NAAC

SHIVAJI UNIVERSITY, KOLHAPUR.

Revised Syllabus of

(T.Y. M.C.A. Part- III Sem –V & VI)

To be introduced from the academic year 2010-11
(i.e. from June 2010) Onwards

(Subject to the modifications will be made from time to time)

Shivaji University, Kolhapur.
REVISED STRUCTURE & SYLLABUS OF MCA
 (With effect from July-2010)

TYMCA PART – I

Code of the subject	Name of the subject	L	T	P	TH	TW	P/O	TOTAL
5TYMCAR1	Data Mining and Warehousing	4	2	-	100	25	-	125
5TYMCAR2	Information Security	4	-	2	100	25	25(O)	150
5TYMCAR3	Cloud computing	4	2	-	100	25	-	125
5TYMCAR4	Elective-I	4	-	-	100	-	-	100
5TYMCAR5	Elective-II	4	-	-	100	-	-	100
5TYMCAR6	Software Development Project-I	-	2	4	-	50	50(O)	100
Total		20	6	6	500	125	75	700
		Total Load: 32			Total Marks: 700			

TYMCA PART – II

Code of the subject	Name of the subject	L	T	P	TH	TW	Oral	TOTAL
6TYMCAR1	Software Development Project-II	-	-	4	-	100	100	200
Total		-	-	4	-	100	100	200
		Total Load: 4			Total Marks: 200			

Elective-I

1. Modelling and Simulation.
2. Internet programming using C#
3. E-Commerce

Elective-II

1. Advanced Unix Network Programming.
2. Mobile computing.
3. ERP.

[Note :- Examination scheme and term work marks strictly as per above structure]

Note:

1. For the purpose of the workload, project batch of third year MCA students should be considered for 9 students.

5TYMCAR1 – DATA MINING & WAREHOUSING

Lectures: 4 hrs/week
Tutorials: 2 hrs/week

Theory: 100 Marks
Term work: 25 Marks

SECTION - I

1. **Data Mining in Context:** What is Data Mining, What can Data Mining do? The Business Context for Data Mining, The Technical Context for Data Mining, the societal context for Data Mining, four approaches for Data Mining. (6)
2. **Data Mining Methodology:** Two styles of Data Mining, The Virtuous Cycle Of Data Mining, Identifying The Right Business Problem, Transforming Data Into Actionable Results, Acting On The Results, Measuring The Models Effectiveness, What Makes Predictive Modeling Successful? (6)
3. **Data Mining Techniques & Algorithms:** Different Goals For Different Techniques, Three Data Mining Techniques, Automatic Cluster Detection, Decision Trees, Neural Networks. (4)
4. **Data, Data Everywhere:** What Should Data Look Like, What Does Data Really Look Like? How Much Data Is Enough? Derived Variables, Case Study: Defining Customers Behavior, Dirty Data (4)

SECTION – II

5. **Building Effective Predictive Models:** Building Good Predictive Models, Working With The Model Set, Using Multiple Models, Experiment. (4)
6. **Taking Control:** Getting Started, Case 1: Building Up A Core Competency Internally, Case 2: Building A New Line Business, Case 3: Building Data Mining Skills On Data Warehouse Efforts, Case 4: Data Mining Using Tessera RME. (6)
7. **System Process & Process Architecture:** Introduction, Typical Process Flow Within A Data Warehouse, Extract & Load Process, Clean & Transform Process, Backup & Archive Process, Query Management Process, Load Manager, Warehouse Manager, Query Manager Detailed Information, Summary Information, Metadata, Data Marting. (6)
8. **Database Schema:** Introduction, Starflake Schemas, Identifying Facts & Dimensions, Designing Fact Tables, Designing Dimension Tables, Designing The Starflake Schema, Query Redirection, Multidimensional Schemas. (4)

Text Books:

1. Mastering Data Mining – Michael J. A. Berry & Gordon S. Linoff (WILEY publ.)

Reference Books:

1. Data Warehousing (Pearson Ed.) – Sam Anahory & Dennis Murray

Term work : It should consist of minimum 10-12 assignments based on the topics of the syllabus.

5TYMCAR2 - INFORMATION SECURITY

Lectures: 4 hrs/week
Practical: 2 hrs/week

Theory: 100 Marks
Term work: 25 Marks
Oral Exam: 25 Marks

SECTION - I

1. **Introduction-** Security trends, OSI security architecture, security attacks, security services, security mechanisms, A model for network security (4)
2. **Classical Encryption Techniques-** Symmetric cipher model, substitute techniques, transposition techniques, rotor machines, steganography, Block cipher model principles, the Data encryption standard, strength of DES, differential and linear cryptanalysis, block cipher design principles. Block cipher modes of operation. (6)
3. **Public key Cryptography -** Principles of public key cryptography, RSA algorithms. Key Management, Diffie-Hellman key Exchange, Elliptic Curve Architecture and Cryptography. (4)
4. **Message authentication and hash functions -** authentication, requirements, authentication functions, message authentication codes, hash functions, security hash functions (6)

SECTION - II

5. **Digital signature and authentication protocols-** digital signature, authentication protocols, digital signature standards. (4)
6. **Network security applications-** Kerberos ,X.509 authentication service, electronic mail security, pretty good privacy, S/MIME, IP security overview and architecture, authentication header, encapsulating security payload, combining security associations, key management. (6)
7. **Web security-** web security considerations, secure socket layer, transport layer security, secure electronic transaction. (4)
8. **Intruder-** Introduction, intrusion detection, password management, viruses and related threats, virus countermeasures, distributed Denial of services attacks, Firewall Design principles, trusted system (6)

Text Book:

1. William Stallings, "Cryptography And Network Security – Principles and Practices", Prentice Hall of India, Third Edition, 2003.

Reference Books:

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in, Third Edition, Pearson Education, 2003.

Term work: It should consist of minimum 10-12 experiments based on the syllabus.

5TYMCAR3- CLOUD COMPUTING

Lectures: 4 hrs/week
Tutorials: 2 hrs/week

Theory: 100 Marks
Term work: 25 Marks

SECTION - I

1. **Introduction:** Cloud computing basics, overview, Applications, Internet and the Cloud, first movers in cloud, organization and cloud computing, benefits, limitations, security concerns, regulatory issues. (6)
2. **Cloud computing with Titans:** Google, EMC, NetApp, Microsoft, Amazon, Salesforce, IBM, partnerships. (4)
3. **The Business Case for Going to the Cloud:** Cloud Computing Services ,How Those Applications ,Help Your Business ,Deleting Your Datacenter ,Salesforce.com ,Thomson Reuters (6)
4. **Cloud Computing Technology:** Hardware and Infrastructure, Clients , Security , Network, Services (4)

SECTION - II

5. **Accessing the Cloud:** Platforms , Web Applications , Web APIs ,Web Browsers ,Cloud Storage Overview , Cloud Storage Providers . (4)
6. **Standards:** Application , Client , Infrastructure ,Service , Software as a Service: Overview , Driving Forces , Company Offerings , Industries . (4)
7. **Software plus Services:** Overview ,Mobile Device Integration ,Providers Microsoft Online (6)
8. **Developing Applications:** Google ,Microsoft ,Intuit QuickBase ,Cast Iron Cloud ,Bungee Connect (4)

Text book:-

1. Cloud Computing: A Practical Approach by Anthony T. Velte, Toby J. Velte and Robert Elsenpeter McGraw-Hill/Osborne © 2010 Citation.

Reference book:-

1. Cloud Computing: Implementation, Management, and Security by John W. Rittinghouse and James F. Ransome Auerbach Publications © 2010 Citation.

Term work : It should consist of minimum 10-12 assignments based on the topics of the syllabus.

5TYMCAR4-ELECTIVE I- (1) MODELLING AND SIMULATION

Lectures: 4 hrs/week

Theory: 100 Marks

SECTION- I

1. **Introduction to simulation** : Need of simulation, Advantages and disadvantages, Applications of simulation, Generic structure of simulation models. (4)
2. **General Principles of simulation and simulation softwares** : Concepts in discrete event simulation, list processing. Examples of simulation : queuing system, inventory system, Historical review of simulation softwares, simulation in C++, Simulation in GPSS, Simulation in CSIM, Simulation packages, current trends in simulation softwares. (6)
3. **Input and Output modeling** : Collecting data and identifying, parameter estimation, goodness of fit tests, Input models and their selection, stochastic nature of output data, performance measures and estimation, termination of simulation, Output analysis for steady state simulations. (4)
4. **Verification and validation of simulation models** : Model building verification, calibration and validation. (6)

SECTION – II

5. **Simulation Models:**
 - a) Statistical models : Terminology and concepts, useful statistical models, Discrete and Continuous distribution poisson. (6)
 - b) Queuing Models : Characteristics of queuing systems, Notations, performances measuring parameters of queuing systems, steady state behavior of infinite and finite population Markov models, Networks of queues. (8)
6. Finite state Machines, Petri net as simulation Model, colored petri nets. (4)
7. **Simulation of computer systems** : Simulation tools: process orientation, Event orientation, Modeling the input, High level computer system simulation, CPU simulation, Memory simulation. (4)

Text Books:

1. Discrete Event System Simulation By Jerry Banks, John Carson Etc, Pearson Education Asia, Low Price Edition, Third Edition.
2. Flexible Manufacturing Systems-Performance Modelling and analysis By Y. Narhari and Vishwanadham, PHI Publication (For chapter No.6)

Reference Book:

1. Simulation, Modeling and analysis by Law and Kelton, 2 edition, MGH Publication

5TYMCAR4- ELECTIVE I- (2) INTERNET PROGRAMMING USING C#

Lectures: 4 hrs/week

Theory: 100 Marks

SECTION - I

1. **Introduction to C# and .NET Programming** : The .NET Framework, C# Language, The Structure of C# application, Types, variables, Definite assignment, constants, string, statement, expression, white space. Branching Unconditional branching statement, conditional branching statements, Iteration (looping) statements Operators, The assignment operators, mathematical operator, increment and decrement, relational operator. The Development Environment, writing and executing program. (6)
2. **Object-oriented Programming using C#** : Classes and Objects, Class relationship, encapsulation, specialization, polymorphism, object-oriented analysis and design. interfaces, structs, arrays, Collection interfaces and types, strings, exception handling, Delegates and events. (4)
3. **Windows Forms** : Creating a Windows Form Application, Class Hierarchy, Windows Functionality, Standard Controls and Components –Button, Checkbox, RadioButton, ComboBox, List Box, and Checked ListBox, DateTimePicker, ImageList, Label, ListView, PictureBox, ProgressBar, Textbox, RichTextBox, ToolStrip, Form Class, Multiple Document Interface. Custom Controls (4)
4. **Assemblies** : Features of Assemblies, Assembly Structure, Assembly Manifests, Private and Shared Assemblies, Satellite Assemblies, Viewing Assemblies, Creating Assemblies, Assembly Attributes, Dynamic Loading, Application Domains, Strong Names, Global Assembly Cache, Delayed Signing of Assemblies, Configuring .NET Applications, Versioning, Runtime Version. (6)

SECTION – II

5. **Security** : Authentication and Authorization, Client Application Services, Encryption, Code Access Security, Permissions, Policy Levels: Machine, User, and Enterprise, Managing Security Policies, Turning Security On and Off, Creating a Code, Changing a Code Group's Permissions , Creating and Applying Permissions Sets, Distributing Code Using a Strong Name, Distributing Code Using Certificates. (6)
6. **Localization** : System.Globalization, Unicode Issues, Cultures and Regions, Cultures in Action, Resources, Windows Forms Localization, Culture, Using Custom Resource Messages, WPF Application, .NET Resources, Localization with XAML, Custom Resource Reader, Creating Custom Cultures. (4)
7. **Manipulating XML** : XML Standards Support in .NET, Xml Namespace, Xml Classes, Reading and Writing Streamed XML, XmlReader Class, Using the DOM in .NET, XmlDocument Class, XPathNavigators, XML and ADO.NET, Converting ADO.NET Data to XML , Converting XML to ADO.NET Data, Serializing Objects in XML, Serialization Without Source Code Access. (6)

8. **Windows Services** : Windows Service, Services Architecture, Service Program, ServiceProcess Namespace, Class Library Using Sockets ,TcpClient Example, Threading and Services, Service Installation, Monitoring and Controlling the Service, MMC Computer Management, ServiceController, Troubleshooting, Interactive Services Event Logging ,Power Events (4)

TextBook:

1. C#.Net - Wrox Publications
2. C#.Net By SPD publications

5TYMCAR4 – ELECTIVE-I (3) E-COMMERCE

Lectures: 4 hrs/week

Theory: 100 Marks

SECTION – I

1. **Internet and World Wide Web:** An overview of the internet, Brief history of the web, Web system architecture, Uniform resource locator, Overview of the hypertext transfer protocol, Hypertext Transfer Protocol (HTTP), Generation of dynamic web pages, cookies, HTTP/1.1, Example (6)
2. **Client-Side Programming:** Important factor in client-side or web programming, web page design and production,, overview of HTML, Basic structure of an HTML document, Basic text formatting, Links, Images, Image Map, Tables, Frames, Form, Cascading style sheets, JavaScript. (4)
3. **Server Side Programming I: Servlet fundamentals:** Revisiting the three- tier model, Common gateway interface (CGI), Active Server Pages (ASP), Overview of Java servlet, Java servlet architecture, Overview of the servlet API, Building the virtual bookstore-step by step, Compilation and execution of servlets, An interactive servlet program example: topics of interest. (4)
4. **Server-side Programming II: Database Connectivity:** Introduction, Relational Database System, JDBC perspectives, A JDBC programme example, simple servlet book query, An advanced book query: ServletBookquerymulti, Advanced JDBC servlet: VBS advance book search engine. (6)

SECTION – II

5. **Server-side programming III: Session Tracking:** Introduction, Traditional session tracking techniques, The servlet session tracking API, A practical case: VBS shopping cart. (4)
6. **Basic Cryptography for Enabling E-Commerce:** Security concerns, security requirements, Encryption, Two basic principles for private key encryption, The key distribution problem, Diffie-Hellman key exchange Protocol, public key encryption, RSA encryption algorithm, Hybrid encryption, Other public key encryption methods, Stream cipher and block cipher, Message digest, Message authentication code, Digital signature, Digital signature standard, Authentication. (6)

7. **Internet Security:** IPSec protocol, setting up security association, the authentication header (AH) service, The encapsulating security payload (ESP) service, Preventing replay attack, Application of IPSec: Virtual private network, Firewalls, Different types of firewalls, Examples of firewall system, Secure socket layer (SSL). (6)
8. **Advanced Technology for E-Commerce:** Introduction to mobile agents, WAP : The enabling technology for mobile commerce, XML (eXtensible Markup Language), Data mining. (4)

Text Books:

1. E-Commerce – Fundamentals and Applications – Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang (Wiley)

5TYMCAR5 –ELECTIVE II - (1) ADVANCED UNIX NETWORK PROGRAMMING

Lectures: 4 hrs/week

Theory: 100 Marks

SECTION – A

1. Review of OSI model. Processes. Client server model. The Unix model: Basics. I/O. Signals. Process control in Unix, Interprocess communication under Unix: Pipes, Messages, Streams and Sockets. (7)
2. Communication protocols review. TCP/IP, XN, SNA,UUCP, Berkeley sockets: overview, socket related systems calls, input output multiplexing.systems V transport layer interface. (6)
3. Library routines: introduction, Berkeley Library routines. Security routines: BSD routines, time & Date routines: Internet time and date client, time synchronization. Ping routines, Introduction. Internet ping client. XNS echo client. (7)

SECTION - B

4. File transfer protocol; protocol, security, data formats, connections. UDP & TCP implementation. Line printer spoolers: BSD spoolers, System V spollers. Remote command execution. (7)
5. Remote login; introduction, terminal line disciplines, Example of remote login, concepts of pseudo terminals, terminal modes, window environments, Flow control. Remote login servers, remote login clients and their implementation. (7)
6. Performance; IPC performance, disk performance, network performance. Introduction to remote procedure calls, transparency issues, Sun RPC, Linux RPC, Xerox courier, Appollo RPC. (7)

Text book:

1. R. Stevens: Unix Network Programming (PHI) Vol. I&II

Reference books: 1. D.E. Comer: Internetworking with TCP/IP(PHI) Vol. I & II, III.

5TYMCAR5 – ELECTIVE II - (2) MOBILE COMPUTING

Lectures: 4 hrs/week

Theory: 100 Marks

SECTION – I

1. **Introduction:** Applications, A short history of wireless communications, A market for mobile communications, Some open research topics, A simplified reference model, overview, review exercise, references. (6)
2. **Wireless Transmission:** Frequencies for radio transmission, signals, antennas, signal propagation, multiplexing, modulation, spread spectrum, cellular systems, summary. (6)
3. **Medium Access Control:** Motivation for a specified MAC, SDMA, FDMA, TDMA, CDMA, comparisons of S/T/F/CDMA. (6)
4. **Telecommunications Systems:** GSM, DECT, TETRA, UMTS & IMT-2000, summary. (6)

SECTION – II

5. **Wireless LAN:** Infra red vs radio transmission, infrastructure & ad-hoc network, IEEE 802.11, HIPERLAN, Bluetooth, summary. (6)
6. **Mobile Network Layer:** Mobile IP, Dynamic host configuration protocol, Mobile ad-hoc networks, summary. (5)
7. **Overview of the Wireless Application protocol:** The Origins of WAP, overview of the WAP Architecture, Components of the WAP standard, Network Infrastructure services supporting WAP Architecture Design Principles, Relationship to other Standards, conclusion. (7)

Text Books:

1. Mobile Communications (second edition)
By Jochen Schiller

Reference Books:

1. The Wireless Application Protocol (PEA) By Sandeep Singhal, Jari Alvinen

5TYMCAR5 –ELECTIVE II- (3) ENTERPRISE RESOURCE PLANNING

Lectures: 4 hrs/week

Theory: 100 Marks

SECTION – I

1. **ERP – Curtain Raiser:** An overview, Accommodating variety, Integrated Management Information, Seamless Integration, Supply Chain Management, Resource Management, Integrated data model, Scope, Technology, Benefits of FRP, Evolution, ERP revised, ERP & Modern Enterprise, problems. (6)
2. **Business Engineering & ERP:** An overview, what is Business Engineering (BE)? Significance of BE, Principles of BE, BPR, ERP & IT, BE with IT, ERP and Management concerns, problems. (4)
3. **Business Modeling for ERP:** An overview, Building the Business Model, problems. (4)
4. **ERP Implementation:** An overview, Role of consultants, vendors & users, customization, precautions, ERP: Post-implementation options, ERP implementation methodology, Guidelines for ERP implementation, problems. (6)

SECTION – II

5. **ERP and the Competitive Advantage:** An overview, ERP & competitive strategy, problems. (4)
6. **The ERP domain:** An overview, MFG/PRO, OFS/Avalon – Industrial & Financial Systems, Baan IV, SAP, SAP R/3 Applications, Examples of as Indian ERP package, The arrival of ERP III, problems. (6)
7. **Making of ERP:** An overview, Market Dynamics & Competitive Strategy, problems. (4)
8. **Case Studies:** An overview, Mercedes-Benz, Kee Hin Industries, Bull Electronics Angers Plant Manufactures, Ameritech, Essar Steel, Jindal Iron & Steel Company Ltd, Godrej Soaps ans associates companies, Indian Renewable Energy Development Agency (IREDA), ERP Handles Pressure, Sara ERP case study – Hawkins Cookers Ltd, A wholesome enterprise application, Sara IEMS (ERP III) case study – Pan Century, Oleochemicals, Malaysia. (6)

Text Books:

1. Enterprise Resource Planning – Concepts & Practice (Second Edition) By V. K. Garg & N.K. Venkitakishnan

Reference Books:

1. ERPWARE – ERP Implementation Framework By V. K. Garg & N. K. Venkitakishnan

5TYMCAR6 –SOFTWARE DEVELOPMENT PROJECT-I

Tutorials: 2 hrs/week
Practicals : 4 hrs/week

Term work: 50 Marks
Oral Exams: 50 Marks

The project batches of 2-3 students should be formed, which will work on the project allocated by the department. The batch must complete it during first semester only. Term work submission should be done in the form of a joint report.

The term work assessment will be done jointly by teachers appointed by Head of the Institution.

The oral examination will be conducted by an internal and external examiner as appointed by the University.

Note:

1. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
2. Two mid-term evaluations should be done, which includes presentations and demos of the work done.
3. **Care should be taken to avoid copying and outsourcing of the project work.**

6TYMCAR1 –SOFTWARE DEVELOPMENT PROJECT-II

Practicals : 4 hrs/week

Term work: 100 Marks
Oral Exams: 100 Marks

The software development project-II is 6 month project in industry/organization. The Evaluation of the term work will be done by the respective guide under whom the project is done in the industry/organization. The project viva will be conducted at the end of final year semester.

The project must be done individually. The candidate must submit project report to the institution in triplicate. The candidate is expected to select the project, carry out the requirements analysis, design and implementation of the project.

The Software Development Project –II must consist of the work on the topic selected for the project. The assessments of the term work should be done by internal examiners.

Practical/Oral Examination will consist of a presentation along with the demonstration of the project. The said examination will be conducted by a panel of examiners appointed by university authority.

Note:

1. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.

2. Two mid-term evaluations should be done, which includes presentations and demos of the work done.
3. Care should be taken to avoid copying and outsourcing of the project work.

EQUIVALENCES OF TYMCA SUBJECTS FOR REPEATER STUDENTS

TYMCA Part - I

Sub. Code	TYMCA (Pre-Revised)	Sub. Code	Equivalent / Replacement subject (Revised)
5SMCA1	E-commerce	5TYMCAR4	E-Commerce (Elective-I)
5SMCA2	Client-Server Computing	5TYMCAR7	Client-Server Computing concepts
5SMCA3	Object Based Computing	5TYMCAR8	Object Based Computing concepts
5SMCA4	Elective-I a. ERP b. Mobile Computing c. Distributed Databases d. AI & Expert Systems	5TYMCAR5 5TYMCAR5 5TYMCAR9 5TYMCAR10	a. ERP (Elective-II) b. Mobile Computing c. Distributed Database concepts d. AI & Applications
5SMCA5	Elective – II a. Bio-Informatics b. Image Processing c. Neuro-Fuzzy Systems d. Data warehousing & Data Mining	5TYMCAR11 5TYMCAR12 5TYMCAR13 5TYMCAR1	a. Bio-Informatics: Theory & Practice b. Image Processing concepts c. ANN Systems. d. Data Mining & Warehousing

SYLLABUS OF EQUIVALENT SUBJECTS

5TYMCAR7 - CLIENT SERVER COMPUTING CONCEPTS

Theory: 100 Marks

SECTION - I

1. **Java networking model:** networking basics, java & the net, InetAddress, TCP/IP client sockets, URL, URL connection, TCP/IP Server sockets, A caching proxy HTTP Server, Datagrams.

2. **Java Database Connectivity:** The design of JDBC, The structured query language, installing JDBC, Basic JDBC programming concepts, Executing queries, scrollable and updateable result sets, metadata.
3. **Remote Method Invocations:** RMI, Setting up RMI, Parameter passing in remote methods, using RMI with Applets, Server object activation.

SECTION - II

4. **Servlets:** Background, The life cycle of servlet, using Tomcat for Servlet Development, A simple servlet, The Servlet API, The javax.servlet Package, Reading Servlet Parameters, The javax.servlet.http Package, Handling HTTP Requests & responses, using cookies.
5. **JavaBeans:** why Beans?, The Bean – writing process, using Beans to build application, naming patterns for Bean properties and events, Bean property types, adding custom Bean events, property editors, going beyond naming patterns.
6. **Basic JSP:** JSP syntax overview, Anatomy of JSP file, running JSP examples on Tomcat, Directives, Scripting elements, Action elements, running Tomcat's JSP example, objects in the JSP file, The JSP life cycle, object scope.

Text Books:

1. Core Java 2 – volume II – advanced features By Cay S. Horstmann & Gary Cornell
2. Java 2 – complete reference (fifth edition) By Herbert Schidt

Reference Books:

1. Professional JSP (second edition) By Brown, Burdick, Falkner, Galbraith.

5YTMCAR8 - OBJECT BASED COMPUTING CONCEPTS

Theory: 100 Marks

SECTION – I

1. **Introduction:** Software distribution, Dynamic Linking, Portability, Encapsulation features & C++, Interfaces & implementation, Abstract based as binary interfaces. Runtime polymorphism, Object extensibility.
2. **Interfaces:** IDL, Methods & results, Interfaces & IDL, IUnknown, Resource management and IUnknown, Type coercion, IUnknown implementation, Using CoM interface pointers, Query Interface optimization, Data types, Attributes, Properties and Exceptions.
3. **Classes:** Interface & implementation, Class objects, Activation, Using SCM, Classes & Services, generalizations, optimization, monitors, compositions, persistence, Service lifetime, Classes & IDL.

SECTION – II

4. **Objects:** QueryInterface properties: Symmetric, Transitivity, Reflexivity, Static types, QueryInterface & IUnknown, Uniqueries & identity, Multiple interface and method names.
5. **Apartments:** Basic concepts, Cross-apartment Access, In-process marshalling, Helpers, Standard marshalling Architecture, Life cycle management & marshalling, Custom marshalling.
6. **Applications:** Inprocess Activation pitfalls, Activation & SCM, Application IDS, COM and security, Programmatic security, Access control, Token management, Pointers & memory, Arrays, Dynamic Vs static invocation.

Text Books:

1. Essential COM ---- Don Box. (Addison – Wesley (LPE))

Reference Books:

1. MFC Programming Unleashed (Techmedia)
2. COM/DCOM Unleashed (Techmedia)
3. COM /CORBA side by side ----J. Pritchard (Pearson Education)

5TYMCAR9 - DISTRIBUTED DATABASE CONCEPTS

Theory: 100 Marks

SECTION – I

1. **Introduction:** Features of distributed Vs centralized databases, uses of distributed databases, Distributed databases management System (DDBMS)
2. **Levels of Distribution transparency:** Architecture for Distributed Databases, Types of Data Fragmentations, Distribution Transparency for update application, Distributed database access primitives.
3. **Distributed Database Design:** A framework for Distributed database design, Design of database fragmentation.
4. **Transportation of Global Queries to fragmented queries:** Equivalence transformation for queries, Transforming global queries into fragment queries, Distributed Grouping and Aggregate function evaluation, Parametric queries, Framework for query optimization, Join queries.

SECTION – II

5. **The management of distributed transactions:** A framework for transaction management, Supporting atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions.
6. **Concurrency Control:** Foundations of distributed concurrency control, Distributed deadlocks, concurrency control based on time stamps.
7. **Reliability:** Basic Concepts, Non-blocking commitment: Protocols, Reliability and concurrency control, Determining consistent view of the network, Detection and Resolution of inconsistency.
8. **Distributed database Administration:** Catalog management in distributed databases, Authorization and protection, a distributed database manager based on adaplex, Multibase.

Text Books:

1. Distributed Databases – Principles & Systems by Stefano Ceri, Giuseppe Pelegatti (MGH)

Reference Books:

1. Database Management System Concepts By Silberschatz, Korth & Sudharshan (MGH)
2. An Introduction to Database Systems By Bipin Deasi (Galgotia Publications)
3. Distributed Computing System By Parkar & Versus (Academic Press)
4. Distributed Databases - – Principles & Systems by Carl & Pelegatti (MGH)
5. Distributed Systems –Methods & tools- Lecture Notes in Computer Science Vol. 190 (springer Verlag)

5TYMCAR10– AI & APPLICATIONS

Theory: 100 Marks

SECTION - I

1. **Expert System:** Nature of expertise, Characteristics of expert system, Acquiring & representing knowledge, Controlling reasoning & explanation of solutions.
1. **Knowledge Representation:** Knowledge representation schemes, Power of knowledge, Principles & techniques of knowledge representations STRIPS planner, Operator tables & means-end analysis, Study of subgoaling.
2. **Symbolic computation:** Symbolic representations, Physical symbol systems, Implementing symbol structures in LISP, Data structure & programs in LISP.
3. **Rule based systems:** Canonical systems for problem solving, Rules, Working memory, Controlling the behavior of the interpreter, Conflictres union.

SECTION - II

4. **Logic Programming, Uncertainty & knowledge acquisition:** Resolution refutation, Proof search in resolution systems, Procedural deduction, Search rule & explicit search control, Sources of uncertainty, Expert systems & probability theory, Certainty factors, Fuzzy sets & logic uncertainty, State of uncertainty, Ontological analysis, Expert system shells, Knowledge acquisition methods.
5. **Heuristic classification & constructive problem solving:** Classification of expert system tasks, Heuristic matching, Mapping tools to task, Confidence factors & evaluation, Managing complexity on prototypes, Constrains & reasoning with constrains, Knowledge elicitation, Architecture for planning.
6. **Tools for building Expert Systems:** Overview, Shells, Shells to tasks, Inflexibility, Constraints of production rule languages, Multiple paradigm programming environments, Software tools , The blackboard environment, Tracing dependencies using TMS.

Text Books :

1. Introduction to Expert Systems - Peter Jackson (Addison Wesley) Pearson Education Asia

References :

1. Expert Systems-Principles & practice A Bonnet, JP Haton, J-M Truong NGOC(Prentice Hall)
2. Decision support & expert systems-Management Support Systems Efrain Turban(Macmillan publishing company)
3. A Practical Guide to Designing Expert System-Sholon M.Weiss & Casimir A Kulikowski (Rowmann Allanheld)

5TYMCAR11 – (BIO-INFORMATICS : THEORY & PRACTICE)

Theory: 100 Marks

SECTION – I

1. **Introduction:** Biology in the computer age, How is computing changing biology? Isn't a bioinformatics just about building database? What does informatics mean to biologists? What challenges does biology offers computer scientist? What skills should a Bioinformatician have? Why should biologists use computers? How can configure PC to do bioinformatics research? What information & software are available? Can I learn a programming language without classes? How can I use web information? How do I understand sequence alignment data? How do I write a program to align two biological sequences? How do I predict protein structure from sequence? What questions can bioinformatics answer?
2. **Tools for Bioinformatics:** Biological Research on the web, Using search engines. Finding scientific articles. Public biological databases, Searching biological databases, Depositing data into the public databases, Finding softwares, Judging the quality of information

3. **Sequence Analysis, Pairwise alignment & Database searching:** Chemical composition of biomolecules, Composition of DNA & RNA, Watson & Crick Solve structure of DNA, Development of DNA sequencing methods, Gene finders & feature detection in DNA, DNA translation, Pair wise sequence comparison, Sequence queries against biological databases.
4. **Multiple sequence Alignments ,Trees & profiles:** The morphological to the molecular, Multiple sequence alignment, Phylogenic analysis, Profiles & motifs.

SECTION - II

5. **Predicting protein structure & function from sequence:** Determining the structure of the proteins, Predicting the structure of proteins, From 3D to 1D, Feature detection in protein sequences, Secondary structure prediction.
6. **Tools for Genomic & Proteomics:** From sequencing genes to sequencing genomes, Sequence assembly, Accessing genome information on the web, Annotating and analyzing whole genome sequences, Functional genomics new data analysis challenges, Proteomics.
7. **Building biological databases:** Types of databases, Database software, Introduction to SQL, Installing the MySQL DBMS, Database design, Developing web based software that interacts with databases.
8. **Visualization And Data Mining:** Preparing your data, Viewing graphics, Sequence data visualization, Networks and pathway visualization, Working with numerical data, Visualization: summary, Data mining & biological information.

Text Books:

1. Developing Bio-informatics computer skills-Cynthia Gibas & Per Jambeck (O'REILLY)

5TYMCAR12– IMAGE PROCESSING CONCEPTS

Theory: 100 Marks

SECTION – I

1. **Image, digitized image and it's properties :** Introduction, steps in digital image processing, Components of an image processing system, image sensing and acquisition, image sampling and quantization, elements of visual perception and its attributes, digitized image – image function, mathematical representation. Image digitization- Sampling and Quantization, Properties – distance, pixel, adjacency, region, background, holes, brightness, segmentation, border, edge, convex hull, histograms, color, noise. Image analysis – level of image data, representation traditional and hierarchical data structures.

2. **Image pre-processing:** Brightness transformation, geometric transformation, local processing, image smoothing and edge detection, introduction to image restoration.
3. **Image enhancement in special domain:** Threshold edge-based segmentation, edge relaxation border tracing, hough transform, region-based segmentation.
4. **Image enhancement in frequency domain:** Fourier transform, 1-D, 2-D, DFT, Handmard transform, discrete cosine transforms, application of image transform.

SECTION – II

5. **Color image processing:** Color fundamentals, color models, RGB, CMY-CMYK, HIS color models, Pseudo color image processing – intensity slicing, gray level to color transforms, Color transformation – formulation, color complements, color slicing, tone and color corrections, smoothing and sharpening.
6. **Space reorientation and detection:** Region identification, color-based representation, chain codes, B-Spline reorientation, region-based representation, moments.
7. **Image compression:** Redundancy and fidelity criteria, error free compression, methods of compression, standards binary, continuous tone still, video.
8. **Object recognition:** Patterns and patterns classes, matching, statistical classification, Bayes classifier, Neural networks, Training algorithms, structural methods – matching shape numbers, string matching.

Text Book:

1. Computer vision and image processing by Milian Sonaka
2. Digital Image Processing by Gonzalez (Addision Wesley)

Reference:

1. Digital Image processing by Pratt.
2. Fundamental of digital image processing by A. K. Jain.

5TYMCAR13– ANN SYSTEMS

Theory: 100 Marks

SECTION – I

1. **Introduction:** Biological neuron, Macullah Pitts model, Principles of learning, AND/OR gates simulation by TLU
2. **Perceptron:** Discrete perceptron as a classifier, Decision and discriminate functions, Principle of supervised learning, Linearly non-separable patterns, Perceptron training for two class.

3. **Multilayer Networks:** Continuous perceptrons, Widrow - Hoff & Delta rule for training, Training algorithms for two category & multi category classifier, Error back propagation algorithm
4. **Performance:** Performance of feed forward multilayer networks, Accelerating learning process, Design considerations, Adaptive multilayer algorithms.- Merchands, Neural Tree & Titling Algorithms.

SECTION - II

5. **Unsupervised learning:** Hebbian learning, Hamming net & Maxnet for classification, Competitive learning, K means clustering & LVQ algorithms, Adaptive resonance theory, ART1 algorithm.
6. **Associatives Memories:** Auto association & hetero association. Hopfield network, discrete hopefield for classification, storage capacity of hopefield network, continuous hopefield network, gradient hopefield network for optimization.
7. **Optimization Techniques:** Hopfield network for optimization, Traveling salesman problem, Iterated gradient descent techniques, Simulated anneal technique, Random search technique, Genetic algorithm for optimization problems.
8. **Application Of Artificial Neural Network:** Character recognition, speech recognition & signature verification applications, Human face recognition using neural networks.

Text Book :

1. Introduction to Artificial Neural System – Zurada (JAICO)

References :

1. Elements of Artificial Neural Networks - Mehrotra, Mohan, Ranka(PENRAM)
2. Introduction To Artificial Neural Netwoks - B. Yegnanarayana (PHI)