SOLAPUR UNIVERSITY, SOLAPUR

FACULTY OF ENGINEERING & TECHNOLOGY

INFORMATION TECHNOLOGY

Structure & syllabus for

B.E. (Information Technology) w.e.f. Academic Year 2015-16

SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY

Structure of B.E. (Information Technology) w.e.f. from 2015-16

Semester-I

Sr. No	Name Of the Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1	Human Computer Interaction	3	-	2	5	100	25	-	-	125
2	Management Information System	3	-	2	5	100	25	-	-	125
3	Advanced Database System	4	-	2	6	100	25	50	-	175
4	Software Testing and Quality Assurance	3	-	-	3	100	25	-	-	125
5	Elective – I	3	-	-	3	100	25	-	-	125
6	C# .Net	2	-	2	4	-	25	50	-	75
7	Project – I	-	4	-	4	-	75	-	-	75
8	Vocational Training (Project based learning)	-	-	-		-	25	-	-	25
	Total	**18**	**4**	**8**	**30**	**500**	**250**	**100**	**-**	**850**

Semester-II

Sr. No	Name Of the Subject	Teaching Scheme				Examination Scheme				
		L	T	P	Total	TH	TW	POE	OE	Total
1	Information Retrieval	4	-	2	6	100	25	50	-	175
2	Mobile Computing & Application	3	-	2	5	100	25	-	-	125
3	Information Assurance & Security	4	-	-	4	100	25	-	-	125
4	Elective – II	3	2	-	5	100	25	-	-	125
5	Web Technology	2	-	2	4	-	25	50	-	75
6	Project – II	-	-	6	6	-	100	100	-	200
7	Mini project	-	-	-	-	-	25		-	25
	Total	**16**	**2**	**12**	**30**	**400**	**250**	**200**	**-**	**850**

Mini Project- in B.E. Semester-II will be based on using RDBMS tools / Open source software.

Elective – I	Elective – II
1. Fuzzy & Neural Networks	1. Data Mining & Warehousing
2. Distributed Computing	2. Pattern Recognition
3. Image Processing	3. Business Intelligence
4. Microcontroller & Embedded Systems	4.Cloud Computing

Note:-

- Term work assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction during theory and lab sessions
- The batch size for practical/tutorials shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 7 students, then a new batch may be formed. For Project the group shall be about 4 students.
- Vocational training (to be evaluated at B.E. Semester -I) of minimum 15 days should be done in vacation in part or whole from S.E. Semester -II to commencement of B.E. Semester – I and the report should be submitted in B.E. Semester -I.
- Minimum strength of the Students for Electives should be 15.
- The vocational training will be evaluated by the respective project guides.

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Semester – I

1. HUMAN COMPUTER INTERACTION

Teaching Scheme	**Examination Scheme**
Theory: 3 Hrs/Week	**Theory:** 100 Marks
Practical: 2 Hrs/Week	**Term-Work:** 25Marks

Course Objectives:

1. To get acquainted with human and computer component functions.
2. To introduce various aspects of human computer interface design consideration.
3. To have hands on experience using design rules, implementation supports, and evaluation techniques

Course Outcomes:

Student will be able to

1. Apply knowledge of human components functions regarding interaction with computer.
2. Apply design rules, produce implementation supports and use evaluation techniques.
3. Analyze and design human computer interfaces.

SECTION-I

Unit 1: Introduction to HCI (6 Hrs)

Human – input output channels, human memory, Thinking, Emotion, Individual differences, psychology and the design of interactive systems; Computer – text entry devices, Positioning pointing and drawing, display devices, devices for virtual reality and 3D interaction; Interaction – models of interaction and interaction styles

Unit 2: **Principles and Guidelines (7 Hrs)**

Paradigms for interaction – Time sharing, video display units, Programming toolkits, Personal computing, The metaphor, Direct manipulation, Language versus action, Hypertext, Multi-modality, agent based interfaces, Ubiquitous computing, Sensor-based and context-aware interaction.

Unit 3: Design Process (8 Hrs.)

Interaction design basics – the process of design, User focus, Navigation design, Screen design and layout, iteration and prototyping; HCI in the software process – software life cycle, Usability engineering, iterative design and prototyping, design rationale; design rules – principles to support usability, standards, golden rules and heuristics, HCI patterns

SECTION II

Unit 4: Implementation Support and Evaluation techniques (6 Hrs.)

Elements of windowing systems, programming the application, Using toolkits, user interface management systems; Evaluation – what is evaluation, goals of evaluation, evaluation through expert analysis and user participation, choosing an evaluation method.

Unit 5: Models for HCI **(6 Hrs.)**

Cognitive models – introduction, goal and task hierarchies, Linguistic models, Cognitive Architectures; Socio-organizational issues and stakeholder requirements – organizational issues, capturing requirements; Communication and collaboration models.

Unit 6: **Theories for HCI** **(10 Hrs.)**

Task analysis – differences between task analysis and other techniques, task decomposition, knowledge based analysis, uses of task analysis; Dialog notations and design – what is dialog, dialog design notations, diagrammatic notations, textual dialog notations, dialog semantics, dialog analysis and design; Models of the system – Interaction models, Continuous behavior; Modeling rich interaction – Status event analysis, Rich contexts, low intention and sensor-based interaction.

Text Books:

1. Human-Computer Interaction, 3rd edition, by Dix, Finlay, Abowd and Beale, Prentice Hall, 2003.

References:

1. Human Computer interaction, 2/e Alan J Dix, Janet E. Finlay, G.D. Abowd and Rusell Beale,Prentice Hall.
2. Designing the user interface Ben shnelderman, Pearson Education Asia.
3. Elements of User interface design Theo Mandel, JW and Son.
4. Essential Guide To User Interface Design Willbert Galitz, JW.

Assignments:

1. Investigate and try to solve the problem with principle of human computer interaction.
2. How to applying relevant principles appropriately to particular situations.
3. How to design to match human perception, attention, memory and thinking processes.
4. How to carry out a task analysis.
5. How to specify a GOMS (goals, operators, methods and selection) model & use it to estimate interaction.
6. How to describe an interaction in the form of an STN (State Transition Networks).
7. How to choose appropriate evaluation methods and analysis.
8. Relevant interaction issues in some specific areas: e.g. agents; websites, ubiquitous computing.

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Semester – I

2. MANAGEMENT INFORMATION SYSTEMS

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

Examination Scheme
Theory: 100 Marks
Term-work:25 Marks

Course Objectives:

1) To get acquainted with the basic infrastructure and strategy for information systems.
2) To introduce the communication technology required for IT.
3) To have hands on experience on building and managing corporate information system.

Course Outcomes:

Student will

- get acquainted with the basic infrastructure and strategies used in information systems.
- Analyze requirements and design information systems using principles of communication technologies.
- Be able to implement the previously created designs as models of information systems.

SECTION-I

Unit 1: **Information Systems in Global &E-Business** **(4 Hrs)**

Information Systems in Global Business, Global E-Business: How Businesses Use Information Systems

Unit 2: Information Systems, Organizations, and Strategy **(4 Hrs)**

Ethical and Social Issues in Information Systems

Unit 3: Information Technology Infrastructure **(6 Hrs)**

IT Infrastructure and Emerging Technologies
Foundations of Business Intelligence: Databases and Information Management

Unit 4 : Communication in IT **(6 Hrs)**

Telecommunications, the Internet and Wireless Technology
Securing Information Systems, information system security and control.

SECTION-II

Unit 5: Key System Applications for the Digital Age **(8 Hrs)**

Key System Applications for the Digital Age , Achieving Operational Excellence and Customer Intimacy: Enterprise Applications E-Commerce: Digital Markets, Digital Goods

Unit 6: Knowledge Management Techniques (5 Hrs)
Knowledge Management Techniques Managing Knowledge Enhancing Decision Making

Unit 7 : Building and Managing Systems (7 Hrs)
Building and Managing Systems Building Information Systems Project Management: Establishing the Business Value of Systems and Managing Change Managing Global Systems

Textbook :

1. Management Information Systems : Managing the Digital Firm , 10th edition, Laudon&Laudon , Pearson Education
2. Management Information Systems : Sashikala Parimi ,Kogent Learning SolutionsInc.

Reference Books :

1. Information Technology for Management: Transforming Organizations in the Digital Economy, Efraim Turban,6th Edition, Wiley Edition

2. Management Information Systems: Shubhalakshmi Joshi, Smita Vaze, biztantra

Practical:
Students should design & develop a MIS for an Institution or Industry, using the principles covered in theory

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Semester – I

3. ADVANCED DATABASE SYSTEMS

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

Examination Scheme
Theory : 100 Marks
Term-Work: 25 Marks
Practical/Oral Exam : 50 Marks

Course Objectives:

1. To introduce different databases like distributed, parallel & object oriented databases.
2. To get acquainted with Query processing and its phases including query optimization.
3. To illustrate data mining & warehousing with OLAP implementations.
4. To demonstrate Bigdata with Hadoop & its components.

Course Outcomes:

After the completion of this course the students will be able to-

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+
6. .

SECTION- I

Unit 1 : Database Systems architectures **(12 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 **(8 Hrs)**

Intruduction, I/O parallelism, Interquery parallelism, Intraquery parallelism, Intraoperation parallelism, Interoperation parallelism.

Unit 3: Data Analysis and Mining **(10 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, Table Inheritance, Array and Multisets Types in SQL, Object Identity and Reference Types in SQL, Object Oriented DBMS versus Object Relational DBMS

Unit 5. Query Processing and Optimization: **(10 Hrs)**

Overview of Query Processing, Measures of query coat, Selection operation, joins operation, other operation, Overview of Query optimization, Transformation of Relational Expressions, Estimating Statistics of Expression Results, Choice of Plan and Summary.

Unit 6. Introduction to Bigdata: **(10 Hrs)**

Bigdata basics, NoSQL, New SQL, Hadoop and its components. Introduction to MongoDB,

Text Books :

1. Database System Concepts – Abrham Silbertschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
2. Database Management Systems Third Edition, by Raghu Ramakrishan and Johannes Gehrke, Mc Grawhill Education.

References:

1. Hadoop definitive guide - Tom White , Doug Cutting, O'relly publication
2. MongoDB definitive guide- Kristina Chodorow, O'Reilly publication

Practical Assignments:

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

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Semester – I

4. SOFTWARE TESTING AND QUALITY ASSURANCE

Teaching Scheme
Lecture: - 3 Hrs/Week

Examination Scheme
Theory – 100 Marks
Term-Work – 25 Marks

Course Objectives:

Student should be able

1. To gain knowledge of the software testing process, various methods of testing, levels of testing.
2. To learn generation and execution of test plan, cases & scripts.
3. To get acquainted with software quality concepts, assurance & standards.
4. To get acquainted with manual and automatic software testing tools.
5. To validate and verify software using measures correctness, completeness and quality of software.

Course Outcomes:

At the end of the course, student will be able to,

1. Detect and rectify software bugs.
2. Test software to meet requirements of quality.
3. Generate test cases and plans.
4. Assess software quality and assurance based on standards.
5. Use testing tools to test software in order to improve test efficiency.

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.

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Semester – I

5. ELECTIVE I : 1. FUZZY & NEURAL NETWORKS

Teaching Scheme	Examination Scheme
Lectures: 3 Hrs/week	**Theory:** 100 Marks
	Term work : 25 Marks

COURSE OBJECTIVES

Students undergoing this course are expected :

1. To be acquainted with the concept of fuzziness involved in various systems.
2. To be provided adequate knowledge about fuzzy set theory.
3. To be provided comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic
4. To be provided adequate knowledge of application of fuzzy logic control to real time systems.
5. To be exposed the concepts of feed forward neural networks.
6. To be provided adequate knowledge about feedback neural networks.

COURSE OUTCOMES

After undergoing the course, Students will be able to

1. Implement numerical methods in soft computing
2. Apply the fuzzy set theory
3. Apply derivative based and derivative free Optimization
4. Apply the neural networks and supervised and unsupervised learning networks
5. Comprehend neuro-fuzzy modeling
6. Demonstrate some applications of computational intelligence

SECTION-I

Unit 1: Classical and fuzzy sets: **(10 Hrs.)**

Introduction, Operations and Properties, Fuzzy Relations: Cardinality, Operations and Properties, Equivalence and tolerance relation, Value assignment: cosine amplitude and max-min method; Fuzzification: Membership value assignment- Inference, rank ordering, and angular fuzzy sets. Defuzzification methods, Fuzzy measures, Fuzzy integrals, Fuzziness and fuzzy resolution; possibility theory and Fuzzy arithmetic; composition and inference; Considerations of fuzzy decision-making

Unit 2: Basic structure and operation of Fuzzy logic control systems: (8 **Hrs.**)
Design methodology and stability analysis of fuzzy control systems, Fuzzy databases and quantification.

Unit 3: fuzzy control (6 **Hrs.**)
Designing fuzzy logic controller, Applications of Fuzzy controllers. Applications of fuzzy theory

SECTION-II

Unit 4: Evolution of neural networks: (8 **Hrs.**)
Artificial Neural Network: Basic model, Classification, Feed forward and Recurrent topologies, Activation functions; Learning algorithms: Supervised, Un-supervised and Reinforcement; Fundamentals of connectionist modeling: McCulloach – Pits model, Perceptron, Adaline, Madaline.

Unit 5: Topology of Multi-layer perceptron : (8 **Hrs.**)
Back propagation learning algorithm, limitations of Multi-layer perceptron. Radial Basis Function networks: Topology, learning algorithm; Kohenen's self-organising network: Topology, learning algorithm; Bidirectional associative memory Topology, learning algorithm, Applications

Unit 6: Recurrent neural networks: (8**Hrs.**)
Basic concepts, Dynamics, Architecture and training algorithms, appllications; Hopfield network: Topology, learning algorithm, Applications; Industrial and commercial applications of Neural networks: Semiconductor manufacturing processes, Communication, Process monitoring and optimal control, Robotics, Decision fusion and pattern recognition

Text Books
1. Limin Fu, *"*Neural Networks in Computer Intelligence,*"* McGraw Hill, 2003.
2. Timothy J. Ross, *"*Fuzzy Logic with Engineering Applications*,"* Wileyl,2014. Third edition

References:
1. Fakhreddine O. Karray and Clarence De Silva., "Soft Computing and Intelligent Systems Design, Theory, Tools and Applications*,"* Pearson Education, India, 2009.
2. B.Yegnanarayana, "Artificial Neural Networks,*"* PHI, India, 2006. Rao, Vallinu B.,and Rao, Hayagriva . Neural networks and fuzzy Logic, second edition, BPB Publication
3. Berkan C. Riza, Trubatch L, Sheldon, Fuzzy Systems design Principles. IEEE Press , standard publishers distributers
4. Freeman A. James, Skapura M. David- neural networks algorithms, applications and programming Techniques, Pearson Education
5. S.N.Sivanandam, s. sumathi, S.N.Deepa, Introduction to Neural Networks using Matlab 6.0 McGraw Hill, 2014.
6. Satish Kumar, Neural Networks-A Classroom Approach, McGraw Hill, 2014

Term Work:
Term work should consist of hands on experience of at least one Tool/ Package supporting Fuzzy Systems & Neural Networks.

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Semester – I

5. ELECTIVE- I 2. DISTRIBUTED COMPUTING

Teaching Scheme
Lectures : 3 Hrs/Week

Examination Scheme
Theory : 100 Marks
Term Work : 25 Marks

Course Objective:

1. To introduce the distributed environment through the design of DOS.
2. To learn Message Passing & Remote Procedure Calls with its architecture.
3. To study different synchronization techniques through process management.
4. To learn the Distributed File System environment.

Course Outcomes:

After completion of the course the students will be able to

1. Differentiate between Distributed Operating System & other OS.
2. Implement Process Synchronization Through RPC & Message Passing.
3. Detect & prevent deadlocks using different algorithms.
4. To manage files in Distributed environment.

SECTION – I

Unit 1: Fundamentals : **(7 Hrs)**

Distributed Computing System, its models, Popularity, Distributed operating System, Issues in Designing Distributed Operating system

Unit 2: Message Passing: **(8 Hrs)**

Introduction,Desirable features,Synchronization,Buffering,MultidatagramMessages,Encoding & Decoding of Message data, Failure handling, Group communication:one to Many, many to one

Unit 3 : Remote Procedure Calls **(7 Hrs.)**

Introduction, RPC Model, RPC mechanism, Stub generation,RPC messages, Marshaling arguments & results, communication Protocols for RPCs client server binding , Exception Handling

SECTION-II

Unit 4 : Process Management: **(8 Hrs.)**

Introduction, Process migration, its desirable features, Process migration mechanisms,advantages of process migration, Threads, models for thread organization, Thread synchronization & scheduling.

Unit 5 : Synchronization in distributed Systems : **(7 Hrs.)**

Clock Synchronization, Event ordering,Mutual Exclusion,Deadlock,Election Algorithms

Unit 6. Distributed File Systems : **(7 Hrs)**

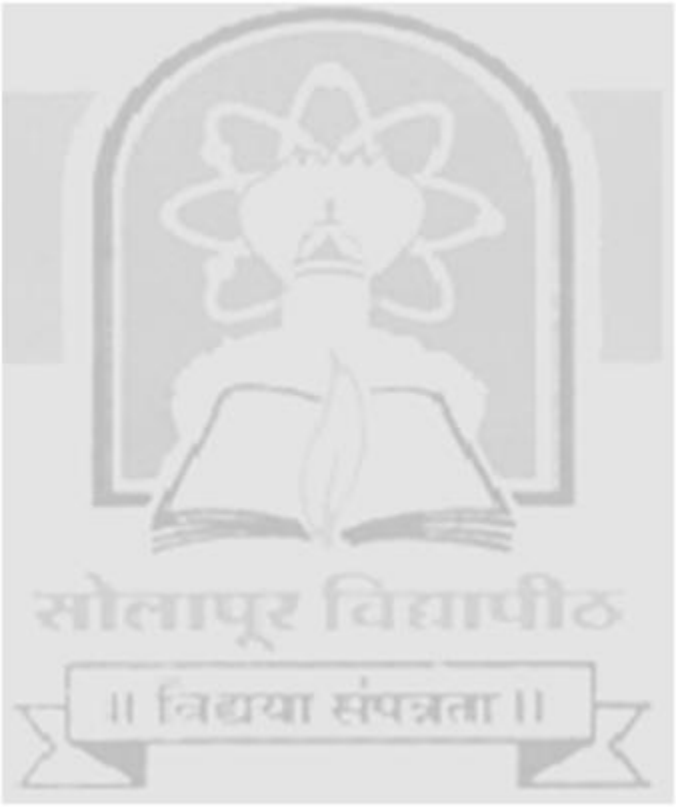
Introduction,Desirable features of DFS,File models,File accessing models,File-Sharing semantics,File-caching schemes,File replication,Fault Tolerance.

Books :

1. Distributed Operating Systems – concepts & design – P.K. Sinha(PHI)

Reference Books:

1. Distributed Systems – Principles & Paradigms… A.S. Tanenbaum & Maarten Van Steen (PHI)



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Semester – I

5.ELECTIVE – I 3. IMAGE PROCESSING

Teaching Scheme
Lectures: 3 Hrs/week

Examination Scheme
Theory: 100 Marks
Term Work: 25 Marks

Course Objectives:

1. To acquaint students with image fundamentals representation and processing elements
2. To learn different image transforms.
3. To learn image enhancement techniques.
4. To learn image compression and restoration methods.
5. To learn image segmentation techniques.

Course Outcomes:

After completion of the course students will be able to

1. Apply different transforms to images.
2. Enhance images using different masks.
3. Restore original image using different techniques.
4. Compress image using lossy or lossless compression techniques.
5. Segment images and find edges or regions.
6. Find different image descriptors.

SECTION - I

Unit 1: Introduction: (**2 Hrs.**)

Digital Image Representation, Fundamental steps in Image Processing, Elements of Digital Image Processing systems.

Unit 2 : Digital Image Fundamentals (3 **Hrs.**)

Elements of Visual Perception, A Simple Image Model, Sampling and Quantization, Some basic relationship between Pixels, Image Geometry, Photographic Film.

Unit 3 : Image Transforms (6 **Hrs.**)

Introduction to the Fourier Transform, The Discrete Fourier Transform, Some properties of the Two Dimensional Fourier Transform, The Fast Fourier Transform, Other Separable Transforms, The Hotelling Transforms.

Unit 4 : Image Enhancement: (7 **Hrs.**)

Background, Enhancement by Point Processing, Spatial Filtering, Enhancement in the Frequency Domain, Generation of Spatial Mask from Frequency Domain Specification, Color Image processing.

Unit 5 : Image Restoration (6 **Hrs.**)
Degradation Model, Diagonalixation of Circulant and Block Circulant Matrices, Algebraic approach to Restoration, Inverse Filtering, Least Mean Square (Wiener) Filter, Constrained Least Squares Restoration, Interactive Restoration, Restoration in the Spatial Domain, Geometric Transformations.

SECTION - II

Unit 6 : Image Compression (6 **Hrs.**)
Fundamentals, Image Compression Models, Image Compression Models, Elements of Information Theory, Error Free Compression, Lossy Compression, Image Compression Standards.

Unit 7: Image Segmentation (8 **Hrs.**)
Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation, The use of Motion in Segmentation.

Unit 8 : Representation and Description: (7 **Hrs.**)
Representation Schemes, Boundary Descriptors, Regional Descriptors, Morphology, and Relational Descriptors.

Text Books:

1. R.C. Gonzalez, R.E.Woods, Digital image processing, Pearson Education India, Third Edition, 2002.
2. Anil K. Jain, Fundamentals of digital image processing, Prentice Hall of India.

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Semester – I

5. ELECTIVE-I : 4. MICROCONTROLLER AND EMBEDDED SYSTEMS

Teaching Scheme
Lectures: 3 Hrs/ Week

Examination Scheme
Theory: 100 Marks
Term Work : 25 Marks

Course Objectives:

1. To acquaint students with the applications of Microprocessors and Microcontrollers and the need of microcontrollers in embedded system.
2. To acquaint students with the basics of organizational and architectural issues of a microcontroller.
3. To get acquainted with the programming techniques used in microcontroller.
4. To learn interfacing of real world input and output devices.
5. To get acquainted with the basics of embedded systems and the fundamentals of real time operating system (RTOS)

Course Outcomes:

At the end of the course the students will be able to

1. Learn importance of microcontroller in designing embedded application.
2. Program microcontroller.
3. Design conceptual embedded system.
4. Develop interfacing to real world devices.

SECTION – I

Unit 1: Microprocessors and microcontroller. (5 Hrs)

Introduction, Microprocessors and Microcontrollers, RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture, Computer software.

The 8051 Architecture, Pin diagram of 8051, Memory organization, External Memory interfacing, stacks.

Unit 2: Assembly Language Programming of 8051. (12 Hrs)

Introduction, Instruction syntax, Data types, Subroutines, Addressing modes;
8051 instructions: Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction;
Assembler directives, Assembly language programs and Time delay calculations.
8051 interrupt structure, 8051 timers/counters, 8051 Serial Communication.

Unit 3: 8051 Interfacing and Applications (4 Hrs)

Interfacing 8051 to LCD, Keyboard, parallel and serial ADC, sensor interfacing.

SECTION – II

Unit 4: Typical Embedded System (6 Hrs)

What is an embedded system, Major application areas and purpose of embedded systems, Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System Components, Characteristics and Quality Attributes of Embedded Systems.

Unit 5: Hardware Software Co-Design and Program Modelling (5 Hrs)

Fundamental Issues in Hardware Software Co-Design, Computational Models in Embedded Design, Introduction to Unified Modelling Language, Hardware Software Trade-offs.

Unit 6:Real-Time Operating System (RTOS) based Embedded System Design (11 Hrs)

Operating System Basics, Types of OS, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling: Putting them altogether, Task Communication, Task Synchronization, Device Drivers, How to Choose an RTOS.

Unit 7: Embedded System - Design case studies (02 Hrs)

Digital clock, Digital camera, Battery operated smart card reader, automated meter reading system.

TEXT BOOKS:

1. "The 8051 Microcontroller and Embedded Systems – using assembly and C "-, Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; PHI, 2006 / Pearson, 2006
2. "The 8051 Microcontroller", V.Udayashankar and MalikarjunaSwamy, TMH, 2009
3. Introduction to Embedded Systems:Shibu K V, Tata McGraw Hill Education Private Limited, 2009

REFERENCE BOOKS:

1. "The 8051 Microcontroller Architecture, Programming & Applications", 2e Kenneth J. Ayala ;, Penram International, 1996 / Thomson Learning 2005.
2. " Microcontrollers: Architecture, Programming, Interfacing and System Design",RajKamal, Pearson Education, 2005.
3. David E. Simon,"An Embedded Software Primer",Addison Wesley,1999.

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Semester – I

6. LAB. – PROGRAMMING IN C#.NET

Teaching Scheme	**Examination Scheme**
Lecture: 2 Hrs/week	**Term work :** 25 Marks
Practical : 2 Hrs/week	**Practical/Oral Exam:** 50 Marks

COURSE OBJECTIVES:

1. To learn .NET Programming using the C# programming language.
2. To develop basic understanding of the syntactical features of C# programming language and effective use of .NET runtime library APIs to develop robust software applications.
3. To develop ability to design and build Object Oriented concepts, GUI and Web applications on Windows platform.

COURSE OUTCOMES:

At the end of the course, student will be able to

1. Use .NET Framework in building robust software applications using C# programming language.
2. Design and develop Object Oriented concepts, GUI and Web application on Windows platform.

SECTION- I

Unit 1: Introduction to .NET Framework (2 Hrs)

The .NET architecture , The common language runtime (CLR) , Microsoft intermediate Language code (MSIL),Just in time Compliers , The framework class library, ,The common language specification, common language type system (CTS), Introduction to Visual Studio .NET and Sharp Develop IDE.

Unit 2: C# Application Basics and Language fundamentals (4Hrs)

Creating and compiling C# programs using command line compiler (csc.exe), Creating applications using IDEs, Namespaces , the “using” keyword , Basic data types, Operators, Flow control and conditional statements , loops, Arrays ,Classes and Objects, Constructor overloading, Methods, Fields, Properties, Access Modifiers and Accessibility Levels, Static methods and fields, Garbage Collection, Structures , Nested Classes, String Manipulations, Naming Conventions, Java vs. C#

Unit 3: Object Oriented Programming using C# (4Hrs)

Objects and Reference Types, Inheritance, Interfaces and Abstract Classes, Polymorphism, the “virtual” and “override” keyword, the “base ” keyword, the “sealed ” keyword, The Object Class, the “new” keyword in context of method overriding , Type Casting: Up casting and Down casting, the “is” and “as” keywords, Boxing and Unboxing,

Unit 4: Exception Handling, Events and Delegates (4Hrs)
Need for Exceptions, Exception Hierarchy, Handling Exceptions using try-catch-finally blocks, creating and defining Custom Exceptions, the "throw" keyword. Events and Delegates in C#, Multicast Delegate, Event Handling

SECTION- II

Unit 5: Multithreading and Basic IO in C# (4 Hrs)
What is Multithreading , Multithreading in C#, Static and Instances members of Thread Class, Basic Thread operations, Thread priorities, Thread Synchronization, **File System and Streams:** Streams and System.IO namespace , Console IO ,Reading writing and updating files and directories, System.IO.FileInfo Class , Serialization and Deserialization.

Unit 6: GUI Programming in C# (4 Hrs)
Windows Forms and System Windows, Form namespace, Building Windows Forms,Applications using IDE, Windows Form controls , Event Handling , List Box , Combo Box, Tree View, File Dialog, Tool Bar, Windows standard Dialog Boxes, Menu Bar, GDI+ Graphics: Drawing Lines ,shapes and images.

Unit 7: Data access using ADO.NET (4Hrs)
Introduction to ADO.NET, System Data namespace, Data Set, Data Table, Data Row, Data Column and other prominent classes, Accessing and Updating Data using ADO.NET**.**

Unit 8: Introduction ASP.NET (4Hrs)
Introduction to ASP.NET, State management in ASP.NET, ASP.NET Web Forms, Server Controls, Web application configuration, Creating Web applications using ASP.NET and C#.

Textbooks:
1 Professional C#, 3rd Edition -Simon Robinson, Christian Nagel, Karli Watson, Jay Glynn, Morgan Skinner, Bill Evjen, Wrox Press - Wiley India.
2 Programming in C#: A Primer 3 Edition -E Balagurusamy, Tata McGraw - Hill Education

Reference Books:
1 C# Language Specification Version 5.0 Microsoft. (E-Resource available at http://www.microsoft.com)
2 C# Programming Guide MSDN, Microsoft. (http://msdn.microsoft.com/en-US/)
3 Microsoft Visual C# Step by Step 2010 - John Sharp, Microsoft Press.

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Semester – I

7. PROJECT-I

Practical: 4 Hrs/week **TermWork:** 75 Marks

Course Objectives:

1. To formulate a realistic problem statement using SDLC.
2. To follow an appropriate designing technique for further development of a project.
3. To get acquainted to work in a team.
4. To develop soft skills including presentation, writing & convincing.

Course Outcomes:

After completion of the course students will be able to

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. Student will finalize his project with the guide and submit a synopsis with presentation.
2. Student should apply appropriate SDLC steps & prepare the project design.
3. Student should prepare a Project report which should preferably contain abstract, literature survey, problem definition, proposed system & design.
4. Student will have to give a seminar on the design of the project.
5. Project will be assessed by a panel of teachers appointed as guides at the institute level.

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Semester – I

8. INDUSTRY INSTITUTE INTERACTION

Term Work : 25

The student should attend an industrial 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 – II (Revised)

1. INFORMATION RETRIEVAL

Teaching Scheme
Lectures : 4 Hrs/week
Practical : 2 Hrs /Week

Examination Scheme
Theory : 100 Marks
Practical/Oral Exam : 50 Marks
Term-Work: 25 Marks

Course Objectives:

1. To acquaint students to information retrieval process and information models.
2. To introduce measures of evaluation performance of information retrieval systems.
3. To learn different querying methods.
4. To learn indexing structures for given collection of documents.
5. To study different sequential and pattern matching algorithms.
6. To learn difference in data retrieval, information retrieval and multimedia retrieval systems.
7. To learn different components of search engine and ranking algorithms.

Course Outcomes:

Students will be able to

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. To design and develop information retrieval systems.

SECTION – I

Unit 1 : Information Retrieval & IR Models (12 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 (**10 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 (**7 Hrs.**)
Data Modelling & Query Languages

Unit 5: Multimedia IR - Indexing and Searching (**6 Hrs.**)
Spatial Access Methods, A generic multimedia indexing approaches, One dimensional time series, Two Dimensional color images, Automatic Feature Extraction.

Unit 6: Web Retrieval (**9 Hrs**.)
Search Engines, Web Crawling, Browsing, Metasearchers, Searching using Hyperlinks

Unit 7: Digital Libraries (**4 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 Books:

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

Practical Assignments:

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

2. MOBILE COMPUTING & APPLICATION

Teaching Scheme
Lectures:3 Hrs/week
Practical :2 Hrs /week

Examination Scheme
Theory :100 Marks
Term work : 25 Marks

Course objective :

1. To get acquainted with basic of wireless and mobile technology
2. To introduce advanced concepts of GSM (3G ,4G)
3. to get in depth knowledge mobile communication system

Course Outcome :

At the end of the course

1. A Student will get acquainted with basic of wireless and mobile technology
2. A student will be able to design modulation techniques
3. A student will be able to design different sensor,Adhoc and wireless network

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SECTION - I

Unit1: Mobility: **(4 Hrs)**

Issues, challenges, and benefits; Review of mobile and cellular communication technology; ubiquitous computing.

Unit2: Principles of Wireless Communication **(10 Hrs)**

Signals, Antennas, Digital modulation techniques ,Linear modulation techniques ,Spread spectrum modulation ,Performance of modulation ,Multiple access techniques ,TDMA ,FDMA ,CDMA ,SDMA ,Overview of cellular networks ,Cellular concept ,Handoff strategies ,Path loss ,Fading and Doppler effect.

Unit 3: Global System for 3G and 4G Mobile Communication (GSM) System Overview: **(10 Hrs)**

GSM Architecture, Mobility Management, Network Signaling, GPRS ,WCDMA, Wi MAX, LTE, Mobility management and handover technologies

Unit 4:Mobile IP Networks **(6 Hrs)**

Physical mobility, challenges, limits and connectivity, mobile IP (IPv4 ,IPv6) and cellular IP in mobile computing

SECTION II

Unit 5: Mobile Transport Layer: **(6 Hrs)**
Transport layer issues in wireless, Indirect TCP, Snoop TCP, Mobile TCP

Unit 6: Wireless LANs: **(8 Hrs)**
Issues and challenges of wireless networks ,Location management ,Resource management ,Routing ,Power management ,Security ,Wireless media access techniques ,ALOHA ,CSMA ,Wireless LAN ,MAN ,IEEE 802.11 (a,b,e,f,g,h,i) ,Bluetooth

Unit 7: Mobile Adhoc Networks: **(10 Hrs)**
Mobile networks , Ad,hoc networks ,Ad,hoc routing ,Sensor networks ,Peer,Peer networks Mobile routing protocols ,DSR , AODV ,Reactive routing ,Location aided routing , Mobility models ,Entity based ,Group mobility ,Random way ,Point mobility model

Unit 8: Simulation **(6 Hrs)**
Designing and evaluating the performance of various transport and routing protocols of mobile and wireless networks using network simulator (any one)

Text Book:

1. Jochen Schiller
   Mobile Communication,Pearson Education

2. U. Hansman and L. Merck.
   Principles of Mobile Computing", 2nd Ed., Springer

References:

1. A. S. Tanenbaum.
   Computer Networks, 4th Ed., Pearson Education.
2. Milojicic, F. Douglis.
   Mobility Processes, Computers and Agents", Addison Wesley
3. Raj Kamal
   Mobile Coomputing, Oxford University Press

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Semester – II

3. INFORMATION ASSURANCE AND SECURITY

Teaching Scheme
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks
Term work: 25 Marks

Objectives:

1. To get acquainted with the fundamental concepts of Network Security.
2. To learn the cryptography algorithms.
3. To know about cyber crimes and cyber laws.
4. To learn various network security tools used in cyber crime.

Outcomes: Students should be able to

1. Classify Secret and Public Key Cryptography
2. Implement cryptography algorithms.
3. Illustrate Security protocols for Network and Transport layer.
4. Apply and design security prevention and detection techniques.
5. Experiment various tools and methods used in cyber crime.

SECTION - I

Unit 1 : Security Fundamentals (6 Hrs.)

Overview – Services, Mechanism and Attacks, the SI Security. Architecture, A model for Network Security. Basics of Cryptography (BZ)Preliminaries ,Elementary Substitution Ciphers, Elementary Transposition Ciphers ,Cipher Properties: Confusion and Diffusion , Block and Stream Ciphers.

Unit 2 : Secret Key Cryptography (6 Hrs.)

Product Ciphers, DES Construction: Fiestel Structure, Round Structure, Modes of Operation, MAC and Other Applications, Attacks , Linear Cryptanalysis

Unit 3: Public Key Cryptography and Key Management (6 Hrs.)

Principles of Public Key Cryptosystems, RSA: Operations, Why does RSA Work? Performance, Applications, Key management: Diffiee Hellman Key Exchange Digital Certificate, Public Key Infrastructure One Way Authentication, Mutual Authentication, Kerberos

Unit 4: IPSec at Network and Security at Transport Layer (6 Hrs.)

Security at different layers: pros and cons, IPSec Protocols: AH and ESP, Tunnel Mode ,Transport mode , IKE- Internet Key Exchange Protocol., SSL -Introduction Handshake Protocol, SSL Record Layer Protocol

SECTION - II

Unit 5: Security Prevention and Detection (4 Hrs.)

Intrusion Detection System: Introduction, Anomaly Based, Signature Based, Host Based, Network Based Systems, Firewall – Basics, Functionality. Access control List, Firewall Types.

Unit 6: Cyber Crime and Cyber Law (4 Hrs.)

Cyber Crime: Introduction, Cyber crime and Information Security, Classification of cybercrimes. Information Technology Act 2000, Positive aspects of ITA 2000, Weakness of ITA 2000.

Unit 7: Tools and Methods used in Cyber Crime (4 Hrs.)

Introduction, Proxy Servers and Anonymizers, Phishing, Password cracking, Key loggers and spyware, Virus Worms, Trojan Horse and Backdoors, Steganography, Attacks on Wireless Network.

Unit 8:Security standard (4 Hrs.)

Security Management: ISO 27001 Security Standard: Introduction, Evolution of standard, Organizational Context, Implementation, security certification, Benefits.

Text Books:

1. Willaim Stallings, "Computer Security: Principles and Practices", Pearson Ed. ISBN :978-81-317-3351-6 (Chapter 1,3)
2. Bernard Menezes, "Network Security and Cryptography", Cengage Learning, ISBN-978-81-315-1349-1 (Chapter 2,3,4,7)
3. Nina Godbole, "Cyber Security-Understanding Cyber crimes Computer Forensics and Legal Perspectives" (Chapter 6)

Reference Books :

1. Nina Godbole, "Information Systems Security", Wiley India Pvt Ltd, ISBN -978-81-265-1692-6 (Chapter 8)

Assignments:

These assignments have to be written in Journal with report and snapshots of tools.

1. Study and Implementation of Encryption Techniques.
2. Study and Implementation of Cryptography Algorithm.
3. Case Study: Study of Firewall (College Network or any organization)
4. Case Study: Study of Intrusion Detection system /Tool .
5. Configure and demonstrate use of IDS tool such as snort.
6. Configure and demonstrate use of recent free Traffic monitoring tool with security perspective.
7. Configure and demonstrate use of vulnerability assessment tool such as NESSUS
8. Case study :Study of Email Spoofing Instances
9. Case Study :Mini Cases in Cybercrime(Financial Frauds, Hacking, Credit card frauds)

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Semester – II

4. ELECTIVE II: 1. DATA MINING & WAREHOUSING

Teaching Scheme	**Examination Scheme**
Lectures: 3hrs/week	**Theory:** 100 Marks
Tutorial : 2 hrs/week	**TW :** 25 Marks

COURSE OBJECTIVES

Students undergoing this course are expected to:

1. Differentiate On Line Transaction Processing and On Line Analytical processing
2. Learn Multidimensional schemas suitable for data warehousing
3. Be acquainted with various data mining functionalities
4. Inculcate knowledge on data mining query languages
5. Study data mining algorithms

COURSE OUTCOMES

After undergoing the course, Students will be able to

1. Design a data mart or data warehouse for any organization
2. Develop skills to write queries using DMQL
3. Adapt to new data mining tools
4. Extract knowledge using data mining techniques
5. Explore recent trends in data mining such as web mining, spatial-temporal mining

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SECTION-I

Unit 1: Introduction **(6 Hrs)**

Data Warehousing and Introduction to data mining basic elements of data warehousing, Data warehousing and OLAP.

Unit 2: Data model development for Data Warehousing **(8 Hrs)**

Business model, selection of the data of interest, creation and maintaining keys, modeling transaction, data warehousing optimization. Data warehousing methodologies: Type and comparisons.

Unit 3: Data Mining techniques (10 Hrs)

Knowledge discovery in databases (KDD) environment, Data mining algorithms, classification, Decision- Tree based Classifiers clustering, association Association-Rule Mining Information Extraction using Neural Networks. Visualization : Data generalization and summarization-based characterization, Analytical characterization: analysis of attribute relevance, mining class Comparison, Discriminating between classes, mining descriptive statistical measures in large database

SECTION-II

Unit 4: Data mining primitives, languages & system architectures (7 Hrs)

Data mining primitives, Query language, designing GUI based on a data mining query language, architectures of data mining systems. Spatial mining, temporal mining.

Unit 5: Web mining (7 Hrs)

Web content mining, web structure mining, web usage mining classifying web pages, extracting knowledge from the web

Unit 6: Application and trends in data mining (7 Hrs)

Applications, systems products and research prototypes, multimedia data mining, indexing of multimedia material, compression, space modeling.

Text Books

1. Paulraj Ponniah, ―Web warehousing fundamentals – John Wiley. 2nd Edition,2014
2 Han, Kamber, ―Data mining concepts and techniques, Morgan Kaufmann

References:

1. Imhoff, Galemmo, Geiger, ―Mastering data warehouse design, Wiley DreamTech
2. Gordon S. Linoff, Michael J.A.Berry, Data Mining Techniques, Third edition-Wiley,2014
3. M. H. Dunham, ―Data mining introductory and advanced topics – Pearson education
4. Jiawei Han & Micheline Kamber --Data Mining – Concepts and Techniques Harcourt India.
5. Margaret H Dunham Data Mining Introductory and advanced topics –, Pearson Education
6. Arun K Pujari Data Mining Techniques –, University Press.
7. Sam Anahory & Dennis Murray Data Warehousing in the Real World –. Pearson Edn
8. Paulraj Ponnaiah Data Warehousing Fundamentals – Wiley Student Edition.
9. Ralph K- The Data Warehouse Life cycle Tool kit –Imball Wiley Student Edition

Term Work:

Term work should consist of hands on experience of at least one Tool/ Package supporting data Mining & Warehousing Techniques.

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Semester – II

4. ELECTIVE – II : 2. PATTERN RECOGNITION

Teaching Scheme	**Examination Scheme**
Lectures : 3 Hrs/week	**Theory :**100 Marks
Tutorial : 2Hrs/week	**Term work** : 25 Marks

Course Objectives:

1. To acquaint students with the principles of pattern recognition
2. To learn different decision functions.
3. To learn pattern classification based on different functions.
4. To learn trainable pattern classifier.
5. To learn pattern preprocessing and feature selection

Course Outcomes:

Students will be able to

1. Identify and analyze patterns from the real world data.
2. Implement techniques for pattern classification.
3. Implement techniques for pre-processing feature selection and syntactic pattern recognition

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SECTION – I

Unit 1. Introduction : **(5 Hrs.)**

The Information-Handling Problem , Basic Concepts of Pattern Recognition, Fundamental Problems in Pattern Recognition System Design, Design Concepts and Methodologies ,Examples of Automatic Pattern Recognition Systems, A Simple Automatic Pattern Recognition , Model

Unit 2. Decision Functions : **(5 Hrs.)**

Introduction ,Linear Decision Functions Generalized Decision Functions ,Pattern Space and Weight Space, Geometrical Properties, Implementation of Decision Functions, Functions of several variables.

Unit 3: Pattern Classification by Distance Functions: **(5 Hrs.)**

Introduction, Minimum-Distance Pattern Classification, Cluster Seeking, Unsupervised Pattern Recognition.

Unit 4: Pattern Classification by Likelihood Functions: **(6 Hrs.)**

Introduction, Pattern Classification as a Statistical Decision Problem, Bayes Classifier for Normal Patterns, Error Probabilities, A Family of Important Probability Density Functions, Estimation of Probability Density Functions.

SECTION – II

Unit 5: Trainable Pattern Classifiers-The Deterministic Approach: (**6 Hrs.**)
Introduction, The Perceptron Approach, Derivation of Pattern Classification Algorithms, Multicategory Classification,, Learning and Generalization, The Potential Function Approach.

Unit 6: Trainable Pattern Classifiers-The Statistical Approach: (**6 Hrs.**)
Introduction, Stochastic Approximation Methods, Derivation of Pattern Classification Algorithms, The method of Potential Functions.

Unit 7: Pattern Preprocessing and Feature Selection: (**6 Hrs.**)
Introduction, Distance Measures ,Clustering Transformations and Feature Ordering Clustering in Feature Selection, Feature Selection Through Entropy Minimization Feature Selection Through Orthogonal Expansions Feature Selection Through functional Approximation, Divergence Concept, Feature Selection Through Divergence Maximization, Binary Feature Selection.

Unit 8: Syntactic Pattern Recognition: (**5 Hrs.**)
Introduction, Concepts From Formal Language Theory, Formulation of the Syntactic Pattern Recognition Problem , Syntactic Pattern Description, Recognition Grammars, Statistical Considerations, Learning and Grammatical inference, Automata as Pattern Recognizers.

Text Book:

1. Pattern Recognition Principles by Julius T. Tou, Rafael C. Gonzalez (Addison Wesley Publishing Company)

Reference Books:

1. Pattern Recognition & Image Analysis by Earl Gose & Richard Johnson Baugh Steve Jost (PHI)
2. Syntactic Pattern Recognition & Applications by K. S. FU (PHI)
3. Pattern Recognition - Statistical Structural & Neural Approaches by Robert Schalkoff (Wiley India Edition)

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Semester – II

4. ELECTIVE – II : 3. BUSINESS INTELLIGENCE

Teaching Scheme	**Examination Scheme**
Lecture: 3 hrs/week	**Theory :** 100 Marks
Tutorial: 2hrs/ week	**Term work:** 25 Marks

Course Objective:

1. To acquaint the students with advanced database techniques.
2. To develop skills to build business intelligence using data mining
3. To optimize decision making in business.

Course Outcome:

On completion of this course, student should be able to:

1. Demonstrate concepts of business intelligence and data mining.
2. Apply theoretical and practical skills to address different data types.
3. Apply data mining techniques in business context.
4. Design a data model and use relevant techniques for data analysis.
5. Implement conventional data mining software, and evaluate its strength and limitations.

SECTION – I

Unit 1 : Introduction to Business Intelligence: (6 Hrs)

Effective and timely decisions, role of mathematical models, BI architectures, ethics on BI. Introduction to data warehouse, architecture, OLAP

Unit 2 : **Decision Support System: (7 Hrs)**

Representation of decision making system, evolution of information system, definition and development of decision support system, mathematical models for decision making,

Unit 3 : Analysis of Data Mining: (8 Hrs)

Definition and applications of data mining, data mining process, analysis methodologies, data preparation, data validation, data transformation, data reduction, data exploration, Univariate analysis, Bivariate analysis, Multivariate analysis.

SECTION - II

Unit 4 : Machine learning and Data analysis: (7 Hrs)
Regression, simple and multiple regression, validation of regression models, time series, evaluating and analysis of time series, exponential smoothing models, autoregressive models,.

Unit 5 : Data mining Techniques for BI: (10 Hrs)
classification and its problems, evaluating classification models, classification trees, Bayesian methods, neural networks, structure of association rules, Apriori algorithm, general association rules, clustering methods, partition methods and hierarchical methods

Unit 6 : Business Intelligence Applications: (7 Hrs)
Marketing models: Relational marketing, Salesforce management, Business case studies, supply chain optimization, optimization models for logistics planning, revenue management system, Logistics business case studies

Text Book:

1. Business Intelligence Data mining and optimization for Decision making by Carlo Vercellis, ISBN:978-81-265-4188-1, Wiley Publication
2. Data Mining and Business Intelligence by S.K. Shinde and Uddagiri Chandrashekhar

Reference Books:

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

Term work assessment shall be a continuous process based on student's performance in – class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction during theory

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Semester – II

4. ELECTIVE-I: 4. CLOUD COMPUTING

Teaching Scheme
Lectures: 3Hrs/Week
Tutorial: 2Hrs/Week

Examination Scheme
Theory: 100 Marks
Term work: 25 Marks

Course Objectives :

The main objective of this course is:

1. To provide students with a sound foundation of the Cloud Computing .
2. To enable students to learn Cloud Computing services and tools in real life scenarios.
3. To enable students to explore cloud computing driven commercial systems.
4. To acquaint students with Services and other business cloud applications.

Course Outcome :

Students are able

1. To differentiate cloud computing services.
2. To demonstrate the core issues of cloud computing.
3. To select the appropriate technologies, algorithms, and approaches for specific problems.

SECTION-I

Unit 1: Introduction to Cloud Computing **(6 Hrs)**

Definition, cloud computing defined, The SPI framework for cloud computing, The traditional Software Model, The cloud service delivery model, cloud deployment models, key drivers to adopting the cloud, the impact of cloud computing on users, governance in the cloud, barriers to cloud computing adoption in the enterprise.

Unit 2: Infrastructure security **(5 Hrs)**

The network level,the host level,the application level,Data security & storage,aspects of data security,data security mitigation ,provider data and its security.

Unit 3: Identity and Access Management **(7 Hrs)**

IAM challenges, IAM definitions, IAM architecture and practice. getting ready for the cloud, IAM standards and protocols for cloud services,IAM practices in the cloud,Cloud Authorization Management, Cloud Service provider.

Unit 4 : Security Management in the cloud (6 Hrs)

Security management standards, Security management in the cloud, Availability Management, Saas Availability Management, Paas Availability Management, Iaas Availability Management, Access control, Security Vulnerability,Patch, and Configuration management

Section-II

Unit 5: Privacy (6 Hrs)

What is Privacy, What is the data life cycle, key privacy concerns in the cloud, responsible for protecting privacy, changes to privacy risk management, compliance in relation to cloud computing,legal and regulatory implications, international laws and regulations

Unit 6: Cloud certifications and audit (5 Hrs)

Certifications, ISO 9000 family of certifications, ISO 27000 and ISMS family of certifications, CMMI certifications, Cloud Audit framework, systrust,webtrust,SAS70,cloud auditing requirement Internal audit requirement, customer audit requirement, government audit requirements

Unit 7: Application Development for cloud (6 Hrs)

developing on-premise versus cloud applications, modifying traditional applications for deployment in the cloud, stages during the development process of cloud applications, managing a cloud application, using agile software development for cloud applications, static code analysis for cloud applications, developing synchronous and asynchronous cloud applications

Textbook :

1. Cloud Security and privacy An enterprise perspective on risks and compliances, by Tim mather, Subra Kumaraswamy, and Shahed Latif, SPD O'EEILLY.
2. Cloud Computing: Black Book, by Kalish Jayaswal, J. Kallakurchi, Donald J. Houde, Dr.Deven Shah Kogent learning Solutions Inc. , Dreamtech press.

Reference Books :

1. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India
2. Enterprise Cloud Computing by Gautam Shroff,Cambridge

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Semester – II

5. WEB TECHNOLOGY

Teaching Scheme
Lectures:2Hrs / Week
Practical : 2 Hrs/Week

Examination Scheme
Term Work: 25 Marks
Practical/Oral Exam : 50 Marks

Course Objectives:

1.To study the architecture of WWW, HTTP, web clients, web servers and session management.
2.To acquire skills of Web designing and development.
3. To acquire skills to develop dynamic website by using Web Technologies.
4.To acquire skills to develop light weight and efficient web applications.

Course Outcome:

Students will be

1.Acquainted with basics of web and its component.
2.Design and develop a website .
3. To develop dynamic website by using web technologies .
4.Able to develop efficient and light weight web applications.

Unit 1 : Web Essentials (2 Hrs)

Clients, Servers, and Communication. The Internet-Basic Internet Protocols -The World Wide Web-HTTP request message-response message-Web Clients Web Servers, Static and Dynamic Websites, Concept of 2,3Tier Architecture, Session Management.

Unit 2 : HTML,HTML5, CSS (4 Hrs)

HTML features, syntax , Lists, Links, Tables, Frames, Forms , Color and images, multimedia, HTML 5 Features, Elements. CSS basics, Style definitions, CSS values and Units, CSS inheritance and Cascade, layouts.

Unit 3 : JAVASCRIPT and AJAX (6 Hrs)

JavaScript introduction, form validation, DHTML, AJAX: Introduction, XMLHttp, Request, Response, Events, Example. JQuery: Introduction, Syntax, Selectors, Events, Effects, Get, Set, Add, Remove, CSS, Example

Unit 4 :XML Primer: (4Hrs)

Introduction, Benefits, components of XML, XML schemas DTD, Parsing XML, XQuery, XML Technologies & applications viz. ECommerce, XLS: Overview, applications and programming with XLS.

Unit 5 : Node.js **(6Hrs)**

Installing Node.js, Node's Event Loop, Alternatives to Node.js, Writing asynchronous code,Understanding built-in modules,Techniques for modularizing JavaScirpt code,Using require() to modularize application code,Using npm for third-party modules,Handling Exceptions. Working with forms, Serving files Working with cookies and sessions.

Unit 6. :Web services: **(3 Hrs)**

Introduction to web services, service oriented architecture and web services, web services application scenario. Simple object access protocol (SOAP):introduction, interaction, Web services description language. Web services invocation & WSDL, Web services Description details, Service Description through WSDL. Registers: Universal description, Discovery and Inteqratron(UDDI),Introduction,UDDI nomenclature, care UDDI, Services publication, services discovery. REST and the Rebirth of HTTP, RESTful Architectural Principles.

Unit 7 : PHP and MySQL **(5Hrs)**

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

Text Books:

1. Head First HTML5 Programming, Eric Freeman,Elisabeth Robson,O'relly publications.
2. Web Technologies, Black Book, DreamTech Press.
3. HTML5 and CSS3, 2nd Edition Level Up with Today's Web Technologies
4. Designing Next Generation Web Projects with CSS3,McGraw Hill - JavaScript a Beginners Guide, Third Edition
5. Head First jQuery, Ryan Benedetti, Ronan Cranley, O'Reilly Media
6. Ruby on Rails – Timothy Fisher – Wiley India
7. Professional Node.js Building Javascript Based Scalable Software , Wrox

Reference Books:

1. RESTful Web Services - O'Reilly Media
2. Web Services – An Introduction – By B.V. Kumar, S.V. Subrahmanya Tata McGraw Hill publication

SOLAPUR UNIVERSITY, SOLAPUR

B. E. (INFORMATION TECHNOLOGY)

Semester – II

6. PROJECT-II

Practical: 6 hr/week **Term Work: 100 Marks**
POE: 100 Marks

Course Objectives:

1. To develop a solution for realistic problem using appropriate tools & technologies.
2. To use testing tools to validate & verify the project for quality assurance.
3. To develop soft skills including presentation, writing & convincing.

Course Outcomes:

After completion of the course students will be able to

1. Apply engineering knowledge for arriving at a solution.
2. Select & apply an appropriate technology to develop a project.
3. Work in teams with good coordination.
4. Present their work through oral communication & writing skills.

Strategy:

1. The group will continue to work on the implementation of project whose design is completed in the semester VII.
2. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
3. The code will be developed and checked by the guide.
4. The group will submit project report in the bound copy.
5. The project report should contain –
    1. Problem specifications.
    2. System definition – requirement analysis.
    3. System design – dataflow diagrams, database design
    4. System implementation – algorithm, code documentation
    5. Test results and test report.
    6. Bibliography

Term work will be jointly assessed by a panel of teachers appointed by head of the department. Oral examination will be conducted by internal and external examiners as appointed by the University.

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7. Mini Project

Term Work: 25 Marks

1. A student should be able to demonstrate a working model based on **RDBMS tools / Open source software.**

2. A student should submit the completed project in softcopy.

3. The project will be assessed by a panel of examiners appointed by head of the department.