### University of Mumbai
#### B.E Information Technology
#### Scheme of Instruction and Evaluation

#### Third Year - Semester VI

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Subjects</th>
<th>Lect/ Prac/ Tut/ Hours</th>
<th>Theory T/W Practical Oral Total</th>
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<tbody>
<tr>
<td></td>
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<td>Lect/ Week Prac/ Week Tut/ Week</td>
<td>Theory Marks T/W Marks Practical Marks Oral Marks Total Marks</td>
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<tr>
<td>1</td>
<td>Information and Network Security</td>
<td>4 2 --</td>
<td>3 100 25 -- 25 150</td>
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<tr>
<td>2</td>
<td>Middleware and Enterprise Integration Technologies</td>
<td>4 2 --</td>
<td>3 100 25 -- 25 150</td>
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<tr>
<td>3</td>
<td>Software Engineering</td>
<td>4 2 --</td>
<td>3 100 25 -- 25 150</td>
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<tr>
<td>4</td>
<td>Data Base Technologies</td>
<td>4 2 --</td>
<td>3 100 25 -- 25 150</td>
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<tr>
<td>5</td>
<td>Programming for Mobile and Remote Computers</td>
<td>4 2 --</td>
<td>3 100 25 25 -- 150</td>
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<tr>
<td>6</td>
<td>Information Technology for Management of Enterprise</td>
<td>4 - 1</td>
<td>3 100 25 -- 25 150</td>
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<td>TOTAL</td>
<td></td>
<td>24 10 1</td>
<td>-- 600 150 25 125 900</td>
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</tbody>
</table>
1. **Introduction**

2. **Cryptography**

3. **Access control - Authentication and Authorization**
   Authentication Methods, Passwords, Biometric, Single – sign on, Authentication Protocol, Kerberos, Access control Matrix, ACLs, Multiple level security model, Multilateral security, Covert channel, CAPTCHA.

4. **Software Security**
   Software Flaws, Buffer Overflow, Incomplete Mediation, Race conditions, Malware, Salami attack, Linearization Attacks, Trusting Software, Software reverse engineering, Digital Rights management, Operating System and Security

5. **Network Security**

6. **Administered Security**
   Planning, Risk Analysis, Organizational Policies, Physical Security

**Text Books**

1. Mark Stamp, “Information security Principles and Practice” Wiley
References

Term Work
Term work shall consist of at least 10 assignments/programming assignments and one written test.

Marks

1. Laboratory work (Experiments & journal) 15 Marks
2. Test (at least one) 10 Marks

The final certification and acceptance of Term Work ensures the satisfactory performance of laboratory Work and Minimum Passing in the term work.

Suggested Experiment List
1. Block Cipher such as Feistel, DES or AES
2. Public Key Cryptography (RSA)
3. Conventional Cryptography
4. Authentication Methods such as password or Kerberos.
5. Software Flaw Frauding tools such as flaw finders, ITS, PScan, RATS
6. Analysis of Network port scanner tool such as NMAP
7. Analysis of Sniffer program such as Ethernet
8. Transport Security using firewall
9. Application level security such as email by using PHP
10. Implementation of IDS
Objectives of the Course:
3. IT systems are more and more integrated with other software systems.
4. The knowledge of integrating these systems by using middleware technologies can be a key competence for IT engineers. Middleware is commonly understood as an intermediary software layer between the application and the operating system, which encapsulates the heterogeneity of the underlying communication network, operating system or hardware platform.
5. This course provides details about the modern component platforms. Based on practical examples, details about modern middleware technologies are studied. Students get the chance to gain in-depth knowledge popular middleware platforms.

7. Introduction to Object Oriented Systems

8. Introduction to Middleware Technologies
   General Middleware, Service Specific Middleware, Client/Server Building blocks – RPC - Messaging – Peer – to – Peer, Java RMI.

9. Introduction to Distributed Objects
   Computing standards, OMG, Overview of CORBA, Overview of COM/DCOM, and Overview of EJB.

10. EJB Architecture
    Overview of EJB software architecture, View of EJB Conversation, Building and Deploying EJBs, Roles in EJB.

11. EJB Applications
    EJB Session Beans, EJB entity beans, Lifecycle of Beans, EJB clients, Steps in developing an application with EJB, EJB Deployment.

12. CORBA
    Introduction and concepts, distributed objects in CORBA, CORBA components, architectural features, method invocations, static and dynamic: IDL (Interface Definition Language) models and interfaces. Structure of CORBA IDL, CORBA's self-describing data; CORBA interface repository. Building an application using CORBA.
11. CORBA Services and CORBA Component Model
   Overview of CORBA Services, Object location Services, Messaging Services, CORBA Component Model.

12. COM and .NET
   Evolution of DCOM, Introduction to COM, COM clients and servers, COM IDL, COM Interfaces, COM Threading Models, Marshalling, Custom and standard marshalling, Comparison COM and CORBA, Introduction to .NET, Overview of .NET architecture, Remoting.

13. Service Oriented architecture(SAO) Fundamentals
   Defining SOA, Business value of SOA, SOA characteristics, Concept of a service, Basic SOA , Enterprise Service Bus (ESB), SOA enterprise Software Models.

14. Web Services Technologies
   XML Technologies - XML, DTD, XSD, XSLT< XQUERY, XPATH, Web Services and SOA, WSDL, SOAP, UDDI, WS Standards (WS-*), Web Services and Service Oriented Enterprise (SOE), WS _ Coordination and Transaction, Business Process Execution Language for Web Services (BPEL4WS)

Text Books

References
5. Sudha Sadasivam “Component Based technology”, Wiley India
8. Jason Pritchard, "COM and CORBA side by side", Pearson Education
9. Introduction to C# Using .NET Pearson Education
10. C# How to program, Pearson Education
12. Don Box, "Essential COM", Pearson Education.

Term Work
   Term work shall consist of at least 10 assignments/programming assignments and one written test.
Marks

1. Laboratory work (Experiments and Journal)  15 Marks
3. Test (at least one)  10 Marks

The final certification and acceptance of TW ensures the satisfactory performance of laboratory Work and Minimum Passing in the term work.

Suggested Topics for Experiment
1. RPC Messaging
2. Creating a distributed Object Application using RMI (DNS, distributed game, some business application etc)
3. Concept addressing COM/DCOM
4. Component framework
5. Mini projects, one business application each to be programmed using CORBA, EJB, COM, .NET
6. One mini project for creating a web service
1. Introduction

2. Requirements Analysis and Engineering
Prototyping – Specification – Analysis Modeling – Various Techniques in Software requirement analysis and system specification

3. Software Design

4. Software Configuration Management

5. Software Quality and Testing
Software Quality Assurance – Quality metrics

6. Web Engineering
For web based applications – attributes, analysis, design and testing. Security Engineering, Service-Oriented Software Engineering, Aspect–Oriented Software Development and Test Driven Development.

References:

**Term Work**
Term work shall consist of at least 10 Laboratory assignments and one written test.

**Marks**

2. Laboratory work (Experiments and Journal) 15 Marks
3. Test (at least one) 10 Marks

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**Suggested List of Experiments**
13. SRS in IEEE format for any case study.
14. Use project management tool to schedule project plan.
15. Use analysis and design tools and draw DFD / CFD.
16. Develop test cases for white box testing.
17. Assignment / code for stubs and drivers.
18. Change specifications and make different versions using any SCM tool.
19. Test Driven Development
Objective of course:

- This course aims to provide continuum to where the first course of databases left off. Design aspects of relational databases are covered.
- Complex data models like OO OR parallel and distributed introduced.
- The course provides students a good overview of the ideas and the techniques, which are behind recent developments in the fields of data warehousing and Online Analytical Processing (OLAP)

1. **Overview**
   Review of relational database systems, ER diagram, SQL.

2. **Integrity and Security**
   Domain constraints; referential integrity, assertions; triggers; triggers and Assertions in SQL. Security and Authorization; Authorization in SQL.

3. **Relational database Design**

4. **The ER Model Revisited**
   Motivation for complex data types, User Defined Abstract Data Types And Structured Types, Subclasses, Super classes, Inheritance, Specialization and Generalization, Relationship Types of Degree Higher Than Two.

5. **Object-Oriented & Object relational databases**
   Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type Hierarchies and Inheritance, Type extents and Queries, Database Design For An ORDBMS- Nested Relations and Collections; Storage And Access methods, Overview of SQL 3

6. **Parallel and Distributed Databases**
Parallel y Evaluation; Parallelizing Individual Operations, Sorting, Joins; Distributed Databases Concepts, Data Fragmentation, Replication, and Allocation technique for Distributed Database Design; Query Processing in Distributed Databases; Concurrency Control and Recovery in Distributed Databases.

   (Overview and Design issues)
   Temporal Databases; Spatial Databases & Geographic Information Systems, Mobile Databases.

8. Data Warehousing and OLAP
   a) Data Warehousing Basics: Data Warehousing (DW) Introduction & Overview; Data Marts, DW components; Data warehouse architecture; ETL – Data Transformation-Extracting, Conditioning, cleansing, Scrubbing, Merging, etc.
   b) OLAP: Multidimensional modeling- Fact table, dimensions, measures, ROLAP, MOLAP, HOLAP; tools. OLAP Operations- Rollup, Drill-down, Dice slice, pivot.

Text Books:
   3. Kimball, Ralph; Reeves, Laura et al Data warehousing lifecycle Toolkit: expert methods for designing, developing, and deploying data warehouses _ Wiley publications.

References:
   1. Korth, Silberchatz, Sudarshan, “Database System concepts” Mcgraw Hill

Term Work
Term Work shall consist of at least 10 assignments/programming assignments and one written test.

Marks
1. Laboratory work (Experiments & journal)  15 Marks
2. Test (at least one) 10 Marks

The final certification and acceptance of TW ensures the satisfactory performance of laboratory Work and Minimum Passing in the term work.
1. At least one or two review SQL assignments covering triggers, assertions and authorizations.
2. Object Oriented Queries
3. Case study assignments for OO and OR database.
4. At least one or two review SQL assignments covering triggers, assertions and authorizations.
5. Object Oriented Queries
6. Case study assignments for OO and OR database.
7. At least one or two review SQL assignments covering triggers, assertions and authorizations.
8. Object Oriented Queries
9. Case study assignments for OO and OR database.
10. Two mini projects in distributed and parallel databases.
11. Hands on any one good warehousing tool (Oracle/SQL Server Analysis tool
12. A full fledged mini project in which a student will design and implement a data warehouse. The data warehouse must be populated and OLAP Queries and operation to be demonstrated for the warehouse.
13. A full fledged mini project in which a student will design and implement a data warehouse. The data warehouse must be populated and OLAP Queries and operation to be demonstrated for the warehouse.
1. Java EE 5: An Overview
Enterprise Architecture Types, Goals of Enterprise Applications. Introducing the Java EE Platform, Features of Java EE 5, The Runtime Infrastructure, Java EE 5 APIs, Architecture of Java EE 5, Describing Java EE Containers, Developing Java EE 5 Applications, Exploring Probable Java EE Application Architectures, Application Development and Deployment Roles

2. Java EE Related Technologies
Java Database Connectivity, Servlets, JavaServer Pages, Java Server Faces, JavaMail, Enterprise JavaBeans, Seam, Java EE Connector Architecture, Web Services, Struts, Spring, JAAS, AJAX

3. Web Applications and Java EE 5
Exploring the HTTP Protocol, Components of a Web Application, Structure /Modules of Web Applications, Describing Web Containers, Types of Web Containers, Building Web Applications, Applications with Basic HTML pages, Applications with Basic JSP Pages and Servlets, Applications with Modular Components, EJB-Centric Applications

4. Understanding J2ME

5. Building MIDlets
Tooling Up, Debugging Your MIDlets, Creating Source Code, Compiling a Midlet, Preverifying Class Files, Sun’s J2ME Wireless Toolkit Devices, Running MIDlets Using the Emulator Controls, Tour of MIDP Features, It’s Java MIDlet Life Cycle, Generalized User Interface, The Likelihood of Server –Side Components, Packaging your Application, Manifest Information, Creating a MIDlet Descriptor, Using an Obfuscator, Using Ant, Running on a Real Device
6. MIDlets
The MIDlet Life Cycle, Requesting A Wakeup Call, A Bridge to the Outside World, Packaging MIDlets, MIDlet Manifest Information, Application Descriptor, MIDlet Properties, MIDlet Suite Security, Permissions, Protection Domains, Permission Types, Permissions in MIDlet Suite Descriptors, No Floating Point In CLDC 1.0, Java . Lang, No Object Finalization, No Reflection, No Native Methods, No User Classloading, Multithreading, String and String Buffer, Math, Runtime and System, Streams In Java io

7. Creating User Interface
The View from the Top, Using Display, Event Handling with Commands Creating Command, Responding to Commands Lists And Forms; Using Lists, Understanding List Types, Event Handling for IMPLICIT Lists, Creating List, about Image, Editing a List, Working with List Selection Custom Items; Introducing Custom items, Custom item Painting, Showing, Hiding and Sizing Handling Events

8. Wireless Messaging Api
Bluetooth and Obex, Programming a Custom User Interface, the Game API, 3d Graphic, Sound, Music, and Video: MMAPI

11. Kogent Solutions Inc, J2EE 1.4 PROJECTS

References


Term Work
Term work shall consist of at least 10 experiments covering all topics and at least one written test.

Marks

1. Laboratory work (Experiments and Journal) 15 Marks
2. Test (at least one) 10 Marks

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Suggested List of Experiments

J2EE
1. Editing, debugging and execution of any one of the project incorporated in the text book J2EE
1.4 PROJECTS preferably- **project III: online shopping site**

J2ME
1. Creation of simple J2ME Midlet
2. Illustration of low level API using Cancas
3. Use of kepresses
4. Use of high level components
5. Use of RMS
6. Creating custom items and performing various operations like painting, showing, hiding and sizing.
7. Mixing 3D graphics, sound, music, video as applicable
1. **Organizational Performance: IT support and Applications.**
Doing Business in the Digital Economy, Business pressures, organizational performance and responses and IT support, Information Systems and Information Technology, the adaptive, Agile, Real time Enterprise, Information Technology Development and Trends.

2. **IT Support Systems: Concepts and Management**

3. **E Commerce and E Business:**

4. **IT Compliance: Functional Applications and Transaction Processing**

5. **Understanding Enterprise Systems: Supply Chain**

6. **Global and Interorganizational Information Systems:**
Interorganizational Activities and order fulfillment, Interorganizational information Systems and Virtual Corporations, Global Information Systems, Facilitating IOS and Global Systems from Demand driven Networks to RFID, Interorganizational Information Integration, Partner relationship Management and collaborative commerce, Managerial issues.

7. **Managing Knowledge**
Introduction to Knowledge Management, Organizational Learning and Memory, knowledge management activities, Approaches to Knowledge management, Information Technology in Knowledge Management, knowledge Management Systems implementation, Roles of people in knowledge management, Ensuring Success of KM Efforts, Managerial Issues.
8. Corporate Performance Management and Business Intelligence:
A framework of Business Intelligence: concepts and Benefits, Business Analytics: Online analytical processing reporting and querying, Data Text Web mining and Predictive Analytics, Data Visualization, Geographical Information Systems and virtual reality, real time business intelligence, and competitive Intelligence, Business Performance Management Scorecards and Dashboards, Managerial Issues.

9. Managerial Decision making and IT support systems
Managers and Decision making, Decision support systems; for Individuals groups and Enterprise, Intelligent Support Systems : The basics, Expert Systems, Other intelligent systems, Automated Decision Support (ADS), Managerial Issues.

10. IT: Strategic objectives and Planning
IT Strategic Alignment, Competitive Forces Model, Value Chain Model, Strategic Resources and Capabilities, IT Planning, Interorganizational and international IT planning, Managing the IS department, Managerial issues.

11. Economics of IT

12. IT Application Acquisitions and Options
The landscape and framework of IT Application Acquisition, Identifying Justifying and planning IT systems applications, Acquiring IT applications: available options, Outsourcing, application service providers and utility computing, selecting an acquisition approach and other implementation issues, Connecting to Databases, Enterprise systems and Business Partners, Business Process Redesign, Managerial Issues.

13. IT Infrastructure

Text Book

Term Work
Term work shall consist of at least 10 practical experiments covering all topics and one written test.

Marks
Distribution of marks for term work shall be as follows:

1. Laboratory work (Experiments and Journal) 15 Marks
2. Test (at least one) 10 Marks
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**Suggested tutorial exercises**

1. UML for modeling scenarios in Microsoft Visio or similar to model a solution to business model.
2. Workflow management in CRM, Procurement process.
3. Basic IT project management such as cost and schedule management.
4. Case studies in access. Design various schema and tables and generate reports as applicable.
5. Using Excel solver as decision support tool.
6. Data communications and technology.

- LAN
- ETHERNET
- How wifi works.
- How routers work.
- Web hosting.
7. Data base processing.
- Oracle.
- SQL.
- IBM DB2.
8. E-Commerce and supply chain
- HTML tutorial.
- XHTML tutorial.
- M-commerce
- Decision Support System (EXCEL solver for model driven DSS, scenario manager for Knowledge driven DSS, Microsoft Netmeeting for communication driven DSS)
- Integrating EXCEL with WWW for web based and inter organizational DSS
- Using EXCEL macros.
- Data warehouse support in MS SQL
- Data mining and OLAP.
10. ERP, CRM development using open source frameworks like OF biz /JBseam, EBI neutrino for distribution, inventory, Ecommerce and workflow support
The scheme of instruction and exact syllabi of all undergraduate programmes are given separately. Scheme of instruction is common for Group A branches comprising of CSE, ECE, and ME for I/IV First and Second Semesters. Scheme of instruction is common for Group B branches comprising of CE, EEE, EIE and IT for I/IV First and Second Semesters. 4.4 Contact Hours and Credits. Every Course comprises of specific Lecture-Tutorial-Practical (L-T-P) Schedule.

Department of Information Technology I / IV B.Tech. Semester â€“ I w.e.f 2007-2008 Code No. Subject Periods per during the first year. iii. The activities will be monitored by the respective faculty in charge and the First Year Coordinator. iv. Grades will be awarded on the basis of participation, attendance, performance and behavior. The second and third meetings will be held six weeks and ten weeks respectively from the commencement of a session to meaningfully interact and express opinions and suggestions to improve the effectiveness of teaching-learning process and analyze the performance of the students in the assessments. The chairman of the class committee should send the minutes of the class committee meetings to the Dean (Academic) through the Head of the Department, immediately after the class committee meetings.