

CS 801

SOFTWARE TESTING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Unit-I

A Mathematical Context: A Perspective on Testing, Examples
Functional Testing: Boundary Value Testing, Equivalence Class Testing, Decision Table-Based Testing, Retrospective on Functional Testing.

Unit-II

Structural Testing: Path Testing, Dataflow Testing, Retrospective on Structural Testing.

Unit-III

Integration and System Testing: Levels of Testing, Integration Testing, System Testing, Interaction Testing.

Unit-IV

Object-Oriented Testing: Issues in Object-Oriented Testing, Class Testing, Object-Oriented Integration Testing, GUI Testing, Object-Oriented System Testing.

Unit-V

Millennium Testing: Exploratory Testing, Model-Based Testing, Test-Driven Development, All Pairs Testing, Software Testing Excellence.

Suggested Reading:

1. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, 3rd Edition, CRC Press, 2007.
2. Boris Beizer, Software Testing Techniques, Dreamtech, 2009.

CS 802

MIDDLEWARE TECHNOLOGIES

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Unit – I

Client/Server Concepts: Client-Server, File Server, Database server, Group server, Object Server, Web server, Middleware – General middleware – Service specific middleware. Client/Server Building blocks – RPC – Messaging – Peer- to- Peer. Web Services – SOA, SOAP, WSDL, REST Services.

Unit – II

EJB Architecture: EJB – EJB Architecture – Overview of EJB software architecture – View of EJB – Conversion – Building and Deploying EJBs – Role in EJB.

Unit – III

EJB Applications: EJB Session Beans – EJB entity beans – EJB Clients – EJB Deployment Building an application with EJB.

Unit – IV

CORBA: EJB – Distributed Systems – Purpose – Exploring CORBA alternatives – Architecture overview – CORBA and networking model – CORBA object model – IDL – ORB – Building an application with CORBA.

Unit – V

COM: COM - Data types – Interfaces – Proxy and Stub – Marshalling – Implementing Server/Client – Interface Pointers – Object Creation, Invocation, Destruction – Comparison COM and CORBA – Introduction to .NET – Overview of .NET architecture – Marshalling – Remoting.

Suggested Reading:

1. Robert Orfali, Dan Harkey and Jeri Edwards, The Essential Client / Server Survival Guide, Galgotia Publications Pvt.Ltd, 2002 (Unit 1).
2. Tom Valesky, Enterprise Java Beans, Pearson Education, 2002 (Unit 2 & 3).
3. Jason Pritchard, COM and CORBA side by side, Addison Wesley, 2000 (Unit 4 & 5).
4. Jesse Liberty, Programming C#, 2nd Edition, O' Reilly Press, 2002 (Unit5).
5. Arno Puder, Kay Romer and Frank Pilhofer, Distributed Systems Architecture, Morgan Kaufman, 2006.

References:

1. Mowbray, Inside CORBA, Pearson Education, 2002.
2. Jeremy Rosenberger, Teach yourself CORBA in 14 days, Tec Media, 2000.

CS 803

OBJECT ORIENTED SYSTEM DEVELOPMENT

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Unit – I

UML Introduction : Why we model, Introducing the UML, Hello World. Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams. Advanced Structural Modeling : Advanced Classes, Advanced Relationships, Relationships, Interfaces, Types and Roles, Packages, Instances, Object Diagrams , Components.

Unit – II

Basic Behavioral Modeling: Interactions, Use Cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams.
Advanced Behavioral Modeling: Events and signals, State Machines, Processes and Threads, Times and space, State Chart Diagrams.

UNIT – III

Architectural Modeling: Artifacts, Deployment Collaborations, Patterns and Frame works, Artifact diagrams, Deployment diagrams, Systems and models.

Unit – IV

Unified Software Development Process: The Unified Process, The Four Ps, A Use- Case- Driven Process, An Architecture, An Architecture – Centric Process, An Iterative and incremental Process.

Unit – V

Core Workflows: Requirements Capture , Capturing Requirements as Use Cases, Analysis, Design, Implementation, Test.

Suggested Reading:

1. Grady Booch, James Rumbaugh, Ivor Jacobson, The Unified Modeling Language – User Guide, (Covering UML 2.0) 2nd Edition , Pearson Education, India, 2007.
2. Ivor Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Pearson Education, India, 2008.

CS 804

ELECTRONIC COMMERCE

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT – I

Electronic Commerce – Electronic Commerce Frame Work , Electronic Commerce and Media Convergence, Anatomy of E- Commerce appellations, Electronic Commerce Consumer applications, Electronic Commerce Organization Applications.

Consumer Oriented Electronic Commerce – Consumer- Oriented Applications, Mercantile Process Models, Mercantile Models from the Consumers’s Perspective., Mercantile Models from the Merchants’s Perspective.

UNIT – II

Electronic Payment systems – Types of Electronic Payment Systems, Digital Token – Based Electronic Payment Systems , Smart Cards Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk and Electronic Payment systems , Designing Electronic Payment Systems .

UNIT – III

Inter Organizational Commerce And EDI- Electronic Data Interchange , EDI applications in business, EDI:Legal, Security, and Privacy issues, EDI and Electronic Commerce

EDI Implementation,MIME , and Value added net works.-Standardization and EDI, EDI Software Implementation, EDI Envelope for Message Transport, Value-Added Networks, Internet-Based EDI.

Intraorganizational Electronic Commerce – Internal Information Systems, Work Flow Automation and Coordination, Customization and internal Commerce, Supply chain Management.

UNIT – IV

Corporate Digital Library – Dimensions of Internal electronic Commerce Systems, Types of Digital Documents, Issues behind Document Infrastructure, Corporate Data Warehouse

Advertising and Marketing on the Internet – Information based marketing, advertising on Internet, on-line marketing process, market research.

UNIT –V

Consumer Search and Resource Discovery – Search and Resource Discovery paradigms, Information search and Retrieval, Electronic Commerce catalogues or Directories, information filtering, Consumer-Data Interface3:Emerging Tools.

Multimedia and Digital Video – key multimedia concepts, Digital Video and Electronic Commerce, Desktop video processing, Desktop video conferencing.

Suggested Reading:

1. Ravi Kalakota & A . B. Whinstong – “ *Frontiers of Electronic Commerce*”, Pearson Education, India, 2006.
2. Daniel Minoli, Emma Minoli: ” *Web Commerce Technology Handbook*” Tata McGraw Hill 2007.

CS 805

HUMAN COMPUTER INTERACTION

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT- I

Importance of the user interface. Characteristics of graphical and web user interfaces, User Interface Design Process: Knowing the client, Understanding business function, Principles of good screen design.

UNIT-II

System Menus and Navigation Schemes, Kinds of windows, Device based controls, Screen based controls, Test and Messages.

UNIT- III

Feedback, Guidance and assistance. Internationalization and accessibility, graphics, icons and images, colours, Layout windows and pages.

UNIT- IV

Interaction Design: Introduction, Goals, Usability, Conceptualization interaction: Problem space, Conceptual models, Interface metaphors, Interaction paradigms, Cognition: Conceptual frameworks for cognition. Collaboration and Communication: Social mechanism, Conceptual framework.

UNIT- V

Affective aspects, Expressive interface, User frustration, Agents, Process of interaction design, Activities characteristics, Practical issues, Life cycle models, Design: Prototyping and construction, Prototyping, conceptual design, Physical design Evaluation: Introduction, Framework, Testing and modelling users: Kinds of tests ,Doing user testing, Experiments, Predictive models.

Suggested Reading:

1. Wilbert O.Galitz, The Essential Guide to User Interface Design, Wiley Dreamtech 2002.
2. Sharp, Rogers, Preece, Interaction Design, John Wiley, 2007.
3. Andrew Sears, Julie A Jacko, Human, Computer Interaction Fundamentals, CRC Press, 2009.
4. Dan R Oslen, Human, Computer Interaction, Cengage Learning, 2010.

CS 806

SOFTWARE REUSE TECHNIQUES

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Software reuse success factors, Reuse driven software engineering business, Object oriented software engineering, applications and component sub systems, use case components, object components.

UNIT-II

Design Patterns – Introduction, Creational patterns, factory, factory method, abstract factory, singleton, builder prototype.

UNIT-III

Structural Patterns- Adapters, bridge, composite, decorator, façade, flyweight, proxy.
Behavioral Patterns – Chain of responsibility, command, interpreter.

UNIT-IV

Behavioral Patterns – Iterator, mediator, memento, observer, state, strategy, template, visitor, other, design patterns- Whole part, master- slave, view handler, forwarder- receiver, client – dispatcher- server, publisher – subscriber.

UNIT-V

Architectural patterns – Layers, pipes and filters, black board, broker, model - view controller, presentation- abstraction – control, micro kernel, reflection.

Suggested Reading:

1. Ivar Jacobson, Martin Griss, Patrick Hohson – Software Reuse. Architecture, Process and Organization for Business Success, ACM Press, 1997.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides – Design Patterns- Addison, 1995, Pearson Education.
3. Frank Buschmann etc. – Pattern Oriented Software Architecture – Volume 1, Wiley 1996.
4. James W Cooper – Java Design Patterns, a tutorial, Addison 2000, Pearson Education.

CS 807

SOFT COMPUTING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I:

Neural Networks, fuzzy logic, and genetic algorithms Fundamentals Of Neural Networks: Basic concepts of neural Networks, human brain, model of an artificial neuron, neural network architectures, characteristics of neural networks, learning methods, taxonomy of neural network architectures, history of neural network research, early neural network architectures, some application domains.

Back propagation Networks: Architecture of a back propagation network, back propagation learning, illustration, applications, effect of tuning parameters of the back propagation neural networks, selection of various parameters in BPN, variations of standard back propagation algorithm, research directions.

Associative Memory: Autocorrelators, heterocorrelators, wang et al.'s multiple training encoding strategy, exponential BAM, associative memory for real-coded pattern pairs, applications, recent trends.

UNIT-II:

Principles of SOFT COMPUTING: Introduction to Fuzzy Logic, Classical sets and fuzzy sets: Introduction to fuzzy logic, classical sets, fuzzy sets.

Classical Relations and Fuzzy Relations: Introduction, Cartesian product of relation, classical relation, fuzzy relations, tolerance and equivalence relations, non interactive fuzzy sets.

Defuzzification: Introduction, lambda-cuts for fuzzy sets, lambda-cuts for fuzzy relations, defuzzification methods.

UNIT-III:

Principles of SOFT COMPUTING: Genetic Algorithm: Introduction, biological background, traditional optimization and search techniques, genetic algorithm and search space, genetic algorithm vs traditional algorithm, basic terminologies in genetic algorithm, simple GA, general genetic algorithm, operators in genetic algorithm, stopping condition for genetic algorithm flow, constraints in genetic algorithm, problem solving using genetic algorithm, the schema theorem, classification of genetic algorithm, Holland classifier systems, advantages and limitations of genetic algorithm, applications of genetic algorithm.

UNIT-IV:

Machine Learning with “ SVM ” and other kernel methods Kernel methods and the evolution of SVM: Introduction, origins of kernel methods, support vector machines, non-linear SVM and kernel trick, v-support vector machine, cost-sensitive learning, generating data sets.

Support vector regression: Introduction, E-insensitive loss function and regression, linear support vector regression formulations, non- linear support vector regression formulations, V-SVR linear model, data sets for experimentation, some special kernels used in support vector regression.

UNIT-V:

Hybrid Rough Sets and Applications in Uncertain Decision-Making Rough set theory: Information Systems and Classification, Information Systems and Indiscernibility Relation, Set and Approximations of Set, Attributes Dependence and Approximation Accuracy, Quality of Approximation and Reduct, Calculation of the Reduct and Core of Information System Based on Discernable Matrix, Decision Table and Rule Acquisition, The Attribute Dependence, Attribute Reduct ,and Core Decision Rules, Use the Discernibility Matrix to Work Out Reducts, Core, and Decision Rules of Decision Table ,Data Discretization, Expert Discrete Method, Equal Width Interval Method and Equal Frequency Interval Method, The Most Subdivision Entropy Method ,Chimerge Method, Common Algorithms of Attribute Reduct ,Quick Reduct Algorithm, Heuristic Algorithm of Attribute Reduct, Genetic Algorithm ,Application Case, Data Collecting and Variable Selection, Data Discretization, Attribute Reduct, Rule Generation, Simulation of the Decision Rules.

Suggested Reading:

1. Neural Networks, fuzzy logic, and genetic algorithms-S.Rajasekaran, Genetic Algorithm, S.Rajasekaran, G.A. Vijayalakshmi Pai- PHI Learning Private Limited-2010
2. Principles of SOFT COMPUTING–S.N.Sivanandam, S.N.Deepa Wiley India, Second Edition 2011.
3. Machine Learning with SVM and other kernel methods- K.P.Soman, R.Loganathan, V.Ajay , PHI Learning Private Limited-2010.
4. Hybrid Rough Sets and Applications in Uncertain Decision-Making, Lirong Jian, Sifeng Liu, Yi Lin, Auerbach Publications, 2010.

CS 808

XML AND WEB SERVICES

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT- I :

Introduction : Role Of XML - XML and The Web - XML Language Basics - SOAP - Web Services - Revolutions Of XML - Service Oriented Architecture (SOA).

UNIT- II :

XML Technology : XML Technology, XML - Name Spaces - Structuring With Schemas and DTD - Presentation Techniques - Transformation - XML Infrastructure.

UNIT- III:

SOAP: Overview Of SOAP - HTTP - XML-RPC - SOAP: Protocol - Message Structure - Intermediaries - Actors - Design Patterns And Faults - SOAP With Attachments.

UNIT- IV:

WEB Services: Overview - Architecture - Key Technologies - UDDI - WSDL - ebXML - SOAP And Web Services In E-Com - Overview Of .NET And J2EE.

UNIT- IV:

XML Security: Security Overview - Canonicalization - XML Security Framework - XML Encryption - XML Digital Signature - XKMS Structure - Guidelines For Signing XML Documents - XML In Practice.

Suggested Reading:

1. Frank. P. Coyle, XML, Web Services And The Data Revolution, Pearson Education, 2002.

References:

1. Ramesh Nagappan , Robert Skoczylas and Rima Patel Sriganesh, Developing Java Web Services, Wiley Publishing Inc., 2004.
2. Sandeep Chatterjee, James Webber, Developing Enterprise Web Services, Pearson Education, 2004.
3. McGovern, et al., Java Web Services Architecture, Morgan Kaufmann Publishers,2005. Gustavo A, Fabio C, Harumi K, Vijay M. Web Services: Concepts, Architectures and Applications. Springer (Universities Press), 2004

CS 809

MOBILE COMPUTING

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT- I

Introduction and applications of mobile computing, Wireless transmission: Frequencies, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread spectrum, Cellular systems. Medium Access Control, SDMA, FDMA, TDMA, CDMA, Comparisons.

UNIT- II

Telecommunication system, GSM, DECT, TDMA, TETRA, UMTS & IMT-2000. Satellite systems: Applications, Basics, routing, localization, Handover. Broadcast systems: Cyclic representation of data, Digital audio Broad casting, Digital video Broadcasting, Convergence of Broadcasting and mobile communication.

UNIT- III

Wireless LAN: Infrared Vs Radio Transmission, Infrastructure and Ad hoc Networks, IEEE 802.11, HIPERLAN, Bluetooth.

UNIT- IV

Mobile IP, Dynamic Host Configuration Protocol, Mobile Adhoc Networks, Mobile Transport Layer, Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks, Performance Enhancing Proxies.

UNIT- V

Operating Systems for Mobile Devices: Features of Windows CE, Palm OS, Symbian Os, Java Card support for Mobility: File systems, WWW, Wireless Application Protocol.

Suggested Reading:

1. Jochen M.Schiller, Mobile Communications, 2nd edition , Pearson Education, India 2003.
2. Hansmann, Merk, Nicklous, Stober, Principles of Mobile Computing, 2nd edition Springer International edition, 2003.
3. Dharma P. Agarwal, Qing An Zeng, Introduction to wireless and Mobile systems, 2nd edition Thomas India 2007.
4. Frank Adelstien, Sandeep K.S.Gupta, Fundamentals of Mobile and Pervasive Computing, Tata McGraw Hill, 2005.
5. Ivan Stojmenovic, Handbook of Wireless and Mobile Computing, Wiley India, 2006.

CS 810

INFORMATION SECURITY

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Introduction: History, Critical characteristics of information, NSTISSC security model, Components of an information system, Securing the components, Balancing security and access, The SDLC, The security SDLC.

Need for Security: Business needs, Threats, Attacks- secure software development.

UNIT-II

Legal, Ethical and professional Issues: Law and ethics in information security, Relevant U.S laws- international laws and legal bodies, Ethics and information security.

Risk Management: Overview, Risk identification, Risk assessment, Risk control strategies, selecting a risk control strategy, Quantitative versus qualitative risk control practices, Risk management discussion points, Recommended risk control practices.

UNIT-III

Planning for Security: Security policy, Standards and practices, Security blue print, Security education, Continuity strategies.

Security Technology: Firewalls and VPNs: Physical design, Firewalls, Protecting remote connections

UNIT-IV

Security Technology: Intrusion detection, access control and other security tools: Intrusion detection and prevention systems, Scanning and analysis tools, Access control devices.

Cryptography: Foundations of cryptology, Cipher methods, Cryptographic Algorithms, Cryptographic tools, Protocols for secure communications, Attacks on cryptosystems.

UNIT- V

Implementing Information Security: Information security project management, Technical topics of implementation, Non technical aspects of implementation, Security certification and accreditation.

Security and Personnel: Positioning and staffing security function, Employment policies and practices, Internal control strategies. Information security maintenance : Security management models, The maintenance model, Digital forensics

Suggested Reading:

1. Michel E Withman and Herbert J Mattord, Principles and Practices of Information Security, Cengage Learning, 2009.
2. Thomas R Peltier, Justin Peltier, John Blackley, Information Security Fundamentals, Auerbach Publications, 2010.
3. Detmar W Straub, Seymour Goodman, Richard L Baskerville, Information Security, Policy, Processes and Practices, PHI , 2008.

4. Mark Merkow and Jim Breithaupt, Information Security Principle and Practices, Pearson Education, 2007.

CS 811

SYSTEM ADMINISTRATION

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT- I

Functions of system administration, UNIX: Files, Processes Devices, file system, essential administrative tools: Grep, awk, files and directory commands, starting and shutdown process.

UNIT- II

User accounts, security, managing system resources : System performance, managing CPU usage, memory, disk I/O automating tasks with scripts.

UNIT- III

File system and Disks: Mounting, adding disks, CD-Rom devices, and backup and restore terminals modems and printers.

UNIT- IV

TCP/IP Network Management: TCP/IP networking, adding a new host, NFS/NIS, monitoring the network, E-mail, configuring and building Kernel for Linux.

UNIT- V

Windows 2003 Server: Startup, shutdown, server configuration , user accounts, managing processes, disks and file system security.

Note: First four units are related to UNIX system, Fifth unit is related to Windows 2003 Server.

Suggested Reading:

1. Aeleon Frisch, Essential System Administration, O'Reilly, 1995, Second Edition.
2. Aeleon Frisch, Essential Windows Administration, O'Reilly, 1998, First Edition.
3. Nemeth, Unix System Administration, Pearson Education, 2000.

CS 812

RICH INTERNET APPLICATIONS

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Web 2.0 Folksonomies and Web 2.0, Software as a service. Multiple delivery channels (Voice – VOXML, and ANT (HTML), Social Net working.

UNIT - II

Client side programming – Overview of Java Script, Objects in Java Script, Regular expressions, Overview of XML, DTD and XML Schema, DOM and SAX Parsers, CSS, XSLT.

UNIT- III

Web Services- SOA, SOAP, WSDL, REST Services.
JSON Format- Ajax introduction, XML HTTP object comparison with I frames.

UNIT-IV

Building Rich Internet Application- Flash Player, Flex framework, MXML introduction, Action Script Introduction, working with Action Script, Flex Data binding, Common UI Components using Datagrids. Tree controls, Pop up controls etc.

UNIT-V

Mashup using Flex and Ajax. Web services in Flex. Semantic web(Web 3.0). Resource Description Frame work, use and examples, Ontologies, Web ontology language(OWL).

Suggested Reading:

1. Ivan Bayross, Web Enabled Commercial Application Development using HTML, DHTML, Javascript , Perl CGI ,BPB Publications, 2007.
2. Colin Mook, Essential Actionscript 3.0 , O'Reilly publications, 2007.
3. Steven Holzner, Ajax Bible Wiley India Edition, 2007.
4. Justin Gethland et al, A Web 2.0 Primer Pragmatic Ajax, SPD Publications, 2006.

WITH EFFECT FROM THE ACADEMIC YEAR 2011-2012

CS 813

SOFTWARE PROJECT MANAGEMENT

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

Unit – I

Introduction to Software Project Management, Project Evaluation and Programme Management, An Overview of Project Planning.

Unit – II

Selection of an Appropriate Project Approach, Software Effort Estimation, Activity Planning.

Unit – III

Risk Management, Resource Allocation, Monitoring & Control.

Unit – IV

Managing Contracts, Managing People in Software Environments, Working in Teams.

Unit – V

Software Quality, An Overview of PRINCE 2

Suggested Reading:

1. Bob Hughes and Mike Cotterell, “Software Project Management”, Tata McGraw Hill, 5th Edition, 2010.

CS 831

PROGRAMMING LAB IX – OOSD LAB

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	50	Marks
Sessional	25	Marks

Students have to perform the following OOAD steps on a given

Case Study:

- * Use Case Modeling
- * Structural Modeling
- * Behavioral Modeling
- * Architectural Modeling

The output should consists of:

- * Use case Diagrams
- * Class Diagrams
- * Sequence Diagrams
- * Collaboration Diagrams
- * State Chart Diagrams
- * Activity Diagrams
- * Deployment Diagrams
- * Component Diagrams

Students should form into groups. They should carry out the Case Study as a group activity. The lab should be carried out using a CASE Tool. Finally they should submit a report.

CS 832

PROGRAMMING LAB X – MWT LAB

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	50	Marks
Sessional	25	Marks

1. Create a Distributed name Server (like DNS) RMI.
2. Create a Java Bean to draw various graphical shapes and display it using or without using JDK.
3. Develop an enterprise Java Bean for student Information System.
4. Develop an enterprise Java Bean for Library operations.
5. Create a Active-X control for Time Table.
6. Develop a component for converting the currency values using COM/.NET.
7. Develop a component for browsing CD catalogue using COM/.NET.
8. Develop a component for retrieving information from message box using DCOM/.NET.
9. Develop a middleware component for retrieving Stock Market Exchange information using CORBA.
10. Develop a middleware component for retrieving Bank balance using CORBA.