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# SHIVAJI UNIVERSITY, KOLHAPUR.

Revised Syllabus of

**(B.E. Computer Science & Engineering  
Sem -VII & VIII )**

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)

## SEMESTER VII

Sr. No.	Subject Name	L	T	P	Theory Marks	T/W	Oral	POE	Total Marks
1	Advanced Computer Architecture	4	1	-	100	25	-	-	125
2	Distributed Systems	3	-	2	100	25	-	-	125
3	Advanced Database Systems	3	-	2	100	25	25	-	150
4	Network Engineering	2	-	4	-	25	-	50	75
5	Elective – I	3	1	-	100	25	-	-	125
6	Community Services	-	-	2	-	25	-	-	25
7	Project – I	-	-	4	-	50	75	-	125
	<b>Total</b>	<b>15</b>	<b>2</b>	<b>14</b>	<b>400</b>	<b>200</b>	<b>100</b>	<b>50</b>	<b>750</b>

## SEMESTER VIII

Sr. No.	Subject Name	L	T	P	Theory Marks	T/W	Oral	POE	Total Marks
1	Grid Technology	4	-	2	100	25	25	-	150
2	Storage Networks	3	1	-	100	25	-	-	125
3	Real Time Operating System	4	1	-	100	25	-	-	125
4	Web Technology	3	-	4	-	50	-	50	100
5	Elective – II	3	1	-	100	25	-	-	125
6	Project – II	-	-	4	-	50	75	-	125
	<b>Total</b>	<b>17</b>	<b>3</b>	<b>10</b>	<b>400</b>	<b>200</b>	<b>100</b>	<b>50</b>	<b>750</b>

### **Elective – I**

1. Soft Computing
2. Project Management
3. Cyber Laws

### **Elective – II**

1. Data Mining
2. Ad hoc Networks
3. Business Intelligence System

### **Note:**

1. The term work as prescribed in the syllabus is to be periodically and jointly assessed by a team of teachers from the concerned department.
2. In case of tutorials, students of different batches be assigned problems of different types and be guided for the solution of the problem during tutorial session. Problems

thus solved be translated into computer programs wherever applicable and executed by respective batches during practical session.

3. The assignments of tutorials and practicals need to be submitted in the form of soft copy and / or written journal.
4. Breakup of term work marks shall be as follows:
  - a. For subjects having term work marks 25 -
    - Mid-semester test – 5 marks.
    - End-semester test – 5 marks.
    - Tutorial assignments and / or practical performance – 15 marks.
  - b. For subjects having term work marks 50 –
    - Mid-semester test – 10 marks.
    - End-semester test – 10 marks.
    - Tutorial assignments and / or practical performance – 30 marks.
5. Project work should be continually evaluated based on
  - a. The contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
  - b. Two mid-term evaluations should be done, which includes presentations and demos of the work done.
  - c. **Care should be taken to avoid copying and outsourcing of the project work.**
6. In addition to the above list of electives, any other elective based on the current developments and need may be offered with prior sanction from the University Authorities.
7. The elective should be offered by the department, if the minimum number of students opting for a particular elective must be 15 students and it should be taught by the concerned teacher.

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

# **B.E. (COMPUTER SCIENCE & ENGINEERING) Sem – VII**

## **1. ADVANCED COMPUTER ARCHITECTURE**

**Lectures : 4 hrs/week**  
**Tutorials : 1 hr/week**

**Theory : 100 Marks**  
**Term work : 25 Marks**

### **SECTION – I**

#### **1. Introduction to Parallel Processing :**

- a. Introduction, architectural classification schemes.
- b. Evolution of parallel processors, current & future trends towards parallel processors.
- c. Principles of pipelining and array processing.
- d. Scalar and vector pipelines. (6)

#### **2. Vector and pipelined processors :**

- a. Classification of pipelined processors, performance evaluation factors.
- b. Vector processing concepts, pipelined vector processors, Cray type vector processor -design example.
- c. Array processors, an example of data routing in array processor.
- d. Systolic arrays and their applications. (6)

#### **3. Different parallel processing architectures:**

- a. Introduction to Associative memory processors.
- b. Multithreaded arch –principles of multithreading, Latency hiding techniques.
- c. Scalable coherent multiprocessor model with distributed shared memory. (6)

#### **4. Distributed Memory Architecture :**

- a. Loosely coupled and tightly coupled architectures.
- b. Cluster computing as an application of loosely coupled architecture. Examples – CM\* and Hadup. (6)

### **SECTION – II**

#### **5. Dataflow Architectures :**

Concepts of data flow computing, static and dynamic dataflow architectures. Dataflow operators, data flow language properties, advantages & potential problems. (6)

#### **6. Programmability Issues :**

- a. Types and levels of parallelism.
- b. Operating systems for parallel processing, Models of parallel operating systems - Master-slave configuration, Separate supervisor configuration, Floating supervisor control. (3)

## 7. Program and Network Properties: Conditions of parallelism

- a. Data and Resource Dependences.
- b. Data dependency analysis - Bernstein's condition.
- c. Hardware and Software Parallelism.
- d. The role of Compilers.

### Program Partitioning and Scheduling

- a. Grain Sizes and Latency.
- b. Grain Packing and Scheduling.
- c. Static Multiprocessor Scheduling.

### System Interconnect Architectures

- a. Network Properties and Routing.
- b. Static Connection Networks.
- c. Dynamic Connection Networks.

(5)

## 8. Parallel Models, Languages and Compilers :

### Parallel Programming Models

- a. Shared-Variable Model.
- b. Message-Passing Model.
- c. Data-Parallel Model.
- d. Object Oriented Model.
- e. Functional and Logic Models.
- f. Study of Open MP.

### Parallel Languages and Compilers

- a. Language Features for Parallelism.
- b. Parallel Language Constructs.
- c. Optimizing Compilers for Parallelism.

### Dependence Analysis of Data Arrays

- a. Iteration Space and Dependence Analysis.
- b. Subscript Separability and Partitioning.
- c. Categorized Dependence Tests.

### Code Optimization and Scheduling

- a. Scalar Optimization with Basic Blocks.
- b. Local and Global Optimizations.
- c. Vectorization and Parallelization Methods.
- d. Code Generation and Scheduling.
- e. Trace Scheduling Compilation

(8)

## Reference Books :

1. Advanced computer architecture – Kai Hwang (MGH).
2. Computer Architecture and Parallel Processing – Kai Hwang And Briggs (MGH).
3. Advanced computer Architecture – Dezsó Sima, Terence Fountain & Peter Kacsuk (Pearson Education)
4. Parallel Programming Techniques & Applications using Networked Workstations & Parallel Computers-Barry Wilkinson & Michael Allen–Second Edition (Pearson)

- Education).
5. Introduction to Parallel Processing – M. Sasikumar, D. Shikare & P. Ravi Prakash (PHI).
  6. Internet for Open MP, Hadup and others.

**Term Work :**

It should consist of minimum 10-12 assignments with emphasis on solving exercise problems.

## **2. DISTRIBUTED SYSTEMS**

**Lectures : 3 hrs/week**

**Practical : 2 hrs/week**

**Theory : 100 Marks**

**Term Work : 25 Marks**

### **SECTION – I**

**1. Introduction**

Definition, Goals, Types of distributed systems: Distributed Computing System, Distributed Information System, Architecture: Architectural, Styles, System Architecture (5)

**2. Processes and Communication**

Virtualization, Servers, Code Migration, Software Agents, Remote Procedure Call, Message Oriented Transient Communication (5)

**3. Synchronization**

Distributed Shared Memory: General architecture, Design and Implementation Issues, Consistency Models, Implementing Sequential Consistency Model, Replacement Strategy, Thrashing, Heterogeneous DSM, Physical Clock Synchronization, Logical Clock, Mutual exclusion, Election Algorithms (8)

### **SECTION - II**

**4. Distributed File Systems**

Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication (6)

**5. Fault Tolerance**

Introduction, Process Resilience, Distributed Commit, Recovery. (3)

**6. Distributed Operating Systems**

Amoeba: Design goals, architecture, process management, file management.  
Mach: Design goals, architecture, process management, memory management (5)

## 7. Distributed Multimedia Systems

Introduction, Characteristics of multimedia data, Quality of service management, Resource management, Stream adaptation, Case study : The Tiger Video file server (5)

### Reference Books:

1. Distributed Systems Principles and Paradigms- A. S. Tanenbaum (2<sup>nd</sup> Edition) , Pearson Education
2. Distributed Operating Systems - P. K. Sinha (PHI) (For Distributed shared memory and distributed operating systems)
3. Distributed Systems – Concepts & Design by George Coulouris, Jean Dollimore, Tim Kindberg (Pearson Education)

### Term Work:

It should consist of minimum 10-12 practical assignments as mentioned below.

1. An assignment on client server paradigm using TCP and UDP.
2. An assignment on three tier architecture.
3. A code migration assignment using Tcl – tk (This package can be downloaded and installed on Linux).
4. A program on RPC (SUN RPC is available in Linux)
5. An assignment on clock synchronization.
6. A program using OPENMP directives to demonstrate shared memory access. (gcc supports OPENMP directives)
7. An assignment on mutual exclusion using a group communication library like OPENMPI
8. An assignment on election algorithms using a group communication library like OPENMPI
9. An assignment on installing a Distributed File System (preferably NFS, Coda) and using it.
10. An assignment on two phase commit /three phase commit using a group communication library.
11. A experiment on Amoeba operating system.
12. A experiment on Mach operating system.

### Note:

1. Teachers can set some additional assignments based on topics mentioned in the syllabus.
2. It is strongly recommended to implement the assignments on Linux platform.

### 3. ADVANCED DATABASE SYSTEMS

**Lectures** : 3 hrs/week  
**Practicals** : 2 hrs/week

**Theory** : 100 Marks  
**Term work** : 25 Marks  
**OE** : 25 Marks

#### SECTION – I

1. **Object Oriented Databases:** Overview of object oriented concepts, object identity, object structure and type constructors, encapsulation of operations, methods and persistence, type hierarchies and inheritance, type extends and queries, complex objects, database schema design for OODBMS, OQL, Persistent programming languages, OODBMS architecture and storage issues, transactions and concurrency control, example of ODBMS. (4)
2. **Object-Relational and Extended Relational Databases** – Database design for an ORDMBS - Nested relations and collections, inheritances, reference types, functions and procedures, storage and access methods, query processing and optimization, an overview of SQL-3, implementation issues for extended type, systems comparison of RDBMS, OODMBS, ORDBMS. (4)
3. **Parallel and Distributed Databases and C/S architectures** – architectures for parallel databases, parallel query evaluation, parallelizing individual operations, sorting joins, Distributed database concepts, data fragmentation, replication and allocation techniques for distributed database design, query processing in distributed databases. Concurrency control and recovery in distributed databases. An overview of Client-Server architectures. (6)
4. **Databases on the Web and Semi-structured data** – Overview of XML, structure of XML data, document schema, querying XML data, storage of XML data, XML applications, the semi-structure data model, implementation issues, indexes for text data. (4)

#### SECTION – II

5. **Application Development & Administration** – Web interfaces to databases, performance tuning, performance benchmarks, standardization, E-commerce, Legacy systems. (6)
6. **Advanced Querying & Information Retrieval** – Decision support systems, data analysis and OLAP, Data mining, data-warehousing, Information retrieval systems. (6)
7. **Advanced Transaction processing** – Transaction-processing monitors, transactional workflows, main-memory databases, real-time transaction systems, long-duration transactions, transaction management in multi-databases. (6)

*\* Note : Teacher should expose the students to spatial and temporal databases and conduct few assignments on the same.*

#### Text Books:

1. Fundamentals of Database Systems - Elmasri and Navathe [4e], Pearson Education



2. Database System Concepts – Silberschatz, Korth, Sudarshan – 4th Edition (MGH International Edition).
3. Database Management System – Raghuram Ramkrishnan, Johannes Gehrke, Database Management Systems[3e], (MGH)

### **References :**

1. Database Systems, Design, Implementation and Management - Peter Rob and Coronel (Thomson Learning).
2. Introduction to Database Systems - C.J. Date, Longman, (Pearson Education)

### **Term Work :**

It should consist of minimum 10-12 assignments, based on the syllabus and below mentioned experiment list, out of which,

- a) 7-8 assignments should be implemented using JAVA/MYSQL/ORACLE/DB2
- b) 2-4 experiments based on fundamental concepts of syllabus topics using JAVA/C++/C# as frontend and MYSQL/Oracle/DB2 as backend.

### **Practical List :**

#### **Distributed Databases:**

1. Create a global conceptual schema Emp(Eno;Ename;Address;Email;Salary) and insert 10 records. Divide Emp into vertical fragments Emp1(Eno;Ename;Address) and Emp2(Eno;Email;Salary) on two different nodes. Fire the following queries :
  - i) Find the salary of an employee where employee number is known.
  - ii) Find the Email where the employee name is known.
  - iii) Find the employee name and Email where employee number is known.
  - iv) Find the employee name whose salary is > 2000.
2. Create a global conceptual schema Emp(Eno;Ename;Address;Email;Salary) and insert 10 records. Divide Emp into horizontal fragments using the condition that Emp1 contains the tuples with salary = 10,000 and Emp2 with 10,000 < salary = 20,000 on two different nodes. Fire the following queries :
  - i) Find the salary of all employees.
  - ii) Find the Email of all employees where salary = 15,000
  - iii) Find the employee name and Email where employee number is known.
  - iv) Find the employee name and address where employee number is known.
3. Create a global conceptual schema Emp (Eno;Ename;Address;Email;Salary) and insert 10 records. Store the replication of Emp into two different nodes and fire the following queries :
  - i) Find the salary of all employees.
  - ii) Find the Email of all employees where salary = 15,000
  - iii) Find the employee name and Email where employee number is known
  - iv) Find the employee name and address where employee number is known.

#### **Object Oriented DataBases:**

4. Using Object Oriented databases create the following types :
  - a) AddrType1 (Pincode : number, Street : char, City : char, State : char)

- b) Branch Type(address : AddrType1, phone1: integer, phone2 : integer)
- c) AuthorType(name : char, addr : AddrType1)
- d) PublisherType(name : char, addr : AddrType1, branches : branchTableType)
- e) AuthorListType as varray, which is a reference to Author Type

Next create the following tables :

- f) BranchTableType of BranchType
- g) Authors of AuthorType
- h) Books(title : varchar, year : date, published\_by : ref Publisher Type, authors : AuthorListType)
- i) Publishers of PublisherType

Insert 10 records into the above tables and fire the following queries :

- a) List all of the authors that have the same pin code as their publisher :
- b) List all books that have 2 or more authors
- c) List the name of the publisher that has the most branches
- d) Name of authors who have not published a book
- e) List all authors who have published more than one book
- f) Name of authors who have published books with at least two different publishers
- g) List all books (title) where the same author appears more than once on the list of authors (assuming that an integrity constraint requiring that the name of an author is unique in a list of authors has not been specified)

### Multimedia Database / IBM-DB2 / Oracle / J2SDK 1.4.2, Java Media Framework 2.

5.

[A] Create a table EMP with the attributes Eno as employee number, Ename as employee name, Eadress as employee address and photo as employee picture. Also create a table Company with attributes Eno, designation, age. Fire the following queries.

- a) Find name and designation of all the employees
- b) Find name and age of all the employees.
- c) Find name and photo of a particular employee.

[B] Create table singer with the attributes sno as singer number, Sname as singer name, Saddress as singer address and audio as an audio clip. Also create a table Company with attributes Sno,age. Fire the following queries.

- a) Find name and age of all the singer.
- b) Find name and audio clip of a particular singer.

[C] Create a table Singer with the attributes sno as singer number, Sname as singer name, Saddress as singer address and video as audio clip. Also create a table Company with attributes Sno,age. Fire the following queries.

- a) Find name and age of all the singer.
- b) Find name and video clip of particular singer.

### Temporal Databases:

6.

[A] Create a table tblEmp\_Appnt, which stores the account number, name, and valid time say, recruitment date and retirement date. Insert 10 records and fire the following queries

- a) Find all the employees who join the company on 2/3/2001.
- b) Find all the employees who retire on 2/3/2001.

[B] Create a table tbl\_shares which stores the name of the company, number of shares and price per share at transaction time. Insert ten records and fire the following queries:

- a) Find all the names of the company whose share price is more than Rs.100 at 11:45 am.
- b) Find the name of the company who has the highest share price at 5.00 pm.

[C] Create a table tblEmp\_Appnt, which stores the account number, name, and valid time say, recruitment date and retirement date. Create a trigger for valid time to check that no two records of the same employee have common employment period and does not allow the user to update the records. Trigger should also fill up the empty retirement date.

### Active Databases:

7. Create a table emp (eno, ename, hrs, pno, super\_no) and project (pname, pno, thrs, head\_no) where thrs is the total hours and is the derived attribute. Its value is the sum of hrs of all employees working on that project. Eno and pno are primary keys, head\_no is foreign key to emp relation. Insert 10 tuples and write triggers to do the following.

- i. Creating a trigger to insert a new employee tuple and display the new total hours from project table.
- ii. Creating a trigger to change the hrs of existing employee and display the new total hours from project table.
- iii. Creating a trigger to change the project of an employee and display the new total hours from project table.
- iv. Creating a trigger to deleting the project of an employee.

### XML Databases:

8. Create a table employee having dept\_id as number datatype and employee\_spec as XML datatype (XML Type). The employee\_spec is a schema with attributes emp id, name, email, acc\_no, managerEmail, dateofjoining. Insert 10 tuples into employee table. Fire the following queries on XML database.

- i. Retrieve the names of employee.
- ii. Retrieve the acc\_no of employees.
- iii. Retrieve the names, acc\_no, email of employees.
- iv. Update the 3<sup>rd</sup> record from the table and display the name of an employee.
- v. Delete 4<sup>th</sup> record from the table.

## **Spatial Databases :**

9. Create a spatial database table that stores the number, name and location, which consists of four different areas say abc, pqr, mno and xyz. Fire the following queries
  - i. Find the topological intersection of two geometries.
  - ii. Find whether two geometric figures are equivalent to each other.
  - iii. Find the areas of all different locations.
  - iv. Find the area of only one location.
  - v. Find the distance between two geometries.
10. Assignment based on querying XML data using DB2.
11. Implement parallel sorting and aggregates
12. Implement parallel joins
13. Implement Hash joins
14. Implement semi join in distributed DBMS
15. Implement bloom join in Distributed DBMS
16. Implement two phase commit in distributed DBMS
17. Implementation of OLAP queries
18. Implementation of cube operator in OLAP queries in data warehousing and decision support system
19. Implement decision tree of data mining problem
20. Implement a priori algorithm in data mining
21. Simulation of a search engine
22. Implement view modification and materialization in datawarehousing and decision support systems.

## **4. NETWORK ENGINEERING**

**Lectures : 2 hrs/week**  
**Practicals : 4 hrs/week**

**Term work : 25 Marks**  
**POE : 50 Marks**

1. **Introduction to concepts and tools of Windows Operating System:** Introduction to networking components, architectures, windows flavours of network operating systems, Foundation Concepts and Terms, Windows API, Services, Functions, Routines, Processes, Threads, Jobs, Virtual Memory, Kernel Mode vs. User Mode, Terminal Services and Multiple Sessions, Objects and Handles, Registry. (4)
2. **System Architecture :** Requirements and Design Goals, Operating System Model, Architecture Overview, Key System Components. (3)
3. **Security:** Security Ratings, Security System Components, Protecting Objects, Account Rights and Privileges, Security Auditing. (3)
4. **I / O system:** Device Drivers, Types of Device Drivers, Structure of a Driver, Types of I/O, The Plug and Play (PnP) Manager, Installation. (2)
5. **Storage Management & File system:** Storage Terminology, Disk Drivers, Volume Management, Windows File System Formats, File System Driver architecture. (3)

6. Windows Networking Architecture, The OSI Reference Model , Windows Networking Components, Networking APIs, Windows Sockets, Winsock Kernel (WSK), Remote Procedure Call, Web Access APIs, Named Pipes and Mailslots, NetBIOS, Other Networking APIs. (4)
7. Linux: - Introduction, Boot and system configuration services, Network Tools, SELinux policy rules and configuration files, Linux services and protocols – FTP, SMTP, Telnet, IP Sec. and VPN (Virtual Private Network), managing services, Superuser control, system runlevels, performance analysis tools, GRUB and RAID. (5)

**Reference Books:**

1. Windows Internals, Including Windows Server 2008 and Windows Vista 5th Edition (2009) – Mark E. Russinovich and David A. Solomon with Alex Ionescu. (MS Press).
2. Introducing Server 2008 R2 by Charlie Russel and Craig Zacker (Microsoft Press).
3. Linux: The Complete Reference sixth edition by Richard Petersen (TMGH).
4. Network Programming for MS Windows 2<sup>nd</sup> Edition – Anthony Jones & Jim Ohlund (Microsoft Corporation).
5. Windows Server 2008: The Definitive Guide by Jonathan Hassell (SPD O’Reilly).
6. Windows Server 2008 – Jeffrey R. Shapiro (Wiley India Edition).

**Term Work:** It should consist of the following –

- I) Minimum 8-10 network programming assignments on different network services and protocols using socket programming, Named pipes, Mailslots, NetBIOS, RPC, etc.

**AND**

- II) Installing, configuring, managing and troubleshooting any one or more network operating systems and services – Win 2008 / 2003, Linux / Unix, Mac, etc and use their services like – FTP, Telnet, DHCP, HTTP, Clustering, Terminal services, Remote Desktop Enabling, DNS, Active Directory Services, User management , etc.

**5. ELECTIVE – I : A) SOFT COMPUTING**

**Lectures : 3 hrs / week**  
**Tutorial : 1 hr / week**

**Theory : 100 Marks**  
**Term work : 25 Marks**

**SECTION - I**

1. **Introduction :** Artificial Neural Network ,Advantages of Neural Network , Fuzzy Logic , Genetic Algorithms , Hybrid Systems : Neuro Fuzzy Hybrid System, Neuro Genetic Hybrid System, Fuzzy Genetic Hybrid System. (4)

2. **Artificial Neural Networks:** Fundamental Concept, Evolution Of Neural Networks, Basic Models of Artificial Neural Network, Terminologies of ANNs, McCulloch-Pitts Neuron , Linear Reparability, Hebb Network. (7)
3. **Supervised Learning Network:** Perceptron Networks, Adaptive Linear Neuron (Adaline) ,Mutiple Adaptive Linear Neuron, Back Propagation Network, Radial Basis Function Network. (7)

## SECTION – II

4. **Introduction to Fuzzy Sets :** Introduction , Classical Sets , Fuzzy Sets, Fuzzy relations , Membership Function , Defuzzification , Fuzzy Arithmetic and Fuzzy Measures, Fuzzy Rule base and Approximate Reasoning , Fuzzy Decision Making, Fuzzy Logic Control System. (7)
5. **Genetic Algorithms :** Introduction , Basic Operators and Terminologies in Gas , Traditional Algorithm vs Genetic Algorithms , Simple GA, General Genetic Algorithm, The Schema Theorem, Classification of Genetic Algorithm, Holland Classifier System, Genetic Programming ,Applications of GA. (7)
6. **Applications of Soft Computing:** GA Based Internet Search Technique; Soft Computing Based Hybrid Fuzzy Controllers. (4)

### Text Books :

- 1) Principles of Soft Computing - S.N. Sivanandam , S.N. Deepa. (Wiley India Edition).
- 2) Elements of Artificial Neural Networks - K. Mehrotra, C.K. Mohan, and S. Ranka  
Published by MIT Press, 1997 (<http://mitpress.mit.edu/book-home.tcl?isbn=0262133288>)

### Reference Books:

1. Soft Computing and Intelligent Systems Design – theory, tools and applications – F.O. Karray & C.D. Silva (Pearson Education).
2. Neuro-Fuzzy and Soft Computing – A computational approach to learning and machine intelligence – J.S.R. Jang, C.T. Sun & E. Mizutani (Pearson Education).

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

## **5. ELECTIVE – I : B) PROJECT MANAGEMENT**

**Lectures : 3 hrs/week**  
**Tutorials : 1 hrs/week**

**Theory : 100 Marks**  
**Term work : 25 Marks**

### **Objectives:**

1. Provide students with a basic understanding of project management principles and practices.
2. Increase the student's ability to function effectively on a project team.
3. Describe and understand the purpose of each component of a project plan document
4. Demonstrate competency in the creation and management of a project plan
5. Share best practices and tools related to project management

### **SECTION – I**

1. **Introduction to Project Management :** Project, project management(PM), role of project manager, project management profession, system view of PM, organization, stakeholders, project phases and lifecycle, context of IT projects, process groups, mapping groups to knowledge areas. (5)
2. **Project Integration Management:** Strategic planning and project selection, preliminary scope statements, project management plans, project execution, monitoring and controlling project work, integrated change control, closing project, software assistance. (4)
3. **Scope management:** scope planning and scope management plan, scope definition and project scope statement, creating the work breakdown structure, scope verification and control, software assistance. (3)
4. **Time management:** Importance of project schedules, activity - definition, sequencing, resource estimating, duration estimating; schedule development and control, software assistance. (3)
5. **Cost management:** Importance, basic principles, cost estimating, budgeting and control, software assistance. (3)

### **SECTION – II**

6. **Quality management:** Importance, quality - planning assurance control, tools and techniques, modern quality management and improving IT project quality, software assistance. (4)
7. **Human Resource management:** Importance, keys to managing people, human resource planning, acquiring, developing and managing project team, software assistance. (4)
8. **Communication management:** Importance, communication planning, information distribution, performance reporting, managing stakeholders, suggestions for improving project communication, software assistance. (3)

9. **Risk management:** Importance, risk management planning, sources of risk, risk identification, qualitative and quantitative risk analysis, risk response planning, risk monitoring and control, software assistance. (4)
10. **Procurement management:** Importance, planning purchases and acquisitions, planning contracting, requesting seller responses, selecting sellers, administering the contract, closing the contract, software assistance. (3)

**Text Book:**

1. Information Technology Project Management (4<sup>th</sup> Edition) – Kathy Schwalbe (Cengage Learning – India Edition).

**Reference Books:**

1. Project Management Core Textbook – Mantel Jr., Meredith, Shafer, Sutton with Gopalan (Wiley India Edition)
2. Project Management- A systems Approach to planning, scheduling and controlling - Harold Kerzner (John Wiley & Sons, Inc)
3. *A Guide to the Project Management Body of Knowledge (3<sup>rd</sup> Edition)*- Newtown Square, PA, Project Management Institute, 2005.

**Note:**

- Microsoft Project 2007 (120-day trial available from <http://www.microsoft.com>).

**Term Work :** It should consist of minimum 10-12 assignments based on the syllabus

**5. ELECTIVE – I : C) CYBER LAWS**

<b>Lectures</b>	<b>: 3 hrs / week</b>	<b>Theory</b>	<b>: 100 Marks</b>
<b>Tutorial</b>	<b>: 1 hr / week</b>	<b>Term work</b>	<b>: 25 Marks</b>

**Objective:**

1. To learn IT security – threats, detection and prevention
2. To understand Cyber Laws and provisions.

**SECTION - I**

1. **Object and Scope of the IT Act :** Genesis, Object, Scope of the Act, Amendments. (3)
2. **E-Governance and IT Act 2000 :** Legal recognition of electronic records, Legal recognition of digital signature, Use of electronic records and digital signatures in Government and its agencies. (7)
3. **Certifying Authorities:** Need of Certifying Authority and Power, Appointment, function of Controller, Who can be a Certifying Authority?, Digital Signature Certifications, Generation, Suspension and Revocation Of Digital Signature Certificate. (7)



## SECTION - II

4. **Domain Name Disputes and Trademark Law** : Concept of Domain Names, New Concepts in Trademark Jurisprudence, Cyber squatting, Reverse Hijacking, Meta tags, Framing, Spamming, Jurisdiction in Trademark Dispute. (6)
5. **The Cyber Crimes (S-65 to S-74)** : Tampering with Computer Source Documents(S-65), Hacking with Computer System(S-66),Publishing of Information Which isObscene in Electronic Form(s-67), Offences : Breanch of Confidentiality & Privacy (S-72), Offences : Related to Digital Signature Certificate (S-73 & S-74) (7)
6. **E-banking and legal issues:** Regulating e-transactions, Role of RBI and legal issues, International transactions of e-cash, Credit card and internet, Laws relating to internet credit cards. (6)

### References:

1. Cyber Law in India by Farooq Ahmad – Pioneer Books
2. Information Technology Law and Practice by Vakul Sharma – Universal Law Publishing Co. Pvt. Ltd.
3. The Indian Cyber Law by Suresh T Vishwanathan – Bharat Law house New Delhi.
4. Hand book of Cyber & E-commerce Laws by P.M. Bakshi & R.K.Suri – Bharat Law house, New Delhi.
5. Guide to Cyber Laws by Rodney D. Ryder – Wadhwa and Company Nagpur.  
The Information Technology Act,2000 – Bare Act – Professional Book Publishers – New Delhi

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

## 6. COMMUNITY SERVICES

**Practicals** : 2 hrs/week

**Term work** : 25 Marks

### Objectives:

1. To create an awareness among the common man of Western Maharashtra region and area coming under jurisdiction of the Shivaji University regarding the e-services provided by various public sector organization.
2. To promote the use of technological services in day-to-day activities.
3. To understand the problems of the locality.
4. To make the student aware of the various engineering tools and techniques used in e-services.
5. Creating awareness of RTI ( Right Of Information) among general public for procuring public documents and it's appropriate use.

### Details:

**Community Services:** The student project group is expected to do the following-

1. With the prior written permission from the Head of the Institute the project group should visit any Public Sector / Government/ Semi government organization like – Zilha Parishad, Collector Office, Municipal Corporation, Tahasildar Office, RTO, MSEB, Court, Railway station , Tourism Services, agricultural service sector, Banks where the facilities of e-governance and e-services available for public purposes.
2. The project group should understand the public related services and identify the required services for the common man.
3. Two/Three groups should plan awareness programs/camps to be carried out in the nearby villages / taluka places / residential colonies / localities and visit the suitable areas along with the staff to create awareness among the common man about various e-services available in public domain.
4. They should prepare a presentation simulating the services that are being exposed to common man and give a demonstration during their visit to the concerned area.
5. Further group should take the feedback from the concerned locality on a pre-designed format that may be provided by the Head of the Institute.
6. Group should prepare a report detailing:
  - a. The kind of services chosen.
  - b. The office / organization visited mentioning the authorities meet.
  - c. The facilities provided by the chosen service.
  - d. Preparations for the visit.
  - e. Presentation Techniques & Tools used.
  - f. Analysis of the Feedback Form filled during visit.
  - g. Observations and conclusions during the entire work.
7. Submission of the above report duly signed by the concerned staff and Head of the department is to be done to the department at the end of semester.

## **7. PROJECT – I**

**Practical : 4 Hrs/week**

**Term Work : 50 Marks**

**Oral Exam : 75 Marks**

The project work is to be carried out in two semesters of B.E. The project should be undertaken preferably by group of 4-5 students who will jointly work and implement the project in the two semesters.

In Semester VII, The group will select a project with the approval of the Guide (teaching staff ) and submit the name of the project with a synopsis of the proposed work of not more than 02 to 08 pages before second week of August in the academic year. The group is expected to complete detailed system design, analysis, data flow design, procurement of hardware and/or software, implementation of a few modules of the proposed work at the end of semester –VII as a part of the term work submission in the form of a joint report.

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

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.**

**MyUniversityBuzz**

# **B.E. (COMPUTER SCIENCE & ENGINEERING) Sem – VIII**

## **1. GRID TECHNOLOGY**

**Lectures : 4 hrs/week**  
**Practicals : 2 hrs/week**

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

### **SECTION – I**

#### **1. Introduction to Grid Architecture**

- a. Characterization of Grid.
- b. Grid related standard bodies.
- c. Grid types, Topologies, Components and Layers.
- d. Comparison with other approaches. (5)

#### **1. System Infrastructure**

- a. Traditional paradigms for distributed computing
- b. Web Services
- c. Grid standards : OGSA & WSRF
- d. Introduction to Globus Toolkit 3 & GT 4 (9)

#### **3. Semantic Grid & Autonomic Computing**

- a. Metadata & Ontology in semantic Web
- b. Semantic Web Services
- c. Layered Structure of Semantic Grid
- d. Semantic Grid Activities
- e. Autonomic Computing (9)

### **SECTION – II**

#### **4. Basic Services**

- a. Grid Security
- b. Grid Monitoring
- c. GMA, Review criteria overview of Grid Monitoring system – Autopilot. (8)

#### **5. Grid Scheduling & Resource Management**

- d. Scheduling Paradigms
- e. How Scheduling Works
- f. Review of Condor (4)

## **6. Introduction to Cloud Computing**

Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS / HAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations (4)

## **7. Virtualization, SOA & Cloud**

Virtualization characteristics, Managing virtualization, Virtualization in cloud, Virtualization desktop and managing desktops in the cloud and security issues, characteristics of SOA, SOA and cloud. (5)

## **8. Cloud Storage and Data Security**

Storage basics, Storage as a service providers, security, aspects of data security, data security mitigation, provider data and it's security. (3)

### **Text Books:**

1. The Grid ( Chapter 1,2,3,4,5) Core Technologies  
by Maozhen Li, Mark Baker ( John Wiley & Sons)
2. Cloud Computing for Dummies (Chapter 6,7)  
by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)
3. Cloud Security & Privacy (Chapter 8)  
by Tim Malhar, S.Kumaraswammy, S.Latif (SPD,O'REILLY)

### **Reference:**

1. A networking Approach To Grid Computing  
by Daniel Minoli (Chapter 1) (John Wiley & Sons, INC Publication)
2. Cloud Computing: A Practical Approach  
by J.Vette, Toby J. Vette, Robert Elsenpeter (Tata McGraw Hill)

### **Term work :**

It should consist of minimum 10 to 12 assignments on the following guidelines covering entire syllabus.

1. Assignments on computing paradigms.
2. Assignment on Web services
3. Use of Globus Tool Kits – GT3 & GT4.
4. Assignment on Ontology language.
5. Assignment on Semantic Grid Portal Tool kit.
6. Assignment on Autonomic Computing Projects.
7. Assignment on Grid Security.
8. Assignment on Grid Monitoring System –Any one per batch.
9. Assignment on scheduling systems.
10. Assignment on Grid portals.
11. Assignment on clouds of different organization (any one).
12. Assignment on virtualization and SOA into the cloud.
13. Assignment on cloud storage and data security.
14. Assignment on Best practices in cloud.

## **2. STORAGE NETWORKS**

**Lectures : 3 hr /week**  
**Tutorial : 1 hr /week**

**Max Marks : 100 Marks**  
**Term Work : 25 Marks**

### **Objectives**

1. To Study storage system architectures
2. To study business needs of storage management
3. To study importance of backup and replication

### **SECTION - I**

#### **1. Introduction to information storage and Storage System Environment**

Evolution of storage technology and architecture, Data Center Infrastructure, Key challenges in Managing Information, Information Lifecycle. Components of Storage System Environment, Disk Drive Components, Disk Drive Performance, Laws governing disk Performance, Logical Components of Host, Application requirements and disk performance. (5)

#### **2. Intelligent Storage System and Direct Attached Storage**

Components of Intelligent Storage System, Intelligent Storage Array. Direct Attached Storage – types , benefits and limitation, Disk drive Interface, Introduction to parallel SCSI, SCSI command model. (4)

#### **3. Storage Area Network**

SAN – Evolution, Components of SAN, Fibre Channel Protocol Stack- Links, ports and topologies, FC-0: Cables, plugs and Signal Encoding, FC-1: 8b/10b encoding, ordered sets and link control protocol, FC-2: data Transfer, FC-3: common Services, FC-4 and ULPs, Fibre Channel SAN – point-to- point topology, Fabric topology, Arbitrated loop topology, Hardware components of Fibre channel SAN. IP SAN – iSCSI – components, connectivity, topology, protocol stack, discovery, names, session, PDU (6)

#### **4. Data Protection : RAID**

Implementation of RAID, RAID array components, RAID levels, Comparison, RAID Impact on disk performance, Hot Spares. (2)

### **SECTION - II**

#### **5. Network -Attached Storage**

Local File Systems, Network File System and File Servers, Benefits of NAS, NAS file I/O, Components of NAS, NAS Implementations, NAS File sharing Protocols, NAS I/O operations, Factors affecting NAS Performance.

Case Study: Direct Access File System, Shared Disk File System

Comparison: NAS Fibre Channel SAN and iSCSI SAN (6)

## **6. Storage Virtualization**

Introduction, Virtualization in the I/O path, Limitations and requirements, Definition of Storage Virtualization, Implementation considerations, Storage Virtualization on block level, File level Virtualization, Storage Virtualization on various levels of the storage network, Symmetric and Asymmetric Storage Virtualization (5)

## **7. Business Continuity, Backup and Recovery**

Introduction, Information Availability, Cause of Information unavailability, Measuring information Availability, Consequences of down time, BC terminology, BC planning life cycle, Failure Analysis, BC Technology Solutions, Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Process, Backup and Restore Operations, Backup Topology, Backup in NAS environment, Backup Technologies, (5)

## **8. Replication**

Local Replication, Uses of Local Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations (2)

### **Text Book:**

1. Information Storage and Management  
- G. Somasudaram – EMC Education Services (Wiley India Edition)
2. Storage Networks Explained  
- Ulf Troppen, Rainer Erkens, Wolfgang Müller (Wiley India Edition)

### **Term work :**

It should consist of minimum 10-12 assignments based on the above topics.

## **3. REAL TIME OPERATING SYSTEM**

**Lectures : 4 hrs / week**  
**Tutorial : 1 hr / week**

**Theory : 100 Marks**  
**Term work : 25 Marks**

### **SECTION - I**

#### **1. Basic Real Time Concepts**

- a. Terminology
- b. Real Time System Design issues
- c. Examples of Real-Time Systems (3)

#### **2. Hardware Considerations**

- a. Basic Architecture
- b. Hardware Interfacing
- c. Central Processing Unit
- d. Memory

- e. Input/Output
- f. Other special devices (6)

### **3. Real-Time Operating System**

- a. Real-Time Kernels
- b. Theoretical Foundation of Real-Time Operating System
- c. Intertask Communication and synchronization
- d. Memory Management
- e. Case study : POSIX (6)

### **4. Software Requirements Engineering**

- a. Requirements- Engineering Process
- b. Types-of Requirements
- c. Requirements Specification for Real-Time System
- d. Formal Methods in Software Specification
- e. Structured Analysis and Design
- f. Object-Oriented Analysis and the Unified Modeling Language
- g. Case Study – Four-way traffic light controller system, Aircraft controller system,
- h. ASIMO Robot. (7)

## **SECTION – II**

### **5. Software System Design**

- a. Properties of Software
- b. Basic Software Engineering Principles
- c. The Design Activity
- d. Procedural-Oriented Design
- e. Object-Oriented Design
- f. Case Study in Software Requirements Specification. (6)

### **6. Programming Language and the Software Production Process**

- a. Introduction
- b. Assembly Language
- c. Procedural Language
- d. Object-Oriented Language
- e. Brief survey of languages – Real time features in C# and Java. (6)

### **7. Engineering Considerations**

- a. Metrics
- b. Cost estimation using COCOMO (3)

### **8. Programming in RTLinux**

- a. Architecture of RTLinux
- b. Creating RTLinux modules



- c. Semaphore and Mutex management in RTLinux
- d. Case Study - Application development to control appliances through RTLinux
- e. Overview of other Realtime development tools. (6)

**Reference Books:**

1. Real time system design and analysis - Phillip A. Laplante (Wiley India)-3<sup>rd</sup> Edition
2. Embedded / Real Time Systems : concepts, design and programming  
Dr. K.V. K. K. Prasad (Dreamtech Press) – New Edition
3. Real time systems - C. M. Krishna, K.G. Shin (TMGH)

**Term work :**

It should consist of minimum 10-12 assignments based on the above topics, out of which 2-3 **practical** assignments should be on RTLinux.

**4. WEB TECHNOLOGY**

**Lectures : 3 hrs / week**  
**Practical : 4 hr / week**

**Term work : 50 Marks**  
**POE : 50 Marks**

**Objectives:**

1. Introduce the students to emerging web technologies
2. Introduce the students with XML concepts and its application
3. Motivate the students to develop web applications
4. To create awareness about the differences in Desktop and Web Application

**1. Introduction to XML:**

What is XML, XML verses HTML, XML terminology, XML standards, XML syntax checking, The idea of markup, XML Structure, Organizing information in XML, Creating Well-formed XML, XML Namespaces. DTD- Introduction to DTD, Document Type Declaration, Element Type Declaration, Attribute Declaration, Conditional Section, Limitations of DTD (2)

**2. Parsing XML:**

Introduction to Parser, Parsing approaches, JAXP, SAX, JAXP and DOM. (3)

**3. Extensible Stylesheet Language(XSL):**

Introduction to XSL, overview, XPATH, XSLT – templates, creating elements and attributes, looping and sorting, conditional processing, defining variables. (2)

**4. XML Schema:**

Introduction, basic and complex schema, specifying frequency, element contents, content model reuse, anonymous types, mixed content, grouping of data, mandating all elements, choices, sequences, simple types- numeric, time, xml, string, binary data types, deriving types- facets, attributes. (2)

5. **Introduction to Servlet:**

History of web applications, support for web application, power of servlet, a Servlet's job, basic servlet code, configuration of apache tomcat server, set up Development Environment, Compiling and Deploying Servlet, Web Application - directory structure, Deployment descriptor, Assigning custom URLs to servlet. (1)

6. **Structure of Servlet:**

HTTP basic, The servlet API, Page Generation, The Servlet Life Cycle – The Service method, doGet and doPost methods, Init method, destroy method, The Single Thread Model Interface. (1)

7. **Retrieving Information :**

Servlet Init Parameters and Parameter Names, Information about server, Context Init Parameters, The Client Information – information about client machine, Restricting Access, Information about user, The Request – Request Parameter, path information, Serving files, Serving Resources, Request Headers, Handling Post Request. (2)

8. **Creating Response in Servlet:**

The Structure of response, sending normal response, using persistent connection, response buffering, controlling response buffer, status codes, setting status code, HTTP headers, setting HTTP headers, Redirecting request, client pull, configuring error pages, logging, Exceptions. (2)

9. **Session Management in servlet:**

Session tracking, Session tracking Mechanisms – Hidden Form Fields, URL Rewriting, cookies, Session Tracking APIs, session life cycle, Setting session timeout, life cycle methods, manually invalidating session, Session ID, non cookie Fallbacks. (2)

10. **Java Server Pages:**

Need for JSP, Benefits of JSP, Advantages of JSP over other technologies, Installation of JSP pages, Creating Template Text, Invoking Java Code From JSP, Limiting the JAVA code in JSP, Using JSP Expression, Example of JSP Expression, Comparing Servlet to JSP, Writing Scriptlets, Scriptlet examples, Scriptlet for conditional execution, Using Declaration, Declaration Example, Using Predefined Variables, JSP page Directive – import, contentType, pageEncoding, session, buffer, autoFlush, errorPage. (3)

11. **ASP.NET:**

**Introduction to ASP.NET:**

The Evolution of Web Development, Important facts about ASP.NET, The Code Model, Web Project.

**Web Forms:** Page Processing, Web Form Processing Stages, The Page as Control Container, The Page Class.

**Server Controls:** Types of Server Controls, HTML Server Controls, Web Controls, List Controls, Input Validation Controls.

**ASP.NET Application:** Anatomy of ASP.NET application, global.asax Application file, ASP.NET Configuration.

**Data Access – ADO.NET Fundamentals:**ADO.NET Architecture, The Connection Class, The Command and DataReader Classes. Data Binding – Basic Data binding, Data source Control, TheSqlDataSource. (6)

12. **Introduction to PHP scripting language:** Basics of PHP script, combining HTML and PHP, variables, data types, static and predefined (super-global) variables, operators, expressions, flow & looping control (2)

13. **Functions and Arrays :** Structure of function, defining & calling function, returning values, arguments, scope of variables, static functions, include & require statements, Arrays, Associative arrays, multidimensional arrays, array related functions (2)

14. **Web Services :** Introduction to Web Services, Comparison of Web Services with traditional technologies, Buzzwords in Web Services, Java Web Services, RESTful Web Services (3)

#### **Text Books:**

1. XML and Related Technologies – Atul Kahate , Pearson Education.
2. Java Servlet Programming – Jason Hunter, SPD O'REILLY.
3. Core-Servlet and JavaServer Pages Volume -1 2<sup>nd</sup> Edition – Marty Hall, Larry Brown, Pearson Education.
4. Pro ASP.NET 3.5 in C# 2008, Matthew MacDonald, Wiley-APRESS publication.
5. Beginning PHP5 [WROX]

#### **Reference Books:**

1. The XML Handbook – Charls Goldfarb.
2. Learning XML – Erik Ray, SPD O'REILLY 2<sup>nd</sup> Edition.
3. Java & XML – Brett McLaughlin, SPD O'REILLY 3<sup>rd</sup> Edition.
4. XML in Nutshell – Elliotte RustyHarold, SPD O'REILLY, 3<sup>rd</sup> Edition.
5. Head First – Servlet and JSP - Bryan Basham, SPD O'REILLY, 2<sup>nd</sup> Edition.
6. Java Server Pages – Hans Bergsten, SPD O'REILLY, 3<sup>rd</sup> Edition.
7. Professional ASP.NET 2.0 by Bill Evjen, Scott Hanselman, Wiley Wrox publication.
8. PHP Bible-John [Wiley]
9. Debian New maintainers guide - <http://www.debian.org/doc/maint-guide/>
10. LaTeX: A document preparation system, User's guide and reference manual by Leslie
11. Getting started with Drupal - <http://drupal.org/getting-started/>

#### **Term Work :**

It should consist of minimum 18-22 experiments based on the following.

1. Create different types of XML documents.
2. Search information from XML document using SAX parser.
3. Navigating the Document Object Model tree for given XML Document.

4. Editing, Updating XML document using DOM.
5. Write XSLT styles-sheet to convert XML document to HTML.
6. XML Validation using XSchema.
7. Remote Procedure call using XML.
8. Installation, Configuration of Tomcat Server and Deployment of servlet based application.
9. Write a servlet to store form data to database – use Type 4 JDBC driver and Database connectivity support from server.
10. Session Management using Servlet.
11. Write a JSP application to display database contents.
12. Session Management using JSP.
13. Accepting and validating user entered data using ASP.NET.
14. Accepting and validating book catalog information using validating controls.
15. Display database contents from SQL server or Oracle database using SqlCommand class from ASP.NET.
16. Display parameterized data using SqlDataReader and GridView in ASP.NET.
17. Database access using DataSet in ASP.NET.
18. Displaying data using DataView in ASP.NET.
19. Develop sample form with validation code using PHP.
20. Develop file up-loader form to upload a file using PHP.
21. Develop sample application for session management using PHP.
22. Develop sample application with database connectivity using PHP.
23. Create a form to send mail using PHP.
24. Use of Foss documentation tools – Latex
25. Introduction to packaging – Debian
26. Content Management Systems – Drupal

## **5. ELECTIVE – II : A) DATA MINING**

**Lectures: 3 hr / week**

**Tutorial : 1 hr / week**

**Max Marks: 100 Marks**

**Term Work: 25 Marks**

### **Objectives:**

1. Introduce the students with basic data mining tasks
2. To study basic data mining techniques
3. To study the basics of web mining

### **SECTION – I**

#### **1. Introduction**

Basic data mining tasks: Classification, Regression, Time Series Analysis, Prediction, Clustering, Summarization, Association Rules, Sequence Discovery, Data Mining Versus Knowledge Discovery in Database, The Development of Data Mining, Data Mining Issues, Data Mining Metrics, Social Implications of Data Mining, Data Mining from a Database Perspective

(5)

## **2. Data Mining Techniques**

Introduction, A Statistical Perspective on Data Mining, Point Estimation, Models Based on Summarization, Bayes Theorem, Hypothesis testing, Regression and Correlation, Similarity Measures, Decision Trees (5)

## **3. Classification**

Introduction, Issues in Classification, Statistical Based Algorithms, Regression, Bayesian Classification, Distance Based Algorithms, Simple Approach, K Nearest Neighbors, Decision Tree Based Algorithms, ID3, C4.5, CART, Scalable DT Techniques, Rule Based Algorithms, Generating Rules from a DT, Generating Rules from Neural Networks, Generating Rules without a DT or NN, Combining Techniques (7)

## **SECTION - II**

## **4. Clustering**

Introduction, Similarity and Distance Measures, Outliers, Hierarchical Algorithms, Agglomerative Algorithms, Divisive Clustering, Partitional Algorithms, Minimum Spanning Tree, Squared Error Clustering Algorithm, K-Means Clustering, Nearest Neighbor Algorithm, PAM Algorithm, Bond Energy Algorithm, Clustering Large Database, BIRCH, DBSCAN, CURE Algorithm, Clustering with Categorical Attributes, Comparison (7)

## **5. Association Rules**

Introduction, Large Item sets, Basic Algorithms, Apriori Algorithm, Sampling Algorithm, Partitioning, Parallel and Distributed Algorithm, Data Parallelism, Task Parallelism, Comparing Approaches, Incremental Rules, Advanced, Association Rule Techniques, Generalized Association Rules, Multiple Level Association Rules, Quantitative Association Rules, Using Multiple Minimum Supports, Correlation Rules, Measuring the Quantity of the Rules (6)

## **6. Web Mining**

Introduction, Web Content Mining, Crawlers, Harvest System, Virtual Web View, Personalization, Web Structure Mining, Page Rank, Clever, Web Usage Mining, Preprocessing, Data Structures, Pattern Discovery, Pattern Analysis (5)

### **Text Book:**

1. Data Mining Introductory and Advanced Topics - Margaret H. Dunham

### **Reference Book:**

1. Data Mining Practical Machine Learning Tools and Techniques - Ian H. Witten, Eibe Frank
2. Mastering Data Mining by Michael J.A. Berry & G.S. Linoff (Wiley Student Edition)

**Term Work :** It should consist of minimum 10-12 assignments based on the above topics.

## **5. ELECTIVE – II : B) ADHOC WIRELESS NETWORKS**

**Lectures : 3 hrs/week**  
**Tutorials : 1 hrs/week**

**Theory : 100 Marks**  
**Term work : 25 Marks**

### **SECTION – I**

1. **Introduction** – Cellular and Ad Hoc wireless networks, Applications, Issues in Ad Hoc wireless networks. (6)
2. **MAC Protocols for ad hoc wireless networks** – Introduction, Issues in designing MAC protocol, Design goals of MAC protocol, Classification of MAC protocols, Contention based protocols. (6)
3. **Routing protocols for ad hoc wireless networks** – Introduction, Issues in designing a routing protocol for ad hoc wireless networks, Classification of routing protocols, Table driven, on-demand Hybrid routing protocols. (6)

### **SECTION – II**

4. **Multicast Routing in Ad hoc wireless networks** – Introduction, Issues in designing a multicast routing protocol, Operation of multicast routing protocols, An architecture reference model for multicast routing protocols, Classification of multicast routing protocols, Tree-based, Mesh-based multicast routing protocols. (6)
5. **Transport layer and security protocols for ad hoc wireless networks – Introduction**, Design issues and goals, Classification of transport layer solutions, TCP over ad hoc wireless networks, Security in ad hoc wireless networks, Network security requirements, Issues and challenges in security provisioning, Network security attacks, Key management, Secure routing. (6)
6. **Quality of service** – Introduction, Issues and challenges, Classification of QoS solutions, MAC layer solutions, Network layer solutions, QoS framework. (6)
7. **Energy management** – Introduction, Need, Classification of energy management schemes, Battery Management, Transmission Power Management, System Power Management schemes. (3)

#### **Text Book:**

1. Ad Hoc wireless Networks – Architecture and Protocols by C.S.R.Murthy & B.S. Manoj, Pearson Education.

#### **Reference Books:**

1. Ad Hoc Wireless Networks – A communication Theoretic perspective by O.K.Tonguz & G.Ferrari, Wiley India.

2. Ad Hoc Mobile Wireless Networks – Protocols and Systems by C. K. Toh (Pearson Education)
3. Ad Hoc Networking by Charles E. Perkins (Pearson Education)
4. Introduction to Wireless and Mobile Systems, 2<sup>nd</sup> Edition, by Dharma Prakash Agrawal & Qing-An Zeng (CENGAGE Learning)

**Term Work** : It should consist of minimum 10-12 assignments based on the above topics.

## **5. ELECTIVE – II : C) BUSINESS INTELLIGENCE SYSTEM**

**Lectures** : 3 hrs / week  
**Tutorial** : 1 hr / week

**Theory** : 100 Marks  
**Term work** : 25 Marks

### **Objectives:**

To study the advanced database techniques to acquaint the students with some refers to skills, processes, technologies, applications and practices used to support decision making issues & build business intelligence systems. At the end of the course students should be able to:

- Gain an awareness of the basic issues in BIS & Modeling techniques.
- Compare and contrast emerging architectures for B. I. systems
- Familiarize with the E-T-L techniques in B.I.S.
- other advanced topics
- Interpret B.I.S applications

### **Pre-requisites:**

Before studying the subject, students should be aware of DBMS concepts, OO concepts, WWW, overview of Data Warehouse, Software Engg.

### **SECTION - I**

1. **Introducing the Technical Architecture:** The value of architecture, Technical Architecture overview, Back room Architecture, Presentation Server Architecture, Front room Architecture, Infrastructure, Metadata, Security. (7)
2. **Introducing Dimensional Modeling:** Making the Case for Dimensional Modeling, Dimensional Modeling primer, Enterprise Data Warehouse Bus Architecture, More on Dimensions & Facts. (6)
3. **Designing the Dimensional Modeling:** Modeling Process overview, Getting Organized, Four Step Modeling Process, Design the Dimensional Model. (5)

### **SECTION - II**

4. **Introducing Extract, Transformation & Load:** Round up the requirements, the 34 subsystems of ETL, Extracting Data, Cleaning & Conforming data. (6)

**5. Introducing Business Intelligence Applications:** Importance of B.I. Applications, Analytical cycle for B.I., Types of B.I. Applications, Navigating Applications via the B.I portal. (6)

**6. Designing & Developing B.I Applications:** B.I. Application resource planning, B.I. Application Specification, B.I. Application Development, B.I. Application maintenance (6)

**Text Book:**

1. The Data Warehouse Lifecycle Toolkit By Raiph Kimball,Ross, 2nd edition, Wiley Publication

**Reference Books:**

1. Data Warehousing in the Real World – Anahory & Murray, Pearson Edt.
2. Data Warehousing Fundamentals – Ponniah [Wiley Publication]

**Term Work:**

It should consist of 10-12 assignments with emphasis on configuration and development of Business Intelligence applications using tools –

1. ETL
2. Reporting tools - Infomatica, Datastage, Abitinio, Microstrategy and Business Objects, Cognos, PowerAnalyzer, Hyperion
3. Relational Database management Systems - Oracle, Terradata, MS SQL
4. Non-relational databases - delimited flat files, Poeplesoft data, XML data.

The assignments must include installation and testing of BI applications, setting up user security, and study process of maintenance of BI applications.

## **6. PROJECT - II**

**Practical :4 Hrs/week**

**Term Work : 50 Marks**  
**Oral Exam : 75 Marks**

**Objective :**

The group will continue to work on the project selected during the semester VII and submit the completed project work to the department at the end of semester VIII as mentioned below-

1. The workable project.
2. The project report in the bound journal complete in all respect with the following :-
  - i) Problem specifications.
  - ii) System definition – requirement analysis.
  - iii) System design – dataflow diagrams, database design
  - iv) System implementation – algorithm, code documentation
  - v) Test results and test report.
  - vi) In case of object oriented approach – appropriate process be followed.

Term work will be jointly assessed by a panel of teachers appointed by head of the department.



Oral examination will be conducted by internal and external examiners 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.**

## **SYLLABUS OF EQUIVALENT SUBJECTS**

### **INFORMATION TECHNOLOGY CONCEPTS**

**Theory : 100 Marks**

#### **SECTION – I**

1. **Organizations, Environments & Information Technology** : The new world of business, Examples of Information systems at work world wide, Information technology developments and trends, why should you learn about information technology? (4)
2. **Information Technologies** : concepts and managements – Information systems concepts and definitions, classification of information systems, transactional and functional processing, operational, managerial and strategic systems, information infrastructure and architecture, Managing information resources. (4)
3. **Strategic Information systems** : Strategic advantage and information technology, Porter's competitive forces model and strategies, Porter's value chain analysis model, strategic information systems frameworks. (4)
4. **Business Process Re-engineering & Information Technology** : Basic concepts & need for BPR, principles of BPR & the role of IT, BPR & restructuring the organization, The networked organizations. (5)

#### **SECTION - II**

5. **Network computing**: Discovery, communication & collaboration – The Internet, Groupware technology & infrastructure, Some internet implementation topics. (5)
6. **Impacts of IT on Organizations, Individuals and Society**: Does it have only positive effects? Ethical issues, impacts on organization, impacts on individuals at work, Societal impacts and the internet community. (6)

7. **Supporting Management and Decision making:** The Managers and decision making, decision support systems, Corporate-level decision support, Advance decision support topics. (6)

**Books:**

1. Information Technology for Management – Turban, McLean, Wetherbe (John Wiley & Sons Inc., 2nd Edi.)
2. Information systems, theory and practice – John Burch Jr., Felix Strater Jr.(Hamilton publishing company).
3. Information system design – Brookes, Grouse, Jeffery and Lawrence (PHI).

**MODERN INFORMATION RETRIEVAL**

**Theory : 100 Marks**

**SECTION – I**

1. **Information Retrieval & IR Models :** Information retrieval and data retrieval, Information retrieval process, A Formal Characterization of IR Models, Classic Information Retrieval Set Theoretic Models, Algebraic Models, Probabilistic Model, Structured Text Retrieval Models, Models For Browsing. (8)
2. **Query Languages:** Keyword based querying, Pattern Matching. (4)
3. **Indexing and Searching:** Inverted Files and Indices for text search, Boolean Queries, Sequential searching, Pattern Matching. (4)

**SECTION – II**

4. **Text and Multimedia Languages and Properties:** Text data & formats, Multimedia Data & formats. (4)
5. **Multimedia IR - Models and Languages:** Data Modeling & Query Languages. (3)
6. **Multimedia IR - Indexing and Searching:** A generic multimedia indexing approaches, One dimensional time series, Two Dimensional color images. (5)
7. **IR in WEB & Digital Libraries: Characterizing** the Web & Search Engines, Architectural issues of Digital Libraries, Document models, Representation, and Access. (4)

**Text Book :**

1. Modern Information Retrieval - Ricardo Baeza-Yates and Berthier Ribeiro-Neto - Pearson Education (Low Price Edition)

**Reference :**

[www.dcc.ufmg.br/irbook](http://www.dcc.ufmg.br/irbook) or [sunsite.dcc.uchile.cl/irbook](http://sunsite.dcc.uchile.cl/irbook).

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# DIGITAL SIGNAL PROCESSING CONCEPTS

**Theory : 100 Marks**

## SECTION – I

1. **Introduction:** Signals, systems and signal processing, classification of signals, concept of frequency in continuous-time and discrete-time signals, Analog to digital and digital to analog conversions. (5)
2. Discrete – time signals and systems: Discrete-time signals, discrete-time systems, Analysis of discrete-time and linear time-invariant systems, discrete-time systems described by difference equations. (5)
3. Z- transforms: Z- transform and its properties, Rational Z-transforms, one sided Z-transforms, Inversion of Z-transforms. (4)
4. Frequency Analysis of discrete signals: Frequency analysis of discrete time signals, properties of Fourier transform for discrete-time signals, sampling of signals in the time and frequency domains. (4)

## SECTION – II

5. Discrete Fourier Transform : DFT and its properties, FFT algorithms – direct, divide and conquer approach, radix-2 algorithm, implementation of FFT; Linear filtering methods based on DFT. (7)
6. Digital Filter Design : Design of digital filters by placement poles and zeros in Z-plane, IIR systems and design of IIR filters from analog filters, Frequency transformation, Direct design techniques for digital IIR filters, design of FIR filters, Decimation and interpolation. (7)
7. Applications of DSP. (4)

### **Books :**

1. Introduction to Digital signal processing – John G. Proakis, D.G. Manolakis (Maxwell Macmillan Int.)
2. Discrete time signal processing – A.V. Oppenheim, R.W. Schaffer (PHI)
3. Digital Signal Processing – A system design approach – D.T. Defrata,
4. J.G. Lucas, W.S. Hodgkis (Wiley)
5. Designing digital filters – C.S. William (PHI)
6. Digital Signal processing – Natarajan & Nasir Ahmed.

# COMPONENT BASED TECHNOLOGY

**Theory : 100 Marks**

## **Section – I**

1. **COM** : Introduction, COM as better C++, S/W distribution, Dynamic linking, separating interface from implementation, Run time polymorphism. (3)
2. **Interfaces** : Introduction , Interface definition language(IDL), interfaces and IDL, Using COM interface pointers, Optimizing query interface, Code sharing and reuse. (4)
3. **Classes and Objects** : Introduction, Classes and servers, Optimization, Classes and IDL, Class emulation, Query interface types and properties, object services and dynamic composition. (5)
4. **Distributed COM**: Fundamental programming architecture of DCOM: Parallel processing, Advantages of distributed computing. Threading models, Implementing multithreaded local components, facilities : Connection points and type information, Connectable objects. (6)

## **SECTION - II**

5. **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. (5)
6. **CORBA services**: Services of object naming, object life cycle, event, Transaction service features, concurrency control services, persistent object service and CORBA security service. (5)
7. **JAVA Beans** : JAVA Beans, Bean Events, Bean Properties, Implementing JAVA Beans, Creating Bean Object, Serializing a Bean. (8)

### **Books:**

1. Essential COM - Booch Jakobson, Rumbaugh, ( Addison Wesley )
2. DCOM, Microsoft Press - Guy Eden and Henry Eden
3. CORBA fundamentals & programming - John Siegle (Jhon Wiley and Sum's 96)
4. Essential CORBA - Mowbray and Zahavi ( Addison Wesley )
5. The essential distributed object survival guide – Orfali (SPD)
6. Learn ActiveX Template Library Development with VC++ - Nathan Wallace (BPB)
7. Client / Server programming with Java & CORBA – Robert Orfali, Dan Harkey (SPD)

# MOBILE TECHNOLOGY & SYSTEMS

**Theory : 100 Marks**

## SECTION – I

1. Introduction to wireless communication, Need and Applications of wireless communication, Wireless Data Technologies, Market for mobile communication, Mobile and wireless devices. (2)
2. **Wireless transmission** : Frequencies for radio transmission, signals, antennas, signal propagation, Multiplexing, Modulation, Spread spectrum and Cellular systems. (3)
3. **Medium Access Control** : Specialized MAC, SDMA, FDMA, TDMA and CDMA. (3)
4. **Telecommunication Systems** : GSM, DECT systems – Architecture and protocols, Tetra frame structure, UMTS basic architecture and UTRA modes. (4)
5. **Wireless LAN** : Introduction, Infrared v/s Radio transmission, Infrastructure and ad-hoc networks, IEEE 802.11, HIPERLAN, Blue Tooth. (6)

## SECTION – II

6. **Wireless ATM** : WATM services, Reference model, functions, radio access layer, handover, Location management, Addressing, Mobile QoS, Access point control protocol. (6)
7. **Mobile Network Layer** : Mobile IP, DHCP. (2)
8. **Mobile Transport Layer** : Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast and selective retransmission & recovery. (4)
9. **Support for Mobility** : File systems, Wireless Application Protocol with example applications. (6)

### Books :

1. Mobile Communications – Jachen Schiller (Addison-Wesley).
2. Wireless LAN – Peter T. Davis, Craig R. Mc Guffin (MGH International Edn).
3. The Wireless Application Protocol – Sandeep Singhal, Jari Alvinen and group. (Addison-Wesley).
4. Professional WAP – Charles Arehart and group (SPD).

# IMAGE PROCESSING

Theory : 100 Marks

## SECTION – I

1. **Introduction:** Digital image processing – problems and applications, Image representation and modeling, 2D systems and necessary mathematical preliminaries. (4)
2. **Image Transforms:** 2-D orthogonal and Unitary transforms, 1-D DFT, 2-D DFT, Cosine and Hadamard transforms, Harr and Slant Transforms. (8)
3. **Image Enhancement:** Point operations, Histogram modeling, Spatial operations, Transform operations. (5)

## SECTION – II

4. **Image Filtering:** Inverse and Wiener filtering, FIR Wiener filters, Filtering using image transforms. (6)
5. **Image Analysis:** Spatial feature extraction, edge detection, boundary extraction, boundary representation, region representation, moment representation. (5)
6. **Approaches to Pattern Recognition:** Pattern vectors & pattern classes, pattern preprocessing, pattern classification methods- statistical approach, Use of decision functions. Clustering techniques, MMD and KNN approaches. (6)

### Books:

1. Fundamentals of Digital Image Processing – A.K. Jain (PHI)
2. Introductory Computer Vision and Image Processing – A. Low (MGH)
3. Pattern Recognition Principles – J.T. Tou, R.C.Gonzalez (Addison-Wesley)

## EQUIVALENCES OF B.E. (CSE) FOR REPEATER STUDENTS

### BE (CSE) Sem.-VII

Sr. No.	BE (CSE) –I (Pre-Revised)	Equivalent / Replacement subject (Revised)
1.	Advanced Computer Architecture	Advanced Computer Architecture of B.E. (CSE) Sem - VII
2.	Distributed Systems	Distributed Systems of B.E. (CSE) Sem-VII
3.	Network Engineering	Network Engineering of B.E. (CSE) Sem- VII

4.	Information Technology	Information Technology concepts
5.	Elective-I	
	a. Information Retrieval b. Object oriented modeling & design c. Digital signal processing	Modern Information Retrieval OOMD of T.E.(CSE) Sem-VI Digital signal processing concepts

### **BE (CSE) Sem.-VIII**

<b>Sr. No.</b>	<b>BE (CSE) –I (Pre-Revised)</b>	<b>Equivalent / Replacement subject (Revised)</b>
1.	Advanced Database Systems	Advanced Database Systems of B.E. (CSE) Sem - VII
2.	Component Technology	Component Based Technology
3.	Information Security	Information Security of T.E.(CSE) Sem - VI
4.	Web Technology	Web Technology of B.E.(CSE) Sem - VIII
5.	Elective –II	
	a. Mobile Computing b. IPPR c. ANN & Genetic Algorithms	Mobile Technology & Systems Image Processing Soft Computing of B.E.(CSE) sem-VIII (Elt-II)

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