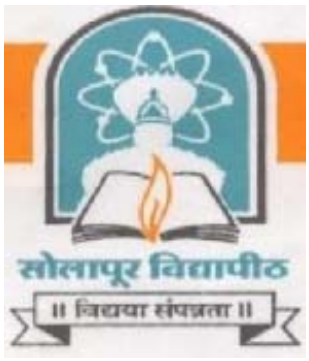

SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

COMPUTER SCIENCE & ENGINEERING

Structure & syllabus for

B.E. (Computer Science & Engineering)

w.e.f. Academic Year 2015-16

SOLAPUR UNIVERSITY, SOLAPUR

Computer Science and Engineering

Structure of B. E. (Computer Science & Engineering.) w.e.f. July 2015

SEMESTER – I

Sr. No	Name of the Subject	Teaching Scheme			Examination Scheme				Total
		L	T	P	Paper	T/W	OE	POE	
1	Advanced Computer Architecture	3	-	-	100	25	-	-	125
2	Distributed Systems	3	-	2	100	25	-	-	125
3	Modern Database Systems	4	-	4	100	25	-	50	175
4	Elective – I	3	-	-	100	25	-	-	125
5	Elective – II	3	-	-	100	25			125
6	Vocational Training	-	-	-	-	25	-	-	25
7	Lab I - Project Phase I	-	-	4	-	50	-	50	100
8	Lab-II - Python	2		2		50		-	50
	Total	**18**	**-**	**12**	**500**	**250**	**-**	**100**	**850**

SEMESTER -II

Sr. No	Name of the Subject	Teaching Scheme			Examination Scheme				Total
		L	T	P	Paper	T/W	OE	POE	
1	Management Information System	3	--		100	25			125
2	Information & Cyber Security	3	--	2	100	25		25	150
3	Elective -III	3	--		100	25			125
4	Elective – IV	3	--		100	25			125
5	Lab I - Web Technology	2	--	4		25		50	75
7	Lab II - Project Phase II		--	6		100		100	200
8	Lab-III -Open Source Technology	2	--	2		50			50
	Total	**16**	**-**	**14**	**400**	**275**		**175**	**850**

Elective – I 1. Human Computer Interaction 2. Digital Signal Processing 3. Software Testing & Quality Assurance 4. Business Intelligence	**Elective – II** 1. Object Oriented Modeling & Design 2. Wireless Ad hoc Networks 3. Intelligent Systems 4. Mobile Application Development
Elective – III 1. Data Warehousing & Mining 2. Image Processing 3. Information Retrieval 4. Cloud Computing	**Elective – IV** 1. Storage Area Network 2. Web 2.0 & Rich Internet Application 3. Artificial Neural Network 4. Big Data Analytics

Note:

1. The term-work will be assessed based on continuous internal evaluation including class tests, assignments, performance in laboratories, Interaction in class, quizzes, group discussions as applicable.
2. The batch size for practical/tutorials be of 15 students. On forming the batches, if the strength of remaining students exceeds 7 students, then a new batch may be formed.
3. Vocational Training (evaluated at B.E. Part-I) of minimum 15 days shall be completed in any vacation after S.E. Part-II but before B.E. Part-I & the report shall be submitted and evaluated in B.E. Part-I
4. For project, the group shall be about 4 /5 students.
5. Minimum strength of the students for Electives be 15.
6. A new elective may be introduced at SEMESTER I / II on any advanced topic in Computer Science and Engineering with prior permission from University.

SOLAPUR UNIVERSITY, SOLAPUR

B.E. (COMPUTER SCIENCE & ENGINEEING)

SEMESTER - I

1. ADVANCED COMPUTER ARCHITECTURE

Teaching Scheme
Lecture : 3 Hours /Week
Tutorial : 1 Hour /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVES :

1) To learn the fundamental aspects of computer architecture design and analysis.
2) The course focuses on study of processor design, pipelining, superscalar architecture.

COURSE OUTCOMES :

1) Enables information about computer performance, instruction set architecture design and implementation
2) Introduces uniprocessor implementation alternatives (single- cycle, multiple-cycle and pipelined implementations)

SECTION – I

Unit 1 : Introduction to Parallel Processing (7 Hrs.)
Basic Concepts, Types and Level of Parallelism, Classification of Parallel architectures, Basic Parallel Techniques-Pipelining and Replication, relationships between languages and Parallel architectures.

Unit 2 : Advanced Pipelining (7 Hrs.)
Instruction Level Parallelism: Concepts and Challenges, overcoming data hazards with dynamic scheduling, reducing branch penalties with dynamic hardware prediction.

Unit 3 : Vector Processing (7 Hrs.)
Why Vector processor?, Basic vector architecture, two real world issues: Vector length and stride, effectiveness of compiler vectorization, enhancing vector performance.

SECTION – II

Unit 4 : Introduction to Data-Parallel Architectures (6 Hrs.)
Introduction, Connectivity, Near neighbors, Trees and Graphs, The Pyramid, The Hypercube, Reconfigurable Networks, Alternate architectural Classes.

Unit 5 : Dataflow Architecture (7 Hrs.)
Concepts of dataflow computing, static and dynamic architectures, dataflow operators, dataflow language properties, advantages and potential problems.

Unit 6 : SIMD and MIMD Architectures: (7 Hrs.)

Introduction, Design Space, Fine-Grained SIMD Architectures, Coarse-Grained SIMD Architectures, MIMD Architectural Concepts, Problems of Scalable Computers, Main design issues of scalable MIMD Computers

Text Books:

1. Computer Architecture A Quantitative Approach – John L. Hennessy and David A. Patterrson.
2. Advanced Computer Architectures A design spaceapproach - Sima, Fountain, Kacsuk-Pearson

Reference Books:

1. Computer organization – HamacherZaky – MGH
2. Advanced Computer Architecture – Kai Hwang.
3. Advanced Computer Architecture and Parallel Processing - Kai Hwang and Briggs.
4. Computer Organization and Architecture-An Integrated Approach - Miles Murdocca, VincentHeuring – Wiley India (For Multiple Choice Questions)

Termwork

Minimum 8 to 10 assignment based on above topics.

SOLAPUR UNIVERSITY, SOLAPUR

B.E. (COMPUTER SCIENCE & ENGINEEING)

SEMESTER - I

2. DISTRIBUTED SYSTEMS

Teaching Scheme
Lecture : 3 Hours /Week
Practical : 2 Hour /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVES :

1) Provide the fundamental concepts of Distributed operating systems, its design issues and challenges in modes of communication of distributed systems and their implementation.
2) Expose students to current technology used to build architectures to enhance distributed computing infrastructures with various computing principles and paradigms.
3) Provide experience in analyzing a distributed computing model and implementing typical algorithms related to Synchronization, deadlock detection and avoidance used in distributed systems.
4) Enhance students' understanding of key issues related to principles of Distributed file systems and provides case study of stand-alone general purpose distributed file system of Hadoop.

COURSE OUTCOME :

1) Understand the basics of distributed systems and middleware.
2) Design and simulate distributed system software modules using various methods, strategies, and techniques presented in the course that fulfills requirements for desired properties.
3) Apply principles of distributed systems in a real world setting across multidisciplinary areas.
4) Apply knowledge of Hadoop Distributed File system, its architecture and working for active research at the forefront of these areas.

SECTION - I

Unit 1 : Fundamentals **(3 Hrs.)**

Fundamentals of OS, What is Distributed System? Evolution of Distributed Computing System, Distributed Computing System Models , Distributed Computing gaining popularity Issues in Designing Distributed System, Introduction to Distributed Computing Environment, Protocols for Distributed System, Network, Interprocess Communication, Issues in Interprocess Communication

Unit 2: Message Passing **(5 Hrs.)**

Introduction , Desirable features of good message passing system, Issues in IPC by Message passing, RPC, RMI Synchronization, Buffering, Multidatagram messages, Encoding and decoding of message data, Process addressing, Failure Handling, Group communication, Case Study: RMI, CORBA**.** Advances in Distributed Systems

Unit 3 : Architecture of Distributed System (6 Hrs.)

Introduction, Motivations, Concepts of Distributed System, Process Synchronization, System architecture types, Distributed operating system, NOS, Middleware Communication Networks, Communication primitives, Architectural models of Distributed System

Unit 4 : Synchronization in distributed Systems (6 Hrs.)

Process Migration, Threads, Clock synchronization, Event ordering, Mutual Exclusion, Deadlock, Election Algorithms Issues in Designing Distributed System and role of middleware in Distributed System

SECTION - II

Unit 5 : Distributed Mutual Exclusion (5 Hrs.)

Introduction, Classification of mutual exclusion algorithms, Preliminaries, A simple solution to distributed mutual exclusion, non token based algorithms, Ricart Agrawala algorithm, Token based algorithms, Suzuki Kasami's broadcast algorithms

Distributed Deadlock detection – Introduction, Preliminaries , Deadlock handling strategies, Issues in deadlock detection and resolution, Control organizations for distributed deadlock detection, Centralized deadlock detection algorithms, Distributed deadlock detection algorithms, Avoidance and Prevention algorithms, Hierarchical deadlock detection algorithms

Unit 6 : Distributed File Systems (4 Hrs.)

Distributed Resource Management, Concepts of File System, Scheduling Algorithms Distributed File System

Introduction, Architecture, Mechanisms for building distributed file system, Design issues, Case studies, Log structured file systems, Google FS

Unit 7 : Distributed Shared Memory – **(5 Hrs.)**

Introduction, Architecture and Motivation, algorithms for implementing DSM, Memory Coherence, Coherence protocols, Design issues, Case studies-Linda

Distributed Scheduling – Introduction, Motivation, Issues in load distribution, Components of load distributing algorithms, Stability, Load distributing algorithms, Performance Comparison, Selecting a suitable load sharing algorithms, Requirements for load distributing, Load sharing policies, Task migration , Distributed File System: Comparisons

Unit 8 : Grid Computing (6 Hrs.)

Emerging Trends in Distributed System, Concepts of Cluster, Concepts of Grid Computing
Grid Computing

Introduction to GRID Computing, How Grid Computing Works, Grid Middleware, Grid Architecture, Types of Grids Grid Computing Applications, Simulators

SOA: Basic SOA Definition, Overview of SOA, SOA and Web Services, Service Oriented Grid, SOA Design and Development, Advantages and Future of SOA

Grid computing, Cloud and SOA

Text books:

1. Distributed O.S Concepts and Design||, P.K.Sinha, PHI
2. Advanced concepts in Operating Systems||, Mukesh Singhal & N.G.Shivaratri, TMH
3. Distributed Computing||, Sunita Mahajan, Seema Shah, OXFORD University Press

Reference Books:

1. Distributed System Principles and Paradigms||, Andrew S. Tanenbaum, 2nd edition , PHI
2. Distributed Systems||, Colouris , 3rd Edition

Term Work: It should consist of the following assignments:

1. Implementation of RMI for any given application.
2. Implementation of communication Protocol of RPC (R, RR, RRA Protocol).
3. Implementation of different sorting algorithms using dispatcher thread model.
4. Implementation of logical clock using counter.
5. Implementation of Berkeley's algorithm.
6. Implementation of Quorem based protocol.
7. Implementation of stateful and stateless server in file reading application.
8. Implementation of Bully Algorithm.
9. Study of HDFS.

SOLAPUR UNIVERSITY, SOLAPUR

B.E. (COMPUTER SCIENCE & ENGINEEING)

SEMESTER - I

3. MODERN DATABASE SYSTEMS

Teaching Scheme
Lecture : 3 Hours /Week
Practical : 2 Hour /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVES:

1) Introduce different databases like distributed, parallel & object oriented databases.
2) Acquaint with Query processing and its phases including query optimization.
3) Illustrate data mining & warehousing with OLAP implementations.
4) Demonstrate Bigdata with Hadoop & its components.

COURSE OUTCOMES:

1) Differentiate between Distributed & Parallel databases.
2) Implement object oriented databases, mining concepts.
3) Implement different query processing algorithms.
4) Tabulate SQL, NoSQL & New SQL with its applications.
5) Articulate technologies like Hadoop, MongoDB, Cassandra, Pig , Hive.

SECTION-I

Unit 1 : Database System architectures (7 Hrs.)

Centralized & C/S architectures, Server systems, Distributed systems, Distributed databases – homogeneous & heterogeneous databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in distributed databases, Availability, Distributed query processing, Heterogeneous distributed databases

Unit 2 : Parallel Databases (7 Hrs.)

Introduction, I/O parallelism, Inter-query parallelism, Intra-query parallelism, Intra-operation parallelism, Inter-operation parallelism

Unit 3 : Data Analysis and Mining (6 Hrs.)

Introduction to decision support, OLAP: Multidimensional Data Model, Multidimensional Aggregation Queries, Window Queries in SQL: 1999, Implementation Techniques for OLAP, Data Warehousing, Introduction to data mining, The knowledge Discovery Process, Counting co-occurrences, Mining for rules, Clustering, Similarity search over sequences

SECTION-II

Unit 4 : Object Based Databases (6 Hrs.)

Overview, Complex Data Types, Structured Types and Inheritance in SQL, TableInheritance, Array and Multisets Types in SQL, Object Identity and Reference Types inSQL, Object Oriented DBMS versus Object Relational DBMS

Unit 5 : Query Processing & Optimization (6 Hrs.)

Overview of query processing, Measure of query cost, Selection Operation, Sorting, Join Operation, Other Operation, Evaluation of Expression, Overview of optimization, Transformation of Relational Expressions, Estimating Statistics of Expression Results, Choice of Evaluation plans.

Unit 6 : BIG data and HADOOP (6 Hrs.)

Big data, characteristics of Big data, introduction to HADOOP, High level architecture of HADOOP, HDFS file system architecture, special feature of HADOOP, working with HADOOP commands, working of MAP reduce with an example.

Unit 7 : NoSQL (4 Hrs.)

Getting started with NoSQL, Key value stores, Document databases, Graph stores, New SQL

Unit 8 : Case Study (2 Hrs.)

Postgre SQL, MongoDB

Text Book :

1) Database System Conceptssixth Edition, by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Sixth Edition, McGraw Hill Publication.
2) Database Management Systems Third Edition, by Raghu Ramakrishan and Johannes Gehrke, McGrawhill Education
3) MongoDB, The Definitive Guide, Kristina Chodorow, Oreilly, Shroff Publishers and Distributors Pvt. Ltd., ISBN : 978-93-5110-269-4

Refernce Books:

1) Hadoop in Action, Chuck Lam, Dreamtech Press, ISBN : 978-81-7722-813-7.

Termwork :

Practical Assignments (minimum 10 to be implemented):

1. Implement 2PC protocol.
2. Implement join operation on n relations using parallelism approach.
3. Implement the Round Robin partitioning for parallel database environment.
4. Implement the Hash partitioning for parallel database environment.
5. Implement the Range partitioning for parallel database environment.
6. Implement Interquery parallelism in parallel databases.
7. Implementation of intraquery parallelism using multithreading
8. Implement Range partitioning Sort algorithm using intraquery parallelism through interoperation
9. Implementation of Asymmetric fragment & replicate join
10. Write a program to join r1⋈ r2⋈ r3⋈ r4 using Independent Parallelism for Inter-operation parallelism.
11. Implement OLAP queries.
12. Implement algorithm for finding Frequent Itemsets for a given minimum support.
13. Implement algorithm for finding association rules for given minimum support and confidence.
14. Implement queries in SQL:1999 that work on Complex Data types, Arrray and Multisets.
15. Implement queries for type inheritance and table inheritance.

SOLAPUR UNIVERSITY, SOLAPUR

BE(COMPUTER SCIENCE & ENGINEERING)

SEMESTER - I

ELECTIVE-I : 1. HUMAN COMPUTER INTERACTION

Teaching Scheme
Lecture : 3 Hours /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVES:

1) Know how to analyze and consider user's need in the interaction system
2) Understand various interaction design techniques and models
3) Understand the theory and framework of HCI
4) Understand and analyze the cognitive aspects of human – machine interaction

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COURSE OUTCOMES:

1) To develop good design for human machine interaction system
2) Analyze the user's need in interaction system
3) To design new interaction model to satisfy all types of customers
4) Evaluate the usability and effectiveness of various products
5) To know how to apply interaction techniques for systems

SECTION - I

Unit 1 **(5 Hrs.)**

Introduction, The human, The computer, The interaction, Paradigms, Usability of Interactive Systems, Guidelines, Principles, and Theories.

Unit 2 **(5 Hrs.)**

Design Process - Interaction design basics, HCI in the software process, Design rules, Implementation support, Evaluation techniques, Universal design, User support

Unit 3 **(5 Hrs.)**

Models and Theories0 Cognitive models, Socio-organizational issues and stakeholder requirements, Communication and collaboration models,Task analysis, Dialogue notations and design, Models of the system, Modelling rich interaction

Unit 4 **(6 Hrs.)**

Interaction Styles- Direct Manipulation and Virtual Environments, Menu Selection, Form Filling and Dialog Boxes, Command and Natural Languages, Interaction Devices, Collaboration and Social Media Participation

SECTION - II

Unit 5 **(5 Hrs.)**

Design Issues- Quality of Service, Balancing Function and Fashion, User Documentation and Online Help, Information Search, Information Visualization

Unit 6 **(5 Hrs.)**

Outside the Box- Group ware,Ubiquitous computing and augmented realities, Hypertext, multimedia, and the world wide web Text

Unit 7 **(6 Hrs)**

Information Search and visualization - Introduction, Search in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Search Interfaces, Information Visualization, OAI Model for Website Design.

Unit 8 **(5 Hrs.)**

Hypertext, Multimedia and the world wide web, Introduction, Understanding hypertext, Web technology and issues, Static web content, dynamic web content

Text Books :

1) Human Computer Interaction, Alan Dix, Janet Finlay, Gregory Abowd and Russel Beale, Prentice Hall Publication
2) Designing the User Interface, Ben Shneiderman, 4th Edition, Pearson Education, 2008, ISBN 81-7808-262-4

Reference Book :

1) Human Computer Interaction, Dan R. Olsen, Cengage Learning, India Edition, ISBN No.978-81-315-1137-4
2) The Essential Guide to User Interface Design, Second Edition, An Introduction to GUI Design Principles and Techniques, Wilbert O. Galitz, Wiley India (P) Ltd., ISBN : 81-265-0280-0
3) The Essential of Interaction Design, Alan Copper, Robert Reimann, David Cronin, Wiley India (P) Ltd., ISBN : 978-81-265-1305-5

Termwork :

Minimum 10 to 12 assignments based on above topics.

SOLAPUR UNIVERSITY, SOLAPUR

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SEMESTER - I

ELECTIVE-I : 2. DIGITAL SIGNAL PROCESSING

Teaching Scheme
Lecture : 3 Hours /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVES :

1) Know digital signal processing fundamentals.
2) Understand and implementation of the DFT.
3) Learn the basic forms of FIR and IIR filters and to design filters.
4) Understand the applications of DSP.

COURSE OUTCOME :

1) Apply digital signal processing fundaments.
2) Implement DFT
3) Design filters.

SECTION –I

Unit 1 : Classification of signals and systems (6 Hrs.)

Introduction, Continuous time and discrete time signals, Classification of signals, Simple manipulations of discrete time signals, Classification of systems, Representation of systems.

Unit 2 : Z-Transforms (5 Hrs.)

Introduction, Definition of Z transform, Properties of Z transform, Evaluations of the inverse z transform.

Unit 3 : Discrete Fourier Transform (5 Hrs.)

Representation of periodic sequence: Discrete fourier series, Properties of discrete fourier series, Fourier transform of periodic signals, Sampling the fourier transform.

Unit 4 : Realization of Digital Linear System (7 Hrs.)

Introduction, Basic realization block diagram and the signal flow graph, Basic structure for IIR system, Basic structure for FIR systems.

SECTION-II

Unit 5 : Filter Design Techniques (6 Hrs.)

Introduction, Design of discrete time IIR filters from continuous time filters, Frequency transformations of lowpass IIR filters, Design of FIR filters by windowing.

Unit 6 : Computation of Discrete Fourier Transform (6 Hrs.)

Introduction, Efficient computation of the discrete fourier transform, Decimation in time FFT algorithms, Decimation in frequency FFT algorithms.

Unit 7 : Application of Digital Signal Processing (5 Hrs.)

Application of DSP in biomedical engineering, Voice processing, Application of RADAR, Application of image processing.

Unit 8 : Digital Signal Processors (5 Hrs.)

Introduction, First generation TMS320C1X processor, Second generation TMS320C2X processor.

Text Books

1. Discrete-Time Signal Processing – Alan V. Oppenheim and Ronald W. Schafer –PHI
2. Digital Signal Processing – S.Salivahanan-Mc Graw Hill Education

Reference Books

1. Digital Signal Processing –A.Nagoor Kani –Mc Graw Hill Education
2. Digital Signal Processing-A Computer based Approach – Sanjit K. Mitra –Mc Graw Hill Education Publication

Termwork

Minimum 6 - 8 assignments based on each topic of above syllabus.

SOLAPUR UNIVERSITY, SOLAPUR

B. E. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - I

ELECTIVE – I : 3. SOFTWARE TESTING & QUALITY ASSURANCE

Teaching Scheme
Lecture : 3 Hours /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVES

1) To learn the principles, techniques and tools of software testing in order to improve the quality of software product.
2) To gain knowledge of the software testing process, various methods of testing, different levels of testing, software quality concepts, assurance & standards
3) To learn generation and execution of test plan, cases & scripts.
4) To learn manual and automatic software testing & various kinds of testing tools.
5) To discover correctness, completeness and quality of software.
6) To recognize the importance of software testing in Software Development Life Cycle.

COURSE OUTCOMES

1) Understand what a software bug is, how serious they can be, and why they occur.
2) Test software to meet quality objectives & requirements
3) Apply testing skills to common testing tasks
4) Perform the planning and documentation of test efforts
5) Understand software quality concepts, assurance & standards
6) Use testing tools to test software in order to improve test efficiency with automation

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SECTION I

Unit 1: Fundamentals of Software Testing (8 Hrs)

Introduction, Basics of Software Testing, Approaches to Testing, Testing During Development Life Cycle, Essential of Software Testing, Features of Testing, Misconceptions About Testing, Principles of Software Testing, Test Policy, Strategy, Planning, Process, Challenges in Testing, Test Team Approach, Methods, Defect Classification, Defect, Error, Mistake in Software, Defect Life Cycle, Defect Management Process, Developing Test Strategy, Developing Testing Methodologies, Testing Process, Attitude Towards Testing, Test Methodologies, Skills Required by Tester.

Unit 2: Methods of Testing (6 Hrs)

Software Verification and Validation, Black-Box and White-Box Testing, Static and Dynamic Testing, Black-Box Testing Techniques-Equivalence Partitioning, Data Testing, State Testing, Other Black Box Test Techniques. White-Box Testing Techniques-Data Coverage, Code Coverage, Other White Box Test Techniques.

Unit 3: Levels of Testing (8 Hrs)

Verification and Validation Model, Levels of Testing, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing, System Testing- GUI Testing, Compatibility Testing, Security Testing, Performance Testing, Volume Testing, Stress Testing, Load Testing, Installation Testing, Regression Testing, Smoke Testing, Sanity Testing, Ad hoc Testing, Usability Testing, Acceptance Testing-Alpha Testing, Beta Testing, Gamma Testing.

SECTION II

Unit 4: Test Planning & Documentation (8 Hrs)

Test Planning-The goal of Test Planning, Test Planning Topics, Writing and Tracking Test Cases-The Goal of Test Case Planning, Test Case Planning Overview, Test Case Organization and Tracking, Reporting Bugs- Getting Your Bugs Fixed, Isolating and Reproducing Bugs, Not All Bugs Are Created Equal, Bug-Tracking Systems.

Unit 5: Quality Concepts & Software Quality Assurance (6 Hrs)

Quality Concepts-What is Quality?, Software Quality, The Software Quality Dilemma, Achieving Software Quality, Software Quality Assurance-Background Issues, Elements of Software Quality Assurance, SQA Processes and Product Characteristics, SQA Tasks, Goals and Metrics, Formal Approaches to SQA, Statistical SQA, Software Reliability, The ISO 9000 Quality Standards, CMM, The SQA Plan.

Unit 6: Automated Testing and Testing Tools (8 Hrs)

Introduction, The Benefits of Automation and Tools, Test Tools, Software Test Automation, Random Testing, Realities of Using Test Tools and Automation, Open Source Testing Tools, Case Studies on Testing Tools-Selenium.

Text books:

1. Software Testing Principles, Techniques and Tools By M G Limaye, Published by Tata McGraw-Hill Education Private Limited, Published 2009, ISBN (13): 978-0-07-013990-9, ISBN (10): 0-07-013990-3 (Chapter 1 & 3)
2. Software Testing, Second Edition By: Ron Patton, Published by SAMS, ISBN-13: 978-0672327988 ISBN-10: 0672327988 (Chapter 2, 4 & 6)
3. Software Engineering: A Practitioner's Approach by Roger S Pressman, 8th Edition, Publisher McGraw Hill (Chapter 5)

References:

Reference books:

1. Software Testing Principle and Practices By Ramesh Desikan, Gopalaswamy Ramesh, Pearson Education, ISBN 978-81-7758-121-8

2. Software Testing Principles and Practices By Naresh Chauhan, Publisher OXFORD UNIVERSITY PRESS-NEW DELHI, ISBN 0-19-806184-6
3. Beautiful Testing: Leading Professionals Reveal How They Improve Software By Adam Goucher, Tim Riley, Publisher O'reilly
4. Foundations of Software Testing By Rex Black, Dorothy Graham, Erik Van Veenendaal, Isabel Evans, Published by Cengage Learning India Pvt Ltd.
5. Lessons Learned in Software Testing by Cem Kaner , James Bach , Bret Pettichord, Publisher Wiley
6. Testing Computer Software Cem Kaner, Jack Falk, Hung Q. Nguyen, Publisher Wiley
7. Selenium Testing Tools Cookbook By Unmesh Gundecha Published by Packt, ISBN: 978-1-84951-574-0
8. Dr. K.V.K.K. Prasad, "Software Testing Tools: Covering WinRunner, Silk Test, LoadRunner, JMeter and TestDirector With Case Studies", Dreamtech Publications ISBN: 10:81-7722-532-4

Reference tutorials:

1. Spoken Tutorials on Selenium Software Testing Framework at http://spoken-tutorial.org/tutorial-search/?search_foss=Selenium&search_language=English

Term work:

Assignment:

Minimum 6 - 8 assignments based on each topic of above syllabus.

Two assignments on use of Selenium for software testing.

SOLAPUR UNIVERSITY, SOLAPUR

B. E. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - I

ELECTIVE – I : 4. BUSINESS INTELLIGENCE

Teaching Scheme
Lecture : 3 Hours /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVES:

1) Study the advanced database techniques
2) Acquaint the students with some refers to skills, Processes, technologies, applications and practices used to support decision making issues and build business intelligence systems

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COURSE OUTCOME :

1) Gain an awareness of the basic issues in BI & Modeling techniques.
2) Compare and contrast emerging architectures for B. I.
3) Familiarize with the E-T-L techniques in B.I. and other advanced topics
4) Interpret B.I. applications

SECTION – I

Unit 1 : Introducing the Technical Architecture (7 Hrs.)
The value of architecture, Technical Architecture overview, Back room Architecture, Presentation Server Architecture, Front room Architecture, Infrastructure, Metadata, Security.

Unit 2: Introducing Dimensional Modeling (7 Hrs.)
Making the Case for Dimensional Modeling, Dimensional Modeling primer, Enterprise Data Warehouse Bus Architecture, More on Dimensions & Facts.

Unit 3 : Designing the Dimensional Modeling (6 Hrs.)
Modeling Process overview, Getting Organized, Four Step Modeling Process, Design the Dimensional Model.

SECTION - II

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

Unit 5 : Introducing Business Intelligence Applications (7 Hrs.)
Importance of B.I. Applications, Analytical cycle for B.I., Types of B.I. Applications, Navigating Applications via the B.I. portal.

Unit 6 : Designing & Developing B.I Applications (7 Hrs.)

B.I. Application resource planning, B.I. Application Specification, B.I. Application Development, B.I. Application maintenance

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,
3. Cognos, PowerAnalyzer, Hyperion
4. Relational Database management Systems - Oracle, Terradata, MS SQL
5. 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.

SOLAPUR UNIVERSITY, SOLAPUR

B. E. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - I

ELECTIVE – II : 1. OBJECT ORIENTED MODELING & DESIGN

Teaching Scheme
Lecture : 3 Hours /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVE :

1. Model and design real world problems.
2. Analyze the risk factor for software development project.
3. Develop the skills to determine which process of object oriented Analysis and design technique should be applied to a given project.

COURSE OUTCOME:

1. List the objects of Unified Modeling Language for a given problem statement.
2. Explain the working understanding of the object oriented analysis and design.
3. Apply the knowledge of object oriented modeling and design to the given software development project.
4. Devise the real world problem using object oriented modeling technique.

SECTION-I

Unit 1 : Introduction **(4 Hrs.)**

Object Oriented development and themes, evidence for usefulness, modeling as a Design Technique.

Unit 2 : Object Modeling **(6 Hrs.)**

Objects, classes, links and associations, generalization and inheritance, grouping constructs, aggregation, abstract classes, generalization as extension and restriction, multiple inheritance, metadata, candidate keys and inheritance.

Unit 3 : Dynamic and Functional Modeling **(6 Hrs.)**

Events, states, operations, concurrency, nested state diagrams, advanced dynamic modeling concepts, relation of object and dynamic models, DFD, relation of functional to object and dynamic models

Unit 4 : Methodology preview and Analysis **(4 Hrs.)**

OMT as a Software Engineering Methodology, The OMT Methodology, Impact of an Object-Oriented Approach, Overview of Analysis, Problem Statement, Automated Teller Machine Example, Object Modeling, Dynamic Modeling, Functional Modeling, Adding Operations, Iterating the Analysis

SECTION-II

Unit 5 : Behavioral Modeling using UML (6 Hrs.)

Interactions, Use cases, Use case diagram, Interaction Diagrams and Activity diagrams, Events and signals, State Machines, Processes and Threads, Time and space, State chart diagrams.

Unit 6 : Architectural Modeling using UML (6 Hrs.)

Components, Deployment, Collaboration, Patterns and Frame works, Component diagrams and Deployment Diagrams

Unit 7 : Implementation of OMT (6 Hrs.)

Use of programming language and database system, Object oriented style, feature of object-oriented languages, Applications of OMT like object diagram compiler, Computer animation, Case study of Hotel management system, course management system

Unit 8 : Design Patterns – 1 (4 Hrs.)

What is a pattern and what makes a pattern? Pattern categories; Relationships between patterns; Pattern description Communication Patterns: Forwarder-Receiver; Client-Dispatcher-Server; Publisher-Subscriber.

Textbook:

1. Object oriented Modeling and Design: Rambaugh, Premerlani, Eddy, Lorenson (PHI)
2. The Unified Modeling Language User Guide: Grady Booch, Jeams Rambaugh, Ivar Jacotson(Addison Wesley)

Reference Books:

1. Brahma Dathan, Sarnath Ramnath: Object-Oriented Analysis, Design, and Implementation, Universities Press, 2009.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, Wiley-Dreamtech India, 2004
3. Simon Bennett, Steve McRobb and Ray Farmer: Object-Oriented Systems Analysis and Design Using UML, 2nd Edition, Tata McGraw-Hill, 200
4. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern-Oriented Software Architecture, A System of Patterns, Volume 1, John Wiley and Sons, 2007.
5. Object Oriented Analysis and design using UML, D. Jeya Mala, S. Geetha, McGraw Hill Publication, ISBN : 978-1-25-900674-6

Termwork :

1. Describe object oriented methodology and themes.
2. Prepare a list of objects that you would expect each of the following system to handle also draw the class and object diagram for the same.
   a. Arithmetic expression b. Air transportation system.
3. Dynamic and Functional Modelling
   a. Draw the state diagram for telephone answering machine. The machine should answer after five rings. If the telephone is answered before five rings, the machine should do nothing.

b. Design functional model for flight simulator.

4. Draw Object Model with attributes and inheritance for Automated Teller Machine(ATM).
5. Draw Use case Diagram for Student Registration System.
6. Draw Sequence and collaboration diagram for buying online product.
7. Draw Deployment diagram for Home Network. (Hint: Modern homes usually have a network of interconnected devices of different kinds and with various types of connections and communication protocols. It contains cable modem, wireless router, various computers and devices.)
8. Draw Component diagram for online examination system.
9. What is a Design pattern and what makes a pattern? Describe Pattern categories and Relationships between patterns.

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SEMESTER - I

ELECTIVE – II : 2. WIRELESS AD-HOC NETWORKS

Teaching Scheme
Lecture : 3 Hours /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVE:

1) Understand need for ad hoc networks.
2) Explain the constraints of physical layer that affect the design and performance of ad hoc network.
3) Understand why protocols required for wired network may not work for wired network at MAC, Network and Transport Layer.
4) Explain the operations and performance of various MAC layer protocols, unicast routing protocols and transport layer protocols proposed for ad hoc networks.
5) Understand security issues and QoS requirements.

COURSE OUTCOMES :

1) Understand the challenges in design of wireless ad hoc networks.
2) Understand and analyze proposed protocols at MAC and routing layers of ad hoc networks.
3) Understand and analyze attacks pertaining to network layer.
4) Describe current technology trends for the implementaion and deployment of wireless ad-hoc / sensor networks.
5) Comprehend the various sensor network platforms, tools and applications.

SECTION- I

Unit 1 : Preliminary Considerations (6 Hrs.)

History of Adhoc Networks and WLANs, Digital Radio Properties, Wireless LAN Technologies, Wireless PAN technologies, Related Work, A New Perspective for the Design of Ad Hoc Wireless Networks.

Unit 2 : Theoretic Framework for Multi-Hop Adhoc Wireless Network (6 Hrs.)

Ideal Scenario :-Introduction, Preliminaries, Communication Theoretic Basics: Bit Error Rate, Link Signal-to-Noise ratio.

Realistic Scenario:- Introduction, Preliminaries, Communication Theoretic Basics: Inter node Interferences.

Unit 3 : Connectivity in AdHoc Wireless Network (6 Hrs.)

Introduction, Quasi-Regular Topology, Random Topoplogy

SECTION- II

Unit 4 : Transport Capacity in AdHoc Wireless Networks (6 Hrs.)

Introduction, Model and Assumption, Preliminaries, Single-Route Effective Transport Capacity, Average Effective Transport Capacity.

Unit 5 : Impact of Mobility and Route Reservation (6 Hrs.)

Impact of Mobility : Introduction, Preliminaries, Switching Model, Mobility Models

Route Reservation: introduction, Related Work, Network Model & Assumptions, Two Switching Schemes.

Unit 6 : Transmission Power (6 Hrs.)

Introduction, Model and Assumption, Connectivity, BER at the end of Multi-Hop Route, Optimal Common Transmit Power, Performance Metrics.

Text Books:

1. Mobile AdHoc Networking – Stefano Basagni, Marco Conti Et al. by Wiley India Publications. (For Chapter 1)
2. AdHoc Wireless Network – Ozan Tonguz, Gianluigi Ferrrari by Wiley India Publications. (For all Chapters)

Term Work: 4 to 5 assignments problems based on mathematical background learned chapters.

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SEMESTER - I

ELECTIVE – II : 2. INTELLIGENT SYSTEMS

Teaching Scheme
Lecture : 3 Hours /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVES :

1) Introduce the basic concepts of artificial intelligence.
2) Introduce new approaches to solve a wide variety of research-oriented problem.
3) Get clear concept of decision support system and heuristic search algorithms.

COURSE OUTCOME :

1) Understand basic concepts of artificial intelligence.
2) Apply with new value added technologies to make it intelligent system.
3) Apply logic for practical implementation using AI languages like LISP,PROLOG etc.

SECTION – I

Unit 1 : Decision Making and Computerized Support (7 Hrs.)

Managers and Decision Making, Managerial-Decision Making and Information Systems, Managers and Computer Support, Computerized Decision Support and the Supporting technologies, A frame work for decision support, The concept of Decision Support systems, Group Decision Support Systems, Enterprise Information Systems, Knowledge Management systems, Expert Systems, Artificial Neural Networks, Hybrid Support Systems. Decision-Making Systems, Modeling, and Support: Introduction and Definitions, Systems, Models.

Unit 2 : Decision Making and Computerized Support (5 Hrs.)

Phases of Decision-Making Process, Decision-Making: TheIntelligence Phase, Decision Making: The Design Phase, Decision Making: TheChoice Phase, Decision Making: Implementation Phase, gender, human cognition, and decision styles; TheDecision –Makers.

Unit 3 : Decision Support Systems : an Overview (5 Hrs.)

DSS Configuration, What is DSS? Characteristics and Capabilities of DSS, Components of DSS, The Data Management Subsystem, TheModel Management Subsystem, The User Interface Subsystem, The Knowledge- BasedManagement Subsystem, The User, DSS Hardware

Unit 4 Decision Support Systems Development (5 Hrs.)

Introduction to DSS development, The Traditional SystemDevelopment Life cycle, Prototyping: TheDSS Development Methodology, DSSTechnology Levels and Tools, DSS

DevelopmentPlatforms, DSS Development Tool Selection, Team-Developed DSS, EndUser-Developed DSS.

SECTION – II

Unit 5 : Group Support Systems (6 Hrs.)

Group Decision Making, Communication and Collaboration, Communication Support, Collaboration Support: Computer- Supported Cooperative work, Group Support Systems, Group Support Systems Technologies, Group Systems Meeting Room and Online, The GSS Meeting Process, Distance Learning, Creativity and Idea Generation.

Unit 6 : Enterprise Information Systems (5 Hrs.)

Concepts and definitions, Evolution of Executive and Enterprise Information Systems, Executive's roles and information needs, Characteristics and capabilities of Executive Support Systems, Comparing and integrating EIS and DSS, Supply and Value Chains and Decision Support, Supply Chain problems and solutions, MRP, ERP / ERM, SCM.

Unit 7 : Knowledge Management (6 Hrs.)

Introduction, Organizational learning and Transformation, Knowledge management initiatives, Approaches to Knowledge management, IT in Knowledge management, Knowledge management systems implications, Role of people in Knowledge management, Ensuring success of Knowledge management.

Unit 8 Integration, Impacts, and Future of Management-Support Systems (6 Hrs.)

System Integration: An Overview, Models of MSS integration, Intelligent DSS, Intelligent modeling and model management, Integration with the Web, Enterprise systems, and Knowledge Management, The impact of MSS: An Overview, MSS impacts on organizations Manager's job, Issues of legality, privacy, and ethics, Intelligent Systems and employment levels, Internet communities, Other societal impacts and the Digital Divide, The future of Management-Support Systems.

Text Books:

1) Decision Support Systems and Intelligent Systems – Efraim Turban. Jay E. Aronson, Ting-Peng Liang, 8th Edition, Pearson Education, 2008.
   (Chapter 1, 2, 3, 6, 7, 8 excluding 8.7 to 8.9, 9, 15)

Reference Books:

1) Decision Support Systems - Sprague R.H. Jr and H.J. Watson, 4th Edition, Prentice Hall, 1996.
2) Artificial Intelligence by Elaine Rich and Kevin Knight –MGH

Termwork :

Minimum 8 to 10 assignments on the above topics.

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SEMESTER - II

ELECTIVE – II : 4) MOBILE APPLICATION DEVELOPMENT

Teaching Scheme
Lecture : 3 Hours /week

Examination Scheme
Theory: 100 Marks
Termwork: 25 marks

COURSE OBJECTIVES:

1) Develop mobile applications using modern mobile development tools for android.
2) Independently manage all phases of mobile project development.
3) Develop applications that effectively combine mobile device capabilities such as communication, computing.

COURSE OUTCOMES:

1) Familiarize with mobile apps development aspects.
2) Design & develop mobile apps, using Android as a development platform.
3) Perform testing, signing, packaging and distribution of mobile apps.

SECTION – I

Unit 1 : Android Operating System (8 Hrs.)

Introduction, History, Features and Characteristics, Ecosystem, Hardware Requirements, Development Model, Android Concepts, Overall Architecture.

Unit 2 : Getting started with Mobility (8 Hrs.)

Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android platform, setting up the mobile app development environment along with an emulator, a case study on Mobile app development

Unit 3 : User Interface Design. (6 Hrs.)

App user interface designing – mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity- states and life cycle, interaction amongst activities.

Unit 4 : Mobile Application Functionality (6 Hrs.)

App functionality beyond user interface - Threads, Async task, Services – states and life cycle, Notifications, Broadcast receivers, Telephony and SMS APIs

SECTION – II

Unit 5: Native data handling (6 Hrs.)

On-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet)

Unit 6 : Sprucing up mobile apps (10 Hrs.)

Graphics and animation – custom views, canvas, animation APIs, multimedia – audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope)

Unit 7 : Testing mobile apps (6 Hrs.)

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk

Unit 8 : Taking apps to Market (6 Hrs.)

Versioning, signing and packaging mobile apps, distributing apps on mobile market place, Google play store.

Text Books:

1. "Android Application Development All in one for Dummies" by Barry Burd
2. "Mobile Apps Development" by Anubhav Pradhan, Anil V Deshpande
3. "Embedded Android-Porting, Extending, and Customizing" by Karim Yaghmour (O'Reilly Media)

Reference Books:

1. Android Developer Resources: http://developer.android.com
2. Android Developer Tools Essentials by Mike Wolfson (O'Reilly Media).

List of Assignments:

Students should implement and learn to use the android application development and testing tools to accomplish the following assignments during regular course schedule.

1) Understand the app idea and design user interface/wireframes of mobile app
2) Set up the mobile app development environment
3) Using emulator to deploy and run mobile apps
4) Develop and debug mobile app components – User interface, services, notifications, broadcast receivers, data components.
5) Testing mobile app - unit testing, black box testing and test automation

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SEMESTER - II

VOCATIONAL TRAINING

Examination Scheme
Termwork: 25 marks

The student should attend vocational training arranged at Industry or Institute and should complete a mini project on the technology on which training was given. A report regarding satisfactory completion of the training should be submitted to the college by competent authority from Industry / Institute. The evaluation of Term Work will be carried out by a panel of Examiners decided by the institute.

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SEMESTER - I

LAB I : PROJECT PHASE I

Teaching Scheme
Practical : 4 Hours /Week

Examination Scheme
Termwork : 50 Marks
POE : 50 Marks

COURSE OBJECTIVES:

1) Formulate a realistic problem statement using SDLC.
2) Follow an appropriate designing technique for further development of a project.
3) Get acquainted to work in a team.
4) Develop soft skills including presentation, writing & convincing.

COURSE OUTCOMES:

1) Define a realistic problem statement.
2) Select & apply an appropriate technique to create a design.
3) Work in teams with good coordination.
4) Present their work through oral communication & writing skills.

Strategy:

1) A project group shall be about 4 students.
2) Students have to study existing system, problems in existing system, proposed system, its definition, scope, design, introduction to programming tools, hardware and software platforms, planning, activity charts, planning for testing, test case design etc.
3) Project leader should maintain the progress register in which each member weekly contribution should be written and the guide will countersign the same.
4) A project design report will be submitted as a term work document at the end of semester.

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SEMESTER - I

LAB II : PYTHON

Teaching Scheme
Lecture : 2 Hours /Week
Practical : 2 Hours/Week

Examination Scheme
Termwork : 50 Marks

COURSE OBJECTIVES :

1) Introduce to the core components of programming using the Python programming language.
2) Introduce library packages to write desktop applications using python

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COURSE OUTCOME:

1) Use fundamental library packages available in python,
2) Design python application using procedure oriented and object oriented approach.
3) Develop database application in python,

SECTION - I

Unit 1 : Introduction to Python **(03 Hrs.)**

Introducing the Python Interpreter, Program Execution, Execution Model Variations, The Interactive Prompt, System Command Lines and Files

Unit 2 : Introduction to procedural programming in Python **(04 Hrs.)**

Data types, Collection data types, Control structures and functions, Exception Handling, Custom Functions,

Unit 3 : Modules and packages **(06 Hrs.)**

String handling, command line programming, time and dates, JSON handling, File and directory handling, Create, read, write delete, and rename files, Traverse directories, PyPI: Python Package Index, pypi.python.org/pypi, Using pip to install python packages from PyPI

SECTION - II

Unit 4 : Object oriented programming **(04 Hrs.)**

Attributes and methods, Inheritance and polymorphism, Unit testing and profiling

Unit 5 : Database programming **(04 Hrs.)**

DBM databases, Executing Queries, SQL databases

Unit 6 : Network and Web Programming **(04 Hrs.)**

Interacting with HTTP services as a client, Creating TCP, UDP Server, Creating Simple REST based interface, Authenticating Clients, Understanding Event-Driven I/O

Unit 7 : Testing, Debugging and exceptions (5 Hrs.)

Testing output, Unit tests in Python, Handling Multiple exceptions, creating custom exceptions, Debugging programs

Text Book:

1. Programming in Python 3, Second Edition, Mark Summerfield

Reference Books:

1. Python Cookbook, Third Edition, David Beazley and Brian K. Jones, Shroff Publishers & Distributors Pvt. Ltd., ISBN : 978-93-5110-140-6
2. Learning Python FIFTH EDITION Mark Lutz
3. Programming Python (English) 4Th Edition Mark Lutz
4. Testing Python, David Sale, Wiley India (P) Ltd., ISBN : 978-81-265-5277-1

Termwork :

Minimum 12 to 15 assignments based on above topics.

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SEMESTER - II

1. MANAGAMENT INFORMATION SYSTEM

Teaching Scheme
Lecture : 3 Hours /Week

Examination Scheme
Theory: 100 Marks
Termwork : 25 Marks

COURSE OBJECTIVES :

1) Study different types of information systems in an organisation
2) Understand various MIS operating in functional areas of an organisation and explain its relationship with the various activities of the organisation.
3) Understand how MIS is developed and implemented for various levels in an organisation.
4) Explore the use of some common IS development tools.

COURSE OUTCOME :

1) Understand information systems and their uses,
2) Use computerized management information systems,
3) In-depth analysis and decision making,
4) Apply modern project management techniques,
5) Aware of security issues related to information systems

SECTION I

Unit 1 : Introduction (6 Hrs.)

Management Information system (MIS) Concept, definition, Role of Management Information system, Impact of the management information system, Computers in Management, The role and importance of information systems, MIS and User, Management as control system, Uses of MIS, Characteristics of MIS, MIS: support to management.

Unit 2 : Information system and decision making (7 Hrs.)

Information System Software, Information needs at different organization levels, Major types of information system in organization and relationship between them, Enhancing management decision making, decision support systems (DSS) –understands DSS, characteristics components, major DSS applications. Group decision support systems (GDSS), - elements, characteristics, how GDSS can enhance group decision - making? Executive support systems (ESS) – role of ESS in the organization, developing ESS, benefits of ESS.

Operational Information Systems in Business, APPLICATION OF MIS IN VARIOUS FUNCTIONAL AREAS: Marketing information systems, financial information systems, human resource information systems, production information systems.

Unit 3 : Strategic Role of Information Systems (4 Hrs.)
Information as a strategic resources and concept of strategic information system, Contribution of information systems to pursue competitive strategies.

Unit 4 : Basics of information system (6 Hrs.)
Building Information System- Overview of system development life cycle, Role of data in Information System, Major problem areas in information system, causes of information system success and failure, evolution of success of information systems, Principle causes of information system failure.

SECTION II

Unit 5 : Information Systems Resource Management and security (7 Hrs.)
Computer System Management, Managing Information Resources, Computer Security, Crime and Ethicsm, Security Concepts – Introduction, Need for security and control, risks to information system data and resources, Confidentiality, integrity, availability, Security policies, security mechanisms, assurance, types of Security Introduction, Risk Analysis, Security Planning, Organizational Security Policies, Security Audit.

Unit 6 : E-commerce (4 Hrs.)
E–Commerce - Concept, Types and Applications of E-Commerce, E-market, M- Commerce.

Unit 7 : ERP (8 Hrs.)
ERP- Introduction What is ERP? Definition, Need of ERP, Advantages of ERP and Growth of ERP, basic features, Benefits, Modules, Implementation of ERP Common ERP myths, The role of CIO. ERP Related Technologies – ERP and Related Technologies – Business process Reengineering (BPR)- Business Process, Process Model of Organization, What delays the business process?, Relevance of IT. BPR, ERP and IT. Supply Chain Management (SCM)- Concept, Supply Chain Performance: Introduction to Customer Relationship Management (CRM).

Text Books:
1. Management Information system, Waman S. Jawadekar 5th edition, McGrawHill Education
2. Management Information Systems Tenth Edition , James A O'Brien,Mc graw hill education

Reference Books:
1. Information Technology for management by Ramesh Behl
2. Management information system by Shashikala parimi, dreamtech
3. ERP by Alexis , Leon
4. Revati Shriram (security Audit for this bit Chap. 5)

Term work

Teacher should prepare a group of 4-5 students (or based on their project group) assign them any case study based on the above chapters and tell them to collect and present that case study in the form of seminar. Evaluation will be done by teacher by considering different factors.

These are few topics for case study, teacher can suggest any other topic for case study

1. IT application in Management: BSNL CDR project (Call-Data-Record)
2. Information System Software: Case study on DSS for ITC, Big Bazaar, Raymond Clothing's
3. Application of MIS in different Functional Area: AADHAR Based Biometric Attendance System implemented in all government organizations. www.attendance.gov.in
4. Information system resource management: IRCTC next Generation Ticketing System
5. Ecommerce: A comprehensive case study on FLIPKART, SNAPDEAL, MYNTRA etc
6. ERP: One Case study on each module of ERP
7. Mc Donald's supply chain management (SCM)
8. Cognizant implementation of People soft (Human Resource Management System)
9. Tata Motors CRM DMS Project (CRM)
10. AICTE, New Delhi (SAP CRM Project)
11. VRL Implementation of SCM (Logistics & Supply Chain Management)

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SEMESTER - II

2. INFORMATION AND CYBER SECURITY

Teaching Scheme
Lecture : 3 Hrs/Week
Practical : 2 Hrs/Week

Examination Scheme
Theory: 100 Marks
Term Work : 25 Marks
POE: 25 Marks

COURSE OBJECTIVES :

1) Provide an understanding of principal concepts, major issues, technologies, and basic approaches in information security.
2) Provide concept-level hands-on experience in specific topic area.
3) Provide the ability to examine and analyze real-life security cases.

COURSE OUTCOME :

1) Recognize common attack patterns, evaluate vulnerability of an information system and establish a plan for risk management.
2) Demonstrate how to detect and reduce threats in Web security, how to secure a wireless network
3) Evaluate the authentication and encryption needs of an information system.
4) Explain the Public Key Infrastructure process
5) Evaluate a company's security policies and procedures

SECTION – I

Unit 1: Symmetric Ciphers (5 Hrs.)

Overview – Services, Mechanism and Attacks, OSI Security Architecture, A model for Network security, Classical Encryption techniques – Symmetric Cipher model, Substitution. Techniques, Transposition techniques, Rotor Machines.

Unit 2: Block Cipher and Data Encryption Standard (6 Hrs.)

Simplified DES, Block Cipher principles, The Data Encryption Standard, The strength of DES, Differential and Linear Cryptanalysis, Block Cipher design principles, Block Cipher Mode of Operation.

Unit 3 : Public Key Cryptography (5 Hrs.)

Public Key Cryptography and RSA – Principles of Public Key Cryptosystems, The RSA Algorithm, Key management - Other public key cryptosystems – Key Management, Diffie-Hellman Key Exchange.

Unit 4 : Message Authentication and HASH Functions: (5 Hrs.)

Authentication requirements, Authentication Functions, Message Authentication Codes, Hash Functions, security of Hash Functions and MACS Digital Signatures. Authentication Protocols– Digital Signatures, Authentication Protocols, Digital Signature Standard.

SECTION – II

Unit 5: IP Security and E-Mail Security (7 Hrs.)

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security payload, Combining Security Associations, Key Management, Secure Socket Layer and Transport Layer Security.

Electronic Mail Security – Secure Electronic Transaction, Pretty Good Privacy, S/MIME

Unit 6 : Introduction to Cybercrime: (5 Hrs.)

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are cybercriminals? Classifications of Cybercrimes, Cybercrimes: The Legal Perspectives and Indian Perspective.

Unit 7 : Tools and Methods used in Cybercrime: (7 Hrs.)

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL injection, Buffer overflow.

Text Book:

1) Williams Stallings–Cryptography and Network security principles and practices. Pearson Education (LPE) (Unit I to V)
2) Nina Godbbole --Information systems security-Security management, metrics, frameworks and best practices(WILEY) (Unit VI and VII)

Reference Books:

1) Behroz A. Forozan, Debdeep Mukhopadhyay, "Cyber and Network Security" McGraw Hill Education, 2nd Edition.
2) Atul Kahate, "Cyptography and Network Security" McGraw Hill Education 3rd Edition
3) Schneir, Bruce, "Applied Cryptography: Protocols and Algorithms"

Practical List:

It should consist of the 08-10 practical based on following guidelines

1) Implementation of Substitution Cipher
2) Implementation of Poly alphabetic Cipher (Vigenere Cipher and Vernam Cipher)
3) Implementation of Transposition Cipher
4) Implementation of Play fair Cipher
5) Implementation of Secure file transfer in Client/Server environment (use any one of above method for encryption and decryption).
6) Write a program to simulate RSA algorithm.
7) Write a program to simulate any Authentication system.
8) Write a program to simulate the PGP.
9) Study different cybercrimes and implement a system to detect any one cyber crime
10) Study and implementation of proxy servers, Keyloggers, Detection of phishing attacks.
11)

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SEMESTER - II

ELECTIVE – III : 1) DATA WAREHOUSING AND MINING

Teaching Scheme
Lecture : 3 Hours /week

Examination Scheme
Theory: 100 Marks
Termwork: 25 marks

COURSE OBJECTIVES :

1) Learn basics in data mining (DM), and knowledge discovery in databases.
2) Understand data preprocessing methods in data mining.
3) Acquaint with data warehouses and OLAP.
4) Learn important data mining techniques.
5) Learn different data mining applications.

COURSE OUTCOME :

1) Apply the concepts, strategies, and methodologies related to the design and construction of data mining applications
2) Comprehend several data preprocessing methods
3) Utilize data warehouses and OLAP for data mining and knowledge discovery activities
4) Determine an appropriate mining strategy for given large dataset
5) Apply appropriate mining techniques to extract unexpected patterns and new rules that are "hidden" in large databases

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SECTION - I

Unit 1 : Introduction (5 Hrs.)

Fundamentals of data mining, Data mining techniques-classification,regression,time-series,prediction,clustering,summarization,association rules, sequence discovery, Information Extraction using Neural Networks, KDD environment, Data mining metrics, Major issues in Data Mining, Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Data transformation and Discretization.

Unit 2 : Data Warehouse and OLAP Technology for Data Mining (4 Hrs.)

Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

Unit 3 : Mining Frequent Patterns, Associations and Correlations (6 Hrs.)

Market Basket Analysis, Frequent Itemsets, Closed Itemsets, and As ociation Rules, Frequent Pat ern Mining, Ef icient and Scalable Frequent Itemset Mining Methods, The Apriori Algorithm for finding Frequent Itemsets Using Candidate Generation, Generating As ociation Rules from

Frequent Itemsets, Improving the Efficiency of Apriori, Frequent Itemsets without Candidate Generation using FP Tree , Mining Multilevel Association Rules, Mining Multidimensional,Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

Unit 4 : Classification and Prediction (6 Hrs.)

What is Classification & Prediction, Issues regarding Classification and prediction, statistical based algorithms, distance based algorithms, Decision tree, Prediction: Linear and non linear regression.

SECTION - II

Unit 5 : Cluster Analysis (7 Hrs.)

Data types in cluster analysis, Categories of clustering methods, Partitioning algorithms- K-Means & K-Mediods, Hierarchical Clustering- Agglomerative and Divisive Clustering, BIRCH and ROCK methods, DBSCAN, Outlier Analysis

Unit 6 : Mining Streams, Time Series and Sequence Data (6 Hrs.)

Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multirelational Data Mining.

Unit 7 : Mining Object, Spatial, Multimedia, Text and Web Data (5 Hrs.)

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

Unit 8 : Applications and Trends in Data Mining (5 Hrs.)

Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining and Social Impacts of Data Mining.

Text Books:

1) Data Mining – Concepts and Techniques - Jiawei Han, Micheline Kamber & Jian Pei, Morgan Kaufmann Publishers, Elsevier,3rd Edition.
2) Data Mining: Introductory And Advanced Topics- Margaret H Dunham, Pearson Education
3) Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

Reference Books:

1) Data Mining Techniques – Arun K Pujari,2nd edition, Universities Press.
2) Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Edn Asia.
3) Insight into Data Mining,K.P.Soman,S.Diwakar,V.Ajay,PHI,2008. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley student Edition
4) Data Warehousing, Data Mining and OLAP, Alex Berson, Stephen J. Smith, Mc Graw Hill Publication, ISBN : 978-0-07-058741-0

Termwork :

Minimum 8 to 10 assignment based on above topics.

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SEMESTER - II

ELECTIVE – III : 2) IMAGE PROCESSING

Teaching Scheme
Lecture : 3 Hours /week

Examination Scheme
Theory: 100 Marks
Termwork: 25 marks

Prerequisites
Familiarity with Fourier transforms.

COURSE OBJECTIVES:

1) Study the Image fundamentals.
2) Study the mathematical morphology necessary for Image processing and Image segmentation.
3) Study the Image Representation and description and feature extraction.
4) Study the principles of Pattern Recognition.
5) Know the various applications of Image processing

COURSE OUTCOMES:

1) Know the basic concepts in Image Processing.
2) Segment the various types of Images.
3) Represent the images in different forms
4) Develop algorithms for Pattern Recognition
5) Implement the features of Image processing in applications

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SECTION - I

Unit 1 : Image , digitized image & it's properties (**8 Hrs.)**

Elements of visual perception & its attributes, Digitized Image - image function, mathematical representation. Image digitization - Sampling & Quantization, Properties - distance, pixel adjacency, region, background, holes, brightness, segmentation, border, edge, convex hull, histograms, color, Noise. Image analysis - Level of image data Representation Traditional & hierarchical data structure, Example of Image Processing

Unit 2 :Image pre – processing **(6 Hrs.)**

Brightness transformation, geometric transformation, Local Processing, Image smoothing and edge detection, Introduction to Image restoration. -

Unit 3 : Image enhancement in special domain **(6 Hrs.)**

Threshold, Edge-based segmentation, Edge relaxation, Border tracing, Hough transform. Region-based segmentation, Region merging, Region splitting, Split & Merge.

SECTION –II

Unit 4 : Image Enhancement in frequency domain (7 Hrs.)

Fourier Transform,1-D & 2-D, DFT, Handmard Transform , Discrete Cosine Transforms, Introduction to Wavelet Transform, Application of Image transform.

Unit 5 Space reorientation and Detection (7 Hrs.)

Region Identification, Contour-based representation. Chain codes, B-Spline reorientation, Region –based representation, moments, Convex Hull.

Unit 6 : Image Compression (6 Hrs.)

Redundancy & fidelity criteria, Error free compression, Methods of compression, standards, Binary, continuous tone still, Video

Text Book :

1) Computer vision & Image processing - by Milan Sonaka.
2) Digital Image Processing - by Gonzalez (Addision Wesley)

Reference Book:

1) Elements of Digital Image Processing & Computer Vision – by Andrew Low(MGH)
2) Digital Image Processing - Pratt.
3) Fundamentals of digital Image Processing – by A. K. Jain

Termwork :

Minimum 8 to 10 assignments on above topics.

SOLAPUR UNIVERSITY, SOLAPUR

B.E. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - II

ELECTIVE – III : 3) INFORMATION RETRIEVAL

Teaching Scheme
Lecture : 3 Hours /week

Examination Scheme
Theory: 100 Marks
Termwork: 25 marks

COURSE OBJECTIVES:

1) Aquaint students to information retrieval process and information models.
2) Introduce measures of evaluation performance of information retrieval systems.
3) Learn different querying methods.
4) Learn indexing structures like inverted index, hash files, suffix arrays for given collection of documents.
5) Study different sequential and pattern matching algorithms.
6) Learn difference in data retrieval, information retrieval and multimedia retrieval systems.
7) Learn different components of search engine and ranking algorithms.

COURSE OUTCOMES:

1) Implement text retrieval models like Boolean, vector and probabilistic and structured retrieval model.
2) Evaluate the performance of information retrieval systems.
3) Implement different querying patterns in retrieval models.
4) Implement different indexing structure like inverted index, hash files, suffix arrays for given collection of documents.
5) Implement different sequential searching algorithms and pattern matching algorithms.
6) Implement multimedia IR system and indexing on multimedia data.
7) Implement different ranking algorithms to find ranking of the documents.
8) Design and develop information retrieval systems.

SECTION – I

Unit 1 : Information Retrieval & IR Models (9 Hrs.)

Information retrieval and data retrieval, Information retrieval process, A Formal Characterization of IR Models, Classic Information Retrieval, Structured Text Retrieval Models, Models For Browsing, Retrieval Performance Evaluation-Recall and Precision

Unit 2 : Query Languages (5 Hrs.)

Keyword based querying, Pattern Matching, Structural Queries.

Unit 3 : Indexing and Searching (8 Hrs.)

Inverted Files and Indices for text search, Boolean Queries, Sequential searching, Pattern Matching, Structural Queries.

SECTION – II

Unit 4 : Multimedia IR - Models and Languages (5 Hrs.)

Data Modelling & Query Languages

Unit 5 : Multimedia IR - Indexing and Searching (5 Hrs.)

Spatial Access Methods, A generic multimedia indexing approaches, One dimensional time series, Two Dimensional color images, Automatic Feature Extraction.

Unit 6 : Web Retrieval (7 Hrs.)

Search Engines, Web Crawling, Browsing, Metasearchers, Searching using Hyperlinks

Unit 7 : Digital Libraries (3 Hrs.)

Architectural issues of Digital Libraries, Document models, Representation, and Access

Text Book -

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

Reference:

1) www.dcc.ufmg.br/irbook or sunsite.dcc.uchile.cl/irbook
2) http://nlp.stanford.edu/IR-book/information-retrieval-book.html
3) Information Storage and Retrieval- Robert R Korthage, WILEY-INDIA

Termwork

1. Study of different search Engines.
2. Create Logical View of a document.
3. Create information retrieval model based on Boolean Model.
4. Create information retrieval model based on Implement Vector Model.
5. Construct index structure like inverted index, suffix array for given document.
6. Implementation of sequential algorithms like KMP, BM, Shift-OR, BDM etc.
7. Implementation of String matching allowing errors like Dynamic Programming.
8. Create Multimedia Information Retrieval System.

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SEMESTER - II

ELECTIVE – III : 4) CLOUD COMPUTING

Teaching Scheme
Lecture : 3 Hours /week

Examination Scheme
Theory: 100 Marks
Termwork: 25 marks

COURSE OBJECTIVES :

1) Develop knowledge about Cloud computing model and associated concepts, terminologies.
2) Develop skills necessary to identify cloud deployment types and deploy them for various use cases.
3) Build necessary cognizance to identify benefits and challenges of cloud Computing for an IT Organizations in building IT solutions.

COURSE OUTCOME :

1) Explain the concepts of Cloud Computing and the various deployment and service models of Cloud Computing, benefits and challenges of Cloud Computing
2) Describe the Public Cloud and its Models
3) Explain about the various Players of Public Cloud and their offerings, Virtual Public Cloud
4) Describe Private Cloud and its deployment models, Building blocks of Private Cloud
5) Explain about Hybrid Cloud
6) Describe the Security concerns of Cloud Computing, Multi-Cloud management System
7) Explain the various vendors of a secure Cloud model

SECTION - I

Unit 1 : Overview of Cloud Computing (4 Hrs.)

Brief history and evolution - History of Cloud Computing, Evolution of Cloud Computing, Traditional vs. Cloud Computing. Why Cloud Computing, Cloud service models (IaaS, PaaS & SaaS). Cloud deployment models (Public, Private, Hybrid and Community Cloud), Benefits and Challenges of Cloud Computing.

Unit 2 : Working with Private Cloud (12 Hrs.)

Basics of virtualization, Virtualization technologies, Server virtualization, VM migration techniques, Role of virtualization in Cloud Computing. Business cases for the need of Cloud computing environment, Private Cloud Definition, Characteristics of Private Cloud, Private Cloud deployment models, Private Cloud Vendors, Private Cloud Building blocks namely Physical Layer, Virtualization Layer, Cloud Management Layer, Challenges to private Cloud, Virtual Private Cloud. Implementing private cloud (one out of CloudStack, OpenStack, Eucalyptus, IBM or Microsoft)

Unit 3 : Working with Public Clouds (12 Hrs.)

What is Public Cloud, Why Public Cloud, When to opt for Public Cloud, Public Cloud Service Models, and Public Cloud Players. Infrastructure as a Service Offerings, IaaS Vendors, PaaS offerings, PaaS vendors, Software as a Service. Implementing public cloud (one out of AWS, Windows Azure, IBM or Rackspace)

Unit 4 : Overview of Cloud Security (6 Hrs.)

Explain the security concerns in Traditional IT, Introduce challenges in Cloud Computing in terms of Application Security, Server Security, and Network Security. Security reference model, Abuse and Nefarious Use of Cloud Computing, Insecure Interfaces and APIs, Malicious Insiders, Shared Technology Issues, Data Loss or Leakage, Account or Service Hijacking, Unknown Risk Profile, Introduce the different vendors offering Cloud Security for public and private clouds.

SECTION - II

Unit 5: Overview of Multi-Cloud Management Systems (4 Hrs.)

Explain concept of multi-cloud management, Challenges in managing heterogeneous clouds, benefits and advantages of multi-cloud management systems. Implementing Multi-Cloud Management System (e.g. RightScale Cloud Management System)

Unit 6 : Business Clouds (6 Hrs.)

Cloud Computing in Business, Various Biz Clouds focused on industry domains (Retail, Banking and Financial sector, Life Sciences, Social networking, Telecom, Education). Cloud Enablers (Business Intelligence on cloud, Big Data Analytics on Cloud)

Unit 7: Future directions in Cloud Computing (4 Hrs.)

Future technology trends in Cloud Computing with a focus on Cloud service models, deployment models, cloud applications, and cloud security, Migration paths for cloud, Selection criteria for cloud deployment, Current issues in cloud computing leading to future research directions.

Text Book :

1) Cloud Computing: Principles and paradigms By Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, 2011 Cloud Computing, By Michael Miller, 2008.
2) Cloud Computing for dummies, By Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, 2009.
3) Cloud Computing: A Practical Approach, By Anthony T. Velte, Toby J. Velte, and Robert Elsenpeter, McGraw Hill, 2010.
4) Handbook of Cloud Computing, By Borko Furht, Armando Escalante (Editors), Springer, 2010.

Reference Book :

1) Cloud Security, A comprehensive Guide to Secure Cloud Computing by Krutz, Ronald L.; Vines, Russell Dean
2) Cloud computing: Implementation, management and security By Rittinghouse, John, W.
3) Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, McGraw Hill, 2013

Termwork

1) Objective of assignments should be to test students understanding and assess their ability to put into practice the concepts and terminologies learned.
2) Assignments must be of nature, which require students to identify the use case scenarios for using technologies mentioned in syllabus.

SOLAPUR UNIVERSITY, SOLAPUR

B.E. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - II

ELECTIVE – IV : 1) STORAGE AREA NETWORK

Teaching Scheme
Lecture : 3 Hours /week

Examination Scheme
Theory: 100 Marks
Termwork: 25 marks

COURSE OBJECTIVES :

1) Understand the fundamentals of storage centric and server centric systems with RAID concepts.
2) Understand how to maintain the data with the concepts of backup for both simple and complex systems.

COURSE OUTCOME :

1) Identify the need for performance evaluation and the metrics used in the context of Storage Network.
2) Deploy and maintain the data with the concepts of Storage Network Application, Management and Network Back-Up.

SECTION – I

Unit 1 : Introduction (9 Hrs.)

Introduction: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages.Case study: Replacing a server with Storage Networks The Data Storage and Data Access problem; The Battle for size and access. Intelligent Disk Subsystems: Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems, Availability of disk subsystems.

Unit 2 : I/O Techniques (8 Hrs.)

I/O Techniques: The Physical I/O path from the CPU to the Storage System; SCSI; Fibre Channel Protocol Stack; Fibre Channel SAN; IP Storage. Network Attached Storage: The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system. File System and NAS: Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS.

Unit 3 : Storage Virtualization (9 Hrs.)

Storage Virtualization: Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network.

SECTION - II

Unit 4 : Application of Storage Networks (8 Hrs.)

Application of Storage Networks: Definition of "Storage Network"; Storage Sharing; Availability of Data; Adaptability and Scalability of IT Systems;

Unit 5 : Network Back Up (9 Hrs.)

General Conditions for Network Back Up; Network Back-up Services; Server components; Back-up Clients; Performance Gains as a result of Network Back-Up; Performance Bottlenecks of Network Back-Up; Limited Opportunities for Increasing performance; Next Generation Back-Up; Back-Up of File Systems; Back up of Databases; Organizational Aspects of Back-Up.

Unit 6 : Management of Storage Network (9 Hrs.)

Management of Storage Network: System Management, Requirement of management System, Support by Management System, Management Interface, Standardized Mechanisms, Property Mechanisms, In-band Management, Out-band Management, Optional Aspects of the Management of Storage Networks.

Text Book:

1) Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, Wiley India, 2013.

Reference Books:

1) Robert Spalding: "Storage Networks The Complete Reference", Tata McGraw-Hill, 2011.
2) Marc Farley: Storage Networking Fundamentals – An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems, Cisco Press, 2005.
3) Richard Barker and Paul Massiglia: "Storage Area Network Essentials A Complete Guide to understanding and Implementing SANs", Wiley India, 2006.

Termwork :

Minimum 8 to 10 assugmnets on the above topics.

SOLAPUR UNIVERSITY, SOLAPUR

B.E. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - II

ELECTIVE – IV : 2) WEB 2.0 & RICH INTERNET APPLICATION

Teaching Scheme
Lecture : 3 Hours /week

Examination Scheme
Theory: 100 Marks
Termwork: 25 marks

COURSE OBJECTIVES:

1) Develop ability to develop Rich Internet applications.
2) Inculcate the principles and concepts of Web 2.0

COURSE OUTCOMES :

1) Develop Web 2.0 based Rich Internet applications
2) Demonstrate his ability to design Rich Internet Application using Client side and Server side frameworks.

SECTION - I

Unit 1 **(4 Hrs.)**

Web 1.0: HTML, URLs, and HTTP, The Web Model and REST, Considerations for Building an HTTP Service, More Representations, XML, Alternatives to XML.

Unit 2 **(4 Hrs.)**

Introduction to Web 2.0, Introduction, Charting the Landscape, Page Presentation in Web 2.0, JavaScript: Understanding Lesser-Known but Crucial Features, JavaScript Optimizations, Ajax, jQuery, Mobile jQuery.

Unit 3 **(5 Hrs.)**

Design Principles, XSLT and XPath, SVG, XForms, What's Next for HTML., From Browsers to Rich Clients, Comparing Rich Client Frameworks.

Unit 4 **(4 Hrs.)**

Syndication: Syndication Basics, The Syndication Process, Syndication Formats. Microformats: The Basics of Microformats, Creating Microformat Documents.

SECTION - II

Unit 5 **(5 Hrs.)**

Combining Protocols to Build Web Services: Clarifying Web Services, REST Services, WS-* Services, REST versus WS-*. Serving XML over HTTP: How Is Serving HTML Different?, Serving Static Content, Serving Dynamic Content, XQuery and XML Databases, Serving JSON, Dealing with Non-XML Sources, Converting Relational Data to XML, Converting Binary Data to XML.

Unit 6 **(6 Hrs.)**

Mashups, HTML Scraping, and Web Services: Popular Examples: Mapping Mashups, Why Use Mashups?, The Business Model of Mashups, Screen Scraping, Creating Feeds, Podcasting and Serving Multimedia: The Formats Labyrinth, Protocols, Mapping and Badges.

Unit 7 **(5 Hrs.)**

Security: What Is Security?, Lessons Learned from History, The Layered Approach, Authentication and Authorization, Message Encryption, Message Digests, Digital Certificates, Secure Sockets Layer, Code Security, Web Services Security.

Unit 8 **(4 Hrs.)**

Web 2.0 Business Strategy: Value created by Users , Building Social Connections, Strategies to b incorporated by Businesses

Textbooks:

1) Web 2.0: A Strategy Guide Business thinking and strategies behind successful Web 2.0 implementations, By Amy Shuen - O'Reilly Media.
2) Professional Web 2.0 Programming By Eric van der Vlist, Danny Ayers, Erik Bruchez, Joe Fawcett, Alessandro Vernet – Wrox (John Wiley & Sons).

Reference Books:

1) Web 2.0 Security: Defending Ajax, RIA, and SOA by Shreeraj Shah - Charles River Media
2) AJAX, Rich Internet Applications, and Web Development for Programmers (Deitel Developer Series) Paul J. Deitel, Harvey M. Deitel.
3) Professional Rich Internet Applications: AJAX and Beyond (Programmer to Programmer) By Dana Moore, Raymond Budd, Edward Benson- Wrox.

Termwork :

1) Objective of assignments should be to test students understanding and asses their ability to put into practice the concepts and terminologies learned.
2) Assignments must be of nature which require students to identify technologies mentioned in syllabus.
3) 15 – 20 assignments on the above syllabus.

SOLAPUR UNIVERSITY, SOLAPUR

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SEMESTER - II

ELECTIVE – IV : 3) ARTIFICIAL NEURAL NETWORK

Teaching Scheme
Lecture : 3 Hours /week

Examination Scheme
Theory: 100 Marks
Termwork: 25 marks

COURSE OBJECTIVES :

1) Cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.
2) Understand the broad concept of artificial intelligence and artificial neural networks.
3) Know the possible applications of artificial neural networks (ANN).
4) Relate biological neural networks to ANN.
5) Understand the capabilities and limitations of ANN.

COURSE OUTCOME :

1) Expose the students to the concepts of feed forward neural networks.
2) Provide adequate knowledge about feedback neural networks.
3) Teach about the concept of fuzziness involved in various systems. To provide adequate knowledge about fuzzy set theory.
4) Provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
5) Provide adequate knowledge of application of fuzzy logic control to real time systems.

SECTION - I

Unit 1 : Introduction to ANN **(6 Hrs.)**

Features, structure and working of Biological Neural Network, Trends in Computing Comparison of BNN and ANN

Unit 2 : Basics of Artificial Neural Networks **(8 Hrs.)**

History of neural network research, characteristics of neural networks terminology, models of neuron Mc Culloch – Pitts model, Perceptron, Adaline model, Basic learning laws, Topology of neural network architecture

Unit 3 : Backpropagation Networks (BPN) **(8 Hrs.)**

Architecture of feed forward network, single layer ANN, multilayer perceptron, back propagation learning, input - hidden and output layer computation, backpropagation algorithm, applications, selection of tuning parameters in BPN, Numbers of hidden nodes, learning.

SECTION - II

Unit 4 : Activation & Synaptic Dynamics **(6 Hrs.)**

Introduction, Activation Dynamics models, synaptic Dynamics models, stability and convergence, recall in neural networks

Unit 5 : Basic functional units of ANN for pattern recognition tasks (8 Hrs.)

Basic feedforward, Basic feed back and basic competitive learning neural network, Pattern association, pattern classification and pattern mapping tasks.

Unit 6 : Applications of ANN (8 Hrs.)

Pattern classification – Recognition of Olympic games symbols, Recognition of printed Characters. Neocognitron – Recognition of handwritten characters.

NET Talk: to convert English text to speech, Recognition of consonant vowel (CV) segments, texture classification and segmentation.

Text Books:

1. Artificial neural Networks- B. Yegnanarayana-PHI
2. Neural networks, Fuzzy logic and Genetic Algorithms- S.Rajsekaran, Vijayalakshmi Pari-PHI
3. Neural Networks- Satish Kumar

Termwork :

Minumum 8 to 10 assignments on the above topics.

SOLAPUR UNIVERSITY, SOLAPUR

B.E. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - II

ELECTIVE – IV : 4) BIG DATA ANALYTICS

Teaching Scheme
Lecture : 3 Hours /week

Examination Scheme
Theory: 100 Marks
Termwork: 25 marks

COURSE OBJECTIVES :

1) Explain need for Big Data Analytics
2) Develop ability to analyze and process Big Data.
3) Build necessary skills to write Map Reduce programs for analyzing Big Data problems.

COURSE OUTCOMES :

1) Identify need for Big Data analysis
2) Analyze and identify Big data processing technology for analyzing the Big data.
3) Write Map Reduce programs to process Big Data by identifying the use case.

SECTION - I

Unit 1 **(1 Hr.)**

Types of Digital Data, Structured, Sources of structured data, Ease with Structured data, Semi-Structured, sources of semi-structured data, Unstructured, sources of unstructured data, Issues with terminology, Dealing with unstructured data Place me in the basket

Unit 2 **(1 Hr.)**

Big data, What is big data? Why big data?, Other characteristics of data but not definitional for big data,Challenges with big data,Big data stack,Exercises - Puzzle, fill in the blanks

Unit 3 **(2 Hrs.)**

Big Data Anayltics, Analytics 1.0, Analytics 2.0, Analytics 3.0, Traditional BI vs. Big Data Envirnoment, Big Data technology Landscape, NoSQL Databases, NoSQL Vs. RDBMS, NewSQL, Hadoop, Hadoop 1.0 vs. Hadoop 2.0, Exercises, Data Science is multidisciplinary, Data Scientist - Your new best friend

Unit 4 **(8 Hrs.)**

Introducing Hadoop, Why not RDBMS, Distributed Computing Challenges, A Brief History of Hadoop, Hadoop Overview, Hadoop Components, High Level Architecture of Hadoop, Hadoop Distributed File System, HDFS Architecture, Daemons Related to HDFS, Working with HDFS Command, Special Features of Hadoop, Processing Data With Hadoop, Introduction, How Map Reduce Works, Map Reduce Example, Word Count Example using Java Managing Resources and Applications with YARN Introduction, Limitation of Hadoop 1.0, Hadoop 2: HDFS, Hadoop 2: YARN, Interacting with Hadoop, EcoSystem Hive, Pig, HBASE, Sqoop, Business Intelligence on Hadoop.

SECTION - II

Unit 5 **(6 Hrs.)**

Recap of NoSQL databases, MongoDB – CRUD, MongoDB- Arrays, Java Scripts, Cursors, Map Reduce Programming, Aggregations

Unit 6 **(6 Hrs.)**

Cassandra- CQLSH - CRUD, Counter, List, Set, Map, Tracing, Hands on Practice

Unit 7 **(8 Hrs.)**

Introduction to Hive - The Problem, Solution - Hive Use Case, Data Growth, Schema Flexibility and Evolution, Extensibility, What is Hive? History of Hive and Recent Releases of Hive, Hive Features, Hive Integration and Work Flow, Hive Data Units, Hive Architecture, Hive Primitive Data Types and Collection Types Hive File Formats, Hive Query Language – Statements - DDL,DML
Hive Partitions – Bucketing, Views, Sub Query, Joins, Hive User Defined Function, Aggregations in Hive, Group by and Having, Serialization and Deserialization, Hive Analytic Functions

Unit 8 **(8 Hrs.)**

Introducing Pig, History and Anatomy of Pig, Pig on Hadoop, Pig Features, Pig Philosophy, Word count example using Pig.
Use Case for Pig, Pig Primitive Data Types , Colletion Types and NULL, Pig Latin Overview Pig Latin Grammar - Comments, Keywords, Identifiers, Case sensitivity in Pig, Common Operators in Pig, Pig Statements - LOAD, STORE, DUMP.
Interactive Shell – GRUNT, FILTER, SORT, GROUP BY, ORDER BY, JOIN, LIMIT
Pig Latin Script - Local Mode, Map Reduce Mode, Running Pig Script Working with Field, Tuple, Bag User Defined Function, Parameters in Pig.

Unit 9 **(4 Hrs.)**

Introduction to Jasper Report using Jasper Soft Studio, Reporting using MongoDB, Reporting using Cassandra

Text Book :

1) Hadoop: The Definitive Guide, 3rd Edition , By Tom White , - O'reilly Media.
2) Programming Hive By Edward Rutherglen, Dean Wampler, Jason Rutherglen, Edward Capriolo. - O'reilly Media.
3) The Definitive Guide to MongoDB: A Complete Guide to Dealing with Big Data Using MongoDB (Definitive Guide Apress) 2e by David Hows, Eelco Plugge, Peter Membrey, Tim Hawkins
4) Programming Pig by Alan Gates - O'reilly Media.
5) Cassandra: The Definitive Guide: by Eben Hewitt - O'reilly Media.
6) Jaspersoft : Reports Ultimate Guide 3e. (e-Resource)

Reference Book :

1) Big Data For Dummies By Judith Hurwitz, Alan Nugent , Fern Halper , Marcia Kaufman : John Wiley & Sons
2) Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses (Wiley CIO) By Michael Minelli, Michele Chambers, Ambiga Dhiraj : John Wiley & Sons
3) Mining of Massive Datasets by Anand Rajaraman, Jure Leskovec, Jeff rey D. Ullman, Cambridge University Press.
4) Hadoop in Action, Chuck Lam, Dreamtech Press, ISBN : 978-81-7722-813-7

Termwork :

1) Objective of assignments should be to test students understanding and assess their ability to put into practice the concepts and terminologies learned.
2) Assignments must be of nature, which require students to identify the use case scenarios for using technologies mentioned in syllabus.

SOLAPUR UNIVERSITY, SOLAPUR

B.E. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - II

LAB I - WEB TECHNOLOGY

Teaching Scheme
Lecture : 2 Hours /Week
Practical : 4 Hours/Week

Examination Scheme
Termwork: 25 marks
POE : 50 marks

COURSE OBJECTIVES

1) Inculcate skills necessary to design, develop and style a web based user interfaces.
2) Develop ability to identify use cases for applying client and server side scripting web technologies.
3) Develop skills necessary to develop efficient, scalable, web based APIs and applications
4) Develop skills required to create light weight browser based web applications using client side scripting frameworks.

COURSE OUTCOME :

1) Design, develop and apply styling to a web based applications.
2) Analyze requirements of developing web applications and choose client or server side scripting technology.
3) Build efficient and scalable web APIs and applications.
4) Develop light weight browser based functionalities leveraging client side scripting frameworks.

SECTION - I

Unit 1 : HTML5, CSS3, DHTML (3 Hrs.)

HTML: HTML Review, HTML5 Introduction, Futures of HTML5, New elements in HTML5 (canvas, Media elements, Form elements, Semantic and structural elements,
CSS: CSS Introduction ,CSS Syntax, CSS Id & Class, CSS Styling, CSS3: Selectors, Box Model, Backgrounds and Borders, Image Values and Replaced Content, Text Effects, 2D/3D Transformations, Animations, Multiple Column Layout, User Interface. DHTML

Unit 2 : XML (4 Hrs.)

XML: Introduction, Benefits, components of XML, XML schemas DTD, Parsing XML, Parsing Methodologies, X Link, X pointer, X Include, XBase, XML Technologies & applications viz. E Commerce, XLS: Overview, applications and programming with XLS.

Unit 3 : JavaScript and jQuery (5 Hrs.)

Introduction, Understanding of variables, data types, control flow, and basic function usage in JavaScript, Event Handling, JS Built-in Objects JSON: JavaScript Object and Array Creation Using Literals, JavaScript Objects in Arrays & Arrays in Objects, JSON syntax, JSON Parsers, JSON Data Transfer Between Client and Server, AJAX.
jQuery: jQuery Fundamentals, using jQuery Selectors, Interacting with the DOM, Handling Events

Unit 4 : RESTful Web Services **(3 Hrs.)**

REST and the Rebirth of HTTP, RESTful Architectural Principles, The Object Model, Model the URIs, Defining the Data Format, Assigning HTTP Methods, JAX-RS.

SECTION - II

Unit 5 : PHP and MySQL **(4 Hrs.)**

Introduction to PHP 5 and PHP 6, variables and constants, program flow, functions, arrays and files and directories, Forms and Databases, integration with MySQL applications on PHP.

Unit 6 : Ruby on Rails **(3 Hrs.)**

Introduction, rails in depth using active record, Controller in depth and view in depth, developing Applications using ruby on rails.

Unit 7 : Node.js **(4 Hrs.)**

Introduction to Node.js, Modularizing code, Handling Exceptions, Events and Streams, Understanding Events, Understanding Streams, Reading and writing streams , Accessing Local Resources, Process Object, Manipulating File System, Understanding Buffers, Node.js and the Web, Handling web requests, Building a web server, Understanding the need for Web sockets, Real time interaction using Web Sockets

Unit 8 : AngularJS **(4 Hrs.)**

Fundamentals of Client Side MVC frameworks, Models, Views, Scopes, Controllers, JQuery vs. AngularJS.

Text Books:

1) Head First HTML5 Programming by Eric Freeman (Author), Elisabeth Robson - O'Reilly Media
2) HTML5 and CSS3, 2nd Edition Level Up with Today's Web Technologies by Brian P. Hogan- Pragmatic Bookshelf; Second Edition
3) Designing Next Generation Web Projects with CSS3 by Sandro Paganotti - CreateSpace Independent Publishing Platform
4) JavaScript, A Beginner's Guide, Third Edition by John Pollock - McGraw-Hill Osborne Media
5) Head First jQuery by Ryan Benedetti, Ronan Cranley- O'Reilly Media
6) Ruby on Rails by Timothy Fisher – Wiley India
7) Web Services – An Introduction – by B.V. Kumar, S.V. Subrahmanya Tata McGraw Hill Publication
8) Professional Node.js Building JavaScript Based Scalable Software by Pedro Teixeira – Wiley India.
9) RESTful Web Services: Web services for the real world by Leonard Richardson, Sam Ruby - O'Reilly Media
10) Angular JS Paperback by S Brad Green- O'Reilly Media

Reference Books:

1) HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and Jquery by Kogent Learning Solutions Inc.
2) Beginning PHP6, Apache, MYSQL Web Development by Timothy Boronczyk , Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec ,Jeremy Stolz , Michael K.Glass – Wiley India.

3) HTML 5 Applications, Zachary Kessin, O'Reilly, Shroff Publishers and Distributions Pvt. Ltd.

Termwork :

1) Objective of assignments should be to test students understanding and asses their ability to put into practice the concepts and terminologies learned.
2) Assignments must be of nature which require students to identify the use case scenarios for using client side and server side scripting technologies mentioned in syllabus.
3) 15 – 20 assignments on the above syllabus.

SOLAPUR UNIVERSITY, SOLAPUR

B.E. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - II

LAB II – PROJECT PHASE II

Teaching Scheme
Practical : 6 Hours/Week

Examination Scheme
Termwork: 100 marks
POE : 100 marks

COURSE OBJECTIVES:

1) Formulate a realistic problem statement using SDLC.
2) Follow an appropriate designing technique for further development of a project.
3) Get acquainted to work in a team.
4) Develop soft skills including presentation, writing & convincing.

COURSE OUTCOMES:

1) Define a realistic problem statement.
2) Select & apply an appropriate technique to create a design.
3) Work in teams with good coordination.
4) Present their work through oral communication & writing skills.

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1) Project – II should contain the work like Design review, Implementation details, coding, Technologies used, Testing, Task distribution. Project leader should maintain the progress register in which each members weekly contribution should be written and the guide will countersign the same.
2) A project report will be submitted as a term work document at the end of semester. Report must include References, Appendix, User manual / Technical reference manual, CD containing Project documentation, implementation, code, required utilities, Software and Manuals.
3) Every student must prepare well formatted, printed and hard bound report.

SOLAPUR UNIVERSITY, SOLAPUR

B.E. (COMPUTER SCIENCE & ENGINEERING)

SEMESTER - II

LAB-III : OPEN SOURCE TECHNOLOGY

Teaching Scheme	**Examination Scheme**
Lecture : 2 Hours /Week	**Theory:** 100 Marks
Practical : 2 Hours/Week	**Termwork:** 25 marks

COURSE OBJECTIVES:

1) Build knowledge about various Open Source Technologies prevalent in IT industry.
2) Develop cognizance about pros and cons associated with Open Source Technologies and their effects on IT organization.
3) Develop skills necessary to reap benefits of Open source Technologies in delivering cost effective and enterprise grade IT solutions.

COURSE OUTCOME :

1) Demonstrate skills in choosing a proper open source alternative to proprietary solutions.
2) Analyze IT needs and demonstrate his cognizance in deciding Open source technologies to be adopted.
3) Develop cost effective enterprise grade IT solutions leveraging Open source technologies.

SECTION I

Unit 1: OST (Open Source Technologies) Overview (3 Hrs.)

Evolution & development of OST and Contemporary technologies, Factors leading to its growth. Open Source Initiative (OSI), Free Software Foundation and the GNU Project, principle and methodologies, Indian Contexts of OST, Applications, Pros and cons of OST, Adoption of Open source Technologies in Industry.

Unit 2: Open Source Licenses (4 Hrs.)

The MIT License, The BSD License, The Apache License, v1.1 and v2.0, The Academic Free License, Application and Philosophy of MIT and BSD Licenses, GNU General Public License, GNU Lesser General Public License, The Mozilla Public License, Application and Philosophy of GNU GPL and GNU LGPL, Artistic and Creative Commons Licenses

Unit 3: Open Source Networking and Security (5 Hrs.)

Basic networking commands, Secure Configuration of Web servers, DNS servers, DHCP servers, mail Servers, NFS, FTP servers. Securing servers with iptables. Setting up Network and cryptographic services, SSL, Managing Certificate Security with OpenSSL, working with the GNU Privacy guard. (5 hrs)

Unit 4: Open Source Web servers and RDBMS (4 Hrs.)

Open Source Web servers: Installation, configuration and administration under Windows and Linux environment: of Apache, Nginx, Apache Tomcat.

Open Source RDBMS: Installation, configuration and administration under Windows and Linux environment: MySQL, PostgreSQL.

SECTION II

Unit 5: Popular Open Source Softwares **(3 Hrs.)**

Installation, customization and maintenance of Open Source Content management Systems: Drupal, Wordpress, Joomla, Umbraco, Liferay Portal, Alfresco. Installation, Customization and Maintenance of Open Source Learning
Management Systems: Moodle, ATutor, OLAT

Unit 6: Git (Open Source version control system) **(3 Hrs.)**

Introduction to Git, Installation, Getting started, Basics of Git.

Unit 7: Open source IT Systems Monitoring tools **(4 Hrs.)**

Installation, customization and maintenance of Cacti, Icinga, Nagios.

Unit 8: Open source Project Management **(4 Hrs.)**

Installation, customization and maintenance of RedMine, OpenProject, LibrePlan

Textbooks:

1) Understanding Open Source and Free Software Licensing - By Andrew M. St. Laurent, Oreily Media. e-Resource available at: http://oreilly.com/openbook/osfreesoft/book/index.html
2) Apache HTTP Server Documentation Version 2.2 by by Apache Software Foundation
3) MySQL 5.5 Reference Manual (Chapter 2 and 3 of manual) (e-Resource)
4) The Complete Guide to Linux System Administration by Nicholas Wells, Cengage Learning.
5) Official Documentation of ATutor, Moodle, Drupal, Joomla, Wordpress, Liferay Portal,
6) Alfresco, Umbraco, Redmine, Nagios, Cacti, Icinga, OpenProject, LibrePlan (e-Resources)
7) Version Control with Git Powerful tools and techniques for collaborative software development By Jon Loeliger O'Reilly Media

Reference Books:

1) BOSS Linux: http://bosslinux.in
2) (NRCFOSS) initiative of the Department of Information Technology, Ministry of Communications & Information Technology, Government of India, http://www.nrcfoss.org.in/
3) Open Source: Technology and Policy By Fadi P. Deek and James A. M. McHugh , Cambridge University Press.

Termwork

1) Minimum 2 to 3 Assignments per topic.
2) Objective of assignments should be to test students understanding and assess their ability to put into practice the concepts and terminologies learned.
3) Assignments must be of nature which require students to identify the use case scenarios for installing, deploying, maintaining various open source tools mentioned in syllabus.