PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPURFaculty of Engineering & TechnologyFinal Year Information Technology

Choice Based Credit System Syllabus Structure of B.E. Information Technology W.E.F. 2019-2020 Semester I

Course	Course Theory Course Name		rs./we	ek	Credits	Examination Scheme				
Code	Theory Course Name	L	T	P	Creaus	ISE	ES	E	ICA	Total
IT411	Management Information System	3		_	3	30	70)		100
IT412	Advanced Database System	4		_	4	30	70	C		100
IT413	Software Testing and Quality Assurance	3	-	_	3	30	70		25	125
IT414	Mobile Computing	3		-	3	30	7()		100
IT415A to IT415D	Elective-I	3		_	3	30	70)	25	125
IT416	C# .Net	2			2	25				25
	Sub Total	18	-		18	175	350		50	575
Course Code	Laboratory Course Name									
						ES	E			
							POE	OE		
IT411	Management Information System			2	1	_			25	25
IT412	Advanced Database System			2	1		50		25	75
IT414	Mobile Computing			2	1	_			25	25
IT416	C# .Net			2	1		50		25	75
IT417	Project-I			4	2				75	75
IT418	Vocational Training								25	25
	Sub Total			12	6		100		200	300
	Grand Total	18		12	24	175	450		250	875

Abbreviations: L- Lectures, P – Practical, T- Tutorial, ISE- In Semester Exam, ESE
End Semester Exam, ICA- Internal Continuous Assessment, ESE – University Examination (Theory &/ POE &/Oral examination)

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR



Faculty of Engineering & Technology Final Year Information Technology

Choice Based Credit System Structure of B.E. Information Technology W.E.F. 2019-2020

								Sei	mester	II
Course	Course Theory Course Name		s./we	ek	Creatita	Examination Scheme				
Code	Theory Course Name			Creaus	ISE	ESE		ICA	Total	
IT421	Information Retrieval	4			4	30	70)		100
IT422	Machine Learning	3			3	30	70)		100
IT423	Information Assurance and Security	4			4	30	7()	25	125
IT424A to IT424D	Elective –II	3	2		5	30	7()	25	125
IT425	Web Technology	2			2	50				50
	Sub Total	16	2		18	170	28	0	50	500
Course Code	Laboratory Course Name									
		ESE								
							POE	OE		
IT421	Information Retrieval			2	1		50		25	75
IT422	Machine Learning			2	1				25	25
IT425	Web Technology			2	1		50		25	75
IT426	Project-II			6	3			100	100	200
	Sub Total			12	6		200		175	375
	Grand Total	16	2	12	24	170	480		225	875

Abbreviations: L- Lectures, P –Practical, T- Tutorial, ISE- In Semester Exam, ESE
End Semester Exam, ICA- Internal Continuous Assessment, ESE - University Examination (Theory &/ POE &/Oral examination)

Elective I			Elective II				
Course	Course	Course	Course				
Code		Code					
IT415A	Data Mining	IT424A	Business Intelligence				
IT415B	Image Processing	IT424B	Pattern Recognition				
IT415C	Distributed Computing	IT424C	Cloud Computing				
IT415D	Microcontroller and Embedded System	IT424D	Internet of Things				

Note

- 1. Batch size for the practical /tutorial shall be of 15 students. On forming the batches, if the strength of remaining students exceeds 7, then a new batch shall be formed.
- 2. 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
- 3. Appropriate Elective I & II Subjects may be added when required.
- 4. Project group for B.E. (Information Technology) Part I and Part II shall not be of more than **five** students.
- **5.** ICA assessment shall be a continuous process based on student's performance in class tests, assignments, homework, subject seminars, quizzes, laboratory books and their interaction and attendance for theory and lab sessions as applicable



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - I IT411 - MANAGEMENT INFORMATION SYSTEMS

Teaching Scheme	Examination Scheme
Lectures: 3 Hours/Week, 3 Credits	ESE- 70 Marks
Practical's: 2 Hours/Week, 1 Credit	ISE - 30 Marks
	ICA - 25 Marks

COURSE OBJECTIVES:

- 1. To understand basic infrastructure and strategy for information systems.
- 2. To make student learn professional ethical codes of conduct as appropriate to industry and organizational environments

- 3. To introduce the Communication Technology required for IT
- 4. To make student learn to develop secure information system.

COURSE OUTCOME:

At the end of the course students will be able to

- 1. elaborate basic infrastructure and strategies used in information systems.
- 2. apply professional ethical codes of conduct as appropriate to industry and organizational environments
- 3. design information systems using principles of Communication Technologies
- 4. develop secure information systems.

SECTION-I

Unit 1: Information Systems in Global Business Today(8)

The Role of Information Systems in Business Today, How information systems are transforming business, What is new in information system Business Processes and Information systems, Systems for collaboration and social business, Tools and technologies for collaboration and social business

Unit 2: Information Systems, Organizations, and Strategy

Organizations and it's features, How Information Systems Impact on Organizations, Competitive strategies using information systems, Challenges posed by strategic information systems

Unit 3: Ethical and Social Issues in Information Systems

Understanding Ethical, Social, political issues raised by information systems, principles for conduct in ethical decisions, Contemporary information systems technology, Challenges to the protection individual privacy and intellectual property.

(8 Hrs)

(6 Hrs)

(6 Hrs)

SECTION-II

Unit 4: IT Infrastructure and Emerging Technologies IT Infrastructure, Infrastructure Components, Contemporary Hardware, Platform Trends, Contemporary Software Platform Trends, Management Issues

Unit 5: Foundations of Business Intelligence: Databases and Information Management (8 Hrs)

Organizing Data in a Traditional File Environment, Major Capabilities of Database Management Systems, Using Databases to Improve Business Performance and Decision Making, Managing Data Resources, Telecommunications, the internet, and Wireless Technology: Principles Components of Telecommunications Network & Ket Networking Technologies, Different types of networks, principle technologies and standards for wireless networking, communication, internet access.

Unit 6: Securing Information Systems

System Vulnerability and Abuse, Business Value of Security and Control, Organizational Framework for Security and Control, Technologies and Tools for safeguarding Information Resources

Unit 7: E-commerce: Digital Markets, Digital Goods

Features of e-commerce. Digital Markets, Digital Goods, principles ecommerce business and revenue models, e-commerce transformed marketing, e-commerce business to business transaction, Role of Mcommerce in business & it's applications, issues related building e-commerce.

Text Book:

- 1. Management Information Systems : Managing the Digital Firm, 15th Edition by Kenneth C.Laudon and Jane Laudon, Pearson Education
- 2. Management Information Systems: Sashikala Parimi, Kogent Learning Solutions Inc.

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, SmitaVaze, biztantra

Note: Teacher can make a group of 4-5 students (or based on their project group) & assign Case Study given in the textbook (Sr.No.1) Evaluation will be done by teacher by considering different factors.

(4 Hrs)

(6 Hrs)

(7 Hrs)



Punyashlok Ahilyadevi Holkar Solapur University Solapur **B.E. (INFORMATION TECHNOLOGY) SEMESTER - I**

IT 412: ADVANCED DATABASE SYSTEMS

Teaching Scheme

Examination Scheme ESE - 70 Marks ISE - 30 Marks

Lectures-4 Hours/week, 4 Credits Practical – 2 Hour/week, 1 Credit

ICA - 25 Marks POE: 50 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:

At the end of the course students will be able to

- 1) differentiate between Distributed & Parallel databases. Implement object oriented databases, mining concepts.
- 2) implement different query processing algorithms.
- 3) tabulate SQL, NoSQL & New SQL with its applications.
- 4) articulate technologies like Hadoop, MongoDB, Cassandra, Pig, Hive _____

SECTION-I

Unit 1 : Database System architectures

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

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

Unit 3 : Data Analysis and Mining

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 cooccurrences, Mining for rules, Clustering, Similarity search over sequences

SECTION-II

Unit 4 : Object Based Databases

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 & Optimization

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.

(10 Hrs)

(12 Hrs)

(10 Hrs)

(8 Hrs)

(10 Hrs)

Unit 6 : BIG data and HADOOP & No SQL

(10 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 HAD OOP commands, working of MAP reduce with an example. Getting started with NoSQL, Key value stores, Document databases, New SQL, Postgre SQL

ICA :

Practical Assignments (minimum 10 to be implemented):

- 1. Implement 2 PC 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 frag ment & replicate join
- 10. Write a program to join $r1 \bowtie q r2 \bowtie q r3 \bowtie q r4$ using Independent Parallelism for Interoperation 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, Array and Multisets.
- 15. Implement queries for type inheritance and table inheritance.

Text Book :

- 1) Data base System Concepts sixth Edition, by Abra ham Silberschatz, Henry F. Korth, S. Sudarshan, Sixth Edition, M cGraw Hill Publication.
- 2) Data base Management Systems Third Edition, by Raghu Ramakrishan and Johannes Gehrke, McGrawhill Education
- 3) Mon goDB, The Definitive Guide, Kristina Cho dorow, Oreilly, Shroff Publishers and Distributors Pvt. Ltd., ISBN : 978-93-5110-269-4

Reference Books:

1. Hadoop in Action, Chuck Lam, Dreamtech Press, ISBN : 97 8-81-7722-813-7.



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - I 3: SOFTWARE TESTING & OUALITY ASSURANCE

Examination Scheme ESE: 70 Marks ISE: 30 Marks ICA: 25 Marks

IT413: SOFTWARE TESTING & QUALITY ASSURANCE

Teaching Scheme	
Lecture: 3 Hours /Week, 3 Credits	

COURSE OBJECTIVES:

1. To learn the principles, techniques and tools of software testing in order to improve the quality of software product.

- 2. To learn generation and execution of test plan, cases & scripts.
- 3. To discover correctness, completeness and quality of software.
- 4. To recognize the importance of software testing in Software Development Life Cycle.

COURSE OUTCOMES

At the end of the course students will be able to

- 1. describe software quality concepts, assurance & standards
- 2. use testing tools to test software in order to improve test efficiency with automation.
- 3. test software to meet quality objectives & requirements
- 4. apply testing skills to common testing tasks and perform the planning and documentation of test efforts

SECTION – I

Unit-1: Fundamentals of Software Testing

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, Defect Classification, Defect, Error, Mistake in Software, Defect Life Cycle, Defect Management Process, Developing Test Strategy, Developing Testing Methodologies

Unit-2: Methods of Testing

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

Levels of Testing, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing,

Unit-4: 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.

(6 Hrs)

(6 Hrs)

(6 Hrs)

(6 Hrs))

SECTION – II

Unit 5: Test Planning & Documentation 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

Unit 6: Quality Concepts & Software Quality Assurance

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

Unit 7: Formal Approaches to SQA

Statistical SQA, Software Reliability, The ISO 9000 Quality Standards, CMM, The SQA Plan.

Unit 8: Automated Testing and Testing Tools

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

Reference tutorials:

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

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, 8 th Edition, Publisher McGraw Hill (Chapter 5)

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.

(6 Hrs)

(6 Hrs)

(4 Hrs)

(5 Hrs)



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - I IT414: MOBILE COMPUTING

Teaching Scheme Lectures– 3 Hours/week, 3 Credits Practical – 2 Hour/week, 1 Credit Examination Scheme ESE – 70 Marks ISE – 30 Marks ICA – 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 students will be able to

- 1. demonstrate basics of wireless and mobile technology
- 2. design modulation techniques

3. design different sensor, Ad-hoc and wireless network and identify with the platforms and protocols used in the mobile environment

Unit1: Mobility

Introduction-Mobile communication, Applications, solutions, limitation, devices, network and Architecture; Mobile and Handheld Devices, Smart systems and limitations of Handheld Devices

Unit2: Principles of Wireless Communication

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: (8 Hrs)

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

Unit 4:Mobile IP Networks

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

(4 Hrs)

(8 Hrs)

(6 Hrs)

SECTION II

Unit 5: Mobile Transport Layer:

Transport layer issues in wireless, Indirect TCP, Snoop TCP, Mobile TCP

Unit 6: Wireless LANs:

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 Ad-hoc Networks:

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

Designing and evaluating the performance of various transport and routing protocols of wireless networks and Ad-hoc networks using network simulator (any one).

Text Book:

- 1. Jochen Schiller Mobile Communication, Pearson Education
- 2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772.(ch 1,7)
- 3. 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

(**3 Hrs**)

(8 Hrs)

(4 Hrs)

(4 Hrs)



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - I IT 415A: ELECTIVE – I: DATA MINING

Teaching Scheme Lecture: 3 Hours /week, 3 credits **Examination Scheme**

eture: 3 Hours /week, 3 credits ISE: 30 Marks ICA: 25 Marks

COURSE OBJECTIVES:

- 1. To acquire the basic concepts and techniques of Data Mining
- 2. To Understand the usage of Data Mining
- 3. To Learn Different data Pre processing techniques.
- 4. To Learn and Analyze different data mining algorithms.
- 5. To apply the data mining algorithms for problem solving.

COURSE OUTCOMES:

At the end of the course students will be able to

- 1. examine the types of the data to be mined for a particular application.
- 2. apply preprocessing statistical methods for any given raw data.
- 3. select and apply proper data mining algorithms to build analytical applications
- 4. comprehend the roles that data mining plays in various fields and manipulate different data mining techniques.
- 5. apply a wide range of Clustering, Classification and association rule mining algorithms

SECTION-I

UNIT 1: Introduction

Why data Mining, What is Data Mining?, Basic data mining tasks, What kind of Data can be mined, What kinds of Patterns can be mined?, technological support for data mining, target applications of data mining, major issues in data mining, KDD process ,Data mining Vs Knowledge Discovery in Databases.

UNIT 2: Data Preprocessing

Need to Preprocess the data, major tasks in Data Preprocessing, Data Cleaning, Data integration, Data Reduction, Data Transformation and Data Dicretization.

UNIT 3: Classification

Issues in Classification, Statistical-Based Algorithms: Regression, Bayesian Classifiers. Distance Based Algorithms: K -Nearest Neighbors Classifiers, Decision Tree Based Algorithms, Neural Network-Based Algorithms, Rule Based Algorithms.

(8 Hrs)

(8 Hrs)

(6 Hrs)

SECTION II

UNIT 4: Cluster Analysis- Basic Concept and Methods

Cluster Analysis : What is Cluster Analysis?, Requirements for Cluster Analysis, Overview of Basic Clustering Methods,

Partitioning Methods: k-Means: A Centroid-Based Technique, k-Medoids: A Presentative Object-Based Technique,

Hierarchical Methods : Agglomerative Algorithms and Divisive Clustering, BIRCH: Multiphase Herarchical Clustering Using Clustering Feature Trees, Evaluation of Clustering.

UNIT 5: Association Rules

Introduction, Large Item sets, Basic Algorithms: Apriori Algorithm, Sampling Algorithm, Partitioning Algorithm, Parallel and Distributed Algorithms, Comparing Approaches, Incremental Rules, Advanced association rule-Techniques, Measuring the quality of rules.

UNIT 6: Web Mining

Introduction, Web Content Mining: Crawlers, Harvest System, Virtual Web View, personalization. Web Structure Mining: PageRank, Clever. Web Usage Mining: Preprocessing, Data Structures, Pattern Discovery Pattern Analysis.

Text Books:

- 1. Margaret H. Dunham, "DATA MINING Introductory and Advanced Topics", PEARSON (Units 3,5,6)
- 2. Han, Kamber, Pei, "DATA MINING Concept and Techniques", 3rd Edition, ELSEVIER (Units 1,2,4)
 - 3. Tan, Vipin Kumar, Steinbach, "Introduction to Data Mining", PEARSON (Unit 3)

Reference Books:

- 1. Galit Shmueli, Nitin Patel, Peter Bruce, "Data mining For Business intelligence" Wiley Student Edition.
- 2. M.Berry and G. Linoff, "Mastering Data Mining", Wiley Student Edition

(8 Hrs)

(7 Hrs)



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - I IT 415B: ELECTIVE – I: IMAGE PROCESSING

Teaching Scheme

Lecture: 3 Hours /week, 3 credits

Examination Scheme

ESE: 70 Marks ISE: 30 Marks ICA: 25 Marks

COURSE OBJECTIVES:

- 1. To make student realize different areas and applications of image processing
- 2. To introduce to student low level image processing operations in spatial and frequency domain
- 3. To introduce to student preliminary methods for image analysis and description
- 4. To make student understand the necessity of image compression and its related techniques
- 5. To activate student's interest in computer vision and video processing applications

COURSE OUTCOMES:

At the end of the course students will be able to

- 1. enlist various application areas and applications of image processing
- 2. express low level operations in spatial and frequency domain
- 3. describe and derive for image analysis operations
- 4. differentiate between image representation & description operations
- 5. compare different image compression techniques

SECTION-I

UNIT 1: Fundamentals of digital image processing

Fields of use of digital image processing, fundamental steps in digital image processing, sampling & quantization, representation, spatial & intensity resolution, neighborhood, connectivity of pixels, distance measurement, matrix operations, spatial operations, and basics of transform domain, color image fundamentals, color models & conversion

UNIT 2: Image preprocessing

Basic intensity transformation functions, histogram processing, preprocessing in spatial domain, preprocessing in frequency domain, image smoothing and sharpening using spatial and frequency domain filters, image restoration in spatial domain & frequency domain, geometric transformations

UNIT 3: Image analysis

Edge detection, line detection, corner detection, boundary detection, Hough transform, thresholding, edge-based segmentation, region-based segmentation, template matching

(8 Hrs)

(8 Hrs)

SECTION-II

UNIT 4: Image representation & description Chain code, polygon approximation, signature, skeleton, shape number, Fourier descriptor, regional descriptors, texture and statistical texture description **UNIT 5 : Image transforms** (7 Hrs) Discrete Fourier transform, discrete cosine transform, wavelet transform, singular value decomposition, principle component analysis. **UNIT 6 : Image compression** (6 Hrs) Transforms for image compressions, predictive compression, vector quantization, hierarchical & progressive compression, coding, JPEG & MPEG **Text Books:** 1. Digital Image Processing; R.C. Gonzalez, R.E. Woods; 2nd Edition; Pearson Education – Chapter 3, 4, 5

2. Digital Image Processing; R.C. Gonzalez, R.E. Woods; 2nd Edition; Pearson Education – Chapter 1

3. Digital Image Processing & Computer Vision; Milan Sonka, Vaclav Hlavac, Roger Boyle; Cengage Learning – Chapter 2, 3, 4, 5, 6

• Reference Books:

- 1. Fundamentals of Digital Image Processing Anil K. Jain; 2nd Edition; Prentice Hall, Englewood cliffs, NJ
- 2. Image Processing: The Fundamentals Maria Petrou; 2nd Edition; John Wiley

Assignments (preferably using Scilab):

- 1. Handling and displaying images
- 2. Displaying Fourier transform of the image
- 3. Analyzing magnitude and phase spectrum of Fourier transform of an image
- 4. Image enhancement using histogram equalization
- 5. Filtering image in the spatial domain
- 6. Filtering image in the frequency domain
- 7. Edge detection
- 8. Corner detection
- 9. Line detection using Hough transform
- 10. Image segmentation
- 11. Vector quantization based image compression

12. JPEG based image compression



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - I IT 415C: ELECTIVE-I: DISTRIBUTED COMPUTING

Teaching Scheme Lecture: 3 Hours /Week, 3 Credits Examination Scheme ESE - 70 Marks ISE - 30 Marks ICA - 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 for enhancement of 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 :

At the end of the course students will be able to

- 1. apply 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 fulfils 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

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 Systems – FLIP and VMTP

Unit 2: Message Passing

Introduction, Desirable features of Good Message-Passing System, Issues in IPC by Message Passing, Synchronization, Buffering, Multidatagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group communication, Case Study: RMI, CORBA

Unit 3 : Remote Procedure Calls

Introduction, The RPC Model, Transparency of RPC, Implementing RPC mechanism, Stub Generation, RPC Messages, Marshalling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Client-Server Binding, Exception Handling, Security

(4 Hrs)

(6 Hrs)

(6 Hrs)

Unit 4 : Synchronization in Distributed Systems

Introduction, 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

Introduction, Classification of Mutual Exclusion Algorithms, Preliminaries, A simple solution to Distributed Mutual Exclusion, Non-Token-Based Algorithms, Lamport's Algorithm, The Ricart-Agrawala Algorithm, Token-Based Algorithms, Suzuki-Kasami's Broadcast Algorithms

Unit 6 : Distributed Deadlock Detection

Introduction, Preliminaries, Deadlock handling strategies in Distributed Systems, 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 7 : Distributed File Systems

Distributed Resource Management, Concepts of File System, Distributed File Systems - Introduction, Architecture, Mechanisms for building Distributed File System, Design issues, Log-Structured file systems, Case studies - Google FS

Unit 8 : Distributed Shared Memory

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

ICA : It should consist of the following assignments:

- 1. Implementation of RMI for any given application.
- 2. Implementation of RPC for any given application.
- 3. Implementation of Communication Protocol of RPC (R, RR, RRA Protocol).
- 4. Implementation of different sorting algorithms using dispatcher thread model.
- 5. Implementation of logical clocks by using Counters.
- 6. Implementation of logical clocks by using Physical clocks.
- 7. Implementation of Mutual Exclusion by using Token-Passing approach.
- 8. Implementation of Stateful and Stateless server in file reading application.
- 9. Implementation of Deadlock Detection Algorithm.
- 10. Implementation of Bully Algorithm.
- 11. Implementation of Ring Algorithm.
- 12. Study of HDFS- Hadoop Distributed File System

Text books:

- 1. Distributed O.S Concepts and Design^[2], P.K.Sinha, PHI (Unit 1,2,3,4)
- 2. Advanced concepts in Operating Systems², Mukesh Singhal & N.G.Shivaratri, TMH (Unit 5,6,7,8)
- 3. Distributed Computing, Sunita Mahajan, Seema Shah, OXFORD University Press (Unit 1, Case studies 7,8)

Reference Books:

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

(6 Hrs)

(5 Hrs)

(6 Hrs)

(6 Hrs)

(6 Hrs)

Punyashlok Ahilyadevi Holkar Solapur University Solapur



B.E. (INFORMATION TECHNOLOGY) SEMESTER - I IT 415D ELECTIVE - I: MICROCONTROLLER AND EMBEDDED SYSTEMS

Teaching Scheme

Lectures: 3 Hours /week, 3 credits

Examination Scheme

ESE - 70 Marks ISE - 30 Marks ICA - 25 Marks

Course Objectives:

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

COURSE OUTCOME :

At the end of the course students will be able to

- 1. learn importance of microcontroller in designing embedded application.
- 2. program microcontroller and design conceptual embedded system.
- 3. develop interfacing to real world devices.
- 4. design and Simulate a microcontroller based embedded system.

SECTION - I

Unit 1: Microprocessors and microcontroller.

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.

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

Interfacing 8051 to LCD, Keyboard, parallel and serial ADC, sensor interfacing. (4 Hrs)

(12 Hrs)

(5 Hrs)

SECTION – II

Unit 4: Typical Embedded System

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
- 2. "Microcontrollers: Architecture, Programming, Interfacing and System Design", RajKamal, Pearson Education, 2005.
- 3. David E. Simon, "An Embedded Software Primer", Addison Wesley, 1999.
- 4. <u>https://www.labcenter.com/</u>

Assignments

- 1. Introduction to Proteus Software.
- 2. Simulating LED Blinking using 8051 in Proteus.
- 3. To create a series of moving lights using 8051 on LED's.
- 4. To interface the seven segment display with microcontroller 8051 in Proteus.
- 5. To interface the stepper motor with microcontroller in Proteus.
- 6. Design and simulate digital clock circuit in Proteus.
- 7. Digital Lock Security system in Proteus.

(6 Hrs)



Punyashlok Ahilyadevi Holkar Solapur University Solapur **B.E. (INFORMATION TECHNOLOGY) SEMESTER - I** IT 416: C#.Net

Teaching Scheme

Lectures: 2 Hours /week, 2 credits Practical: 2 Hours /week, 1 credit **Examination Scheme**

ISE: 25 Marks POE: 50 Marks ICA: 25 Marks

COURSE OBJECTIVES:

- 1. To learn the components of a .NET Framework.
- 2. To develop a basic understanding of the OOP features.
- 3. To effectively use .NET runtime library APIs for robust application development.
- 4. To develop Windows Forms with C#.
- 5. To develop applications to access Data using ADO.NET.
- 6. To learn to create Web applications through ASP.NET

COURSE OUTCOMES:

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

- 1. describe .NET Framework
- 2. apply Object Oriented Programming concepts to develop applications.
- 3. effectively use .NET runtime library APIs to build robust applications.
- 4. develop Windows Forms with C#.
- 5. develop applications to access Data using ADO.NET.
- 6. create Web applications through ASP.NET

SECTION-I

Unit 1: Introduction to .NET Framework

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

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 Concepts and Exception Handling using C# (4 Hrs)

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.

Need for Exceptions, Exception Hierarchy, Handling Exceptions using try-catch-finally blocks, creating and defining Custom Exceptions, the "throw" keyword.

(2 Hrs)

(4 Hrs)

Unit 4: Events, Delegates and Multithreading

Events and Delegates in C#, Multicast Delegate, Event Handling.

What is Multithreading, Multithreading in C#, Static and Instances members of Thread Class, Basic Thread operations, Thread priorities, Thread Synchronization

SECTION-II

Unit 5: 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#

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

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

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 <u>http://www.microsoft.com</u>)
- 2. C# Programming Guide MSDN, Microsoft. (http://msdn.microsoft.com/en-US/) 3 Microsoft Visual C# Step by Step 2010 - John Sharp, Microsoft Press.

(4 Hrs)

(4 Hrs)

(4 Hrs)

(4 Hrs)

(4 Hrs)

List of Assignments:

- 1. Study of .Net framework.
- 2. Implementation of C# applications based on language fundamentals.
- 3. Implementation of C# applications based on Inheritance.
- 4. Implementation of C# applications based on Polymorphism, Type Casting, Boxing and Unboxing.
- 5. Implementation of C# applications based on Exception Handling.
- 6. Implementation of C# applications based on Delegates.
- 7. Implementation of C# applications based on Multithreading.
- 8. Implementation of C# applications to perform I/O Operations.
- 9. Design Windows Forms using various controls, GDI+ Graphics.
- 10. Implementation of ASP.NET & ADO.NET applications



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - I IT 417: PROJECT-I

Teaching Scheme Practical: 4 Hours /week, 2 credits **Examination Scheme** ICA: 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:

At the end of the course, student 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.



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - II IT 421: INFORMATION RETRIEVAL

Teaching Scheme

Lectures: 4 Hours /week, 4 credits Practical: 2 Hours /week, 1 credit **Examination Scheme**

ESE - 70 Marks ISE - 30 Marks POE - 50 Marks ICA - 25 Marks

Course Objectives:

- 1. To acquaint students to information retrieval process and information models.
- 2. To evaluate the performance of information retrieval systems.
- 3. To search text using sequential searching & pattern matching algorithms and using various indexing structures.
- 4. To learn difference in data retrieval, information retrieval and multimedia retrieval systems.
- 5. To learn different components of search engine and ranking algorithms.

Course Outcomes:

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

- 1. Implement text retrieval models like Boolean, vector and probabilistic and structured retrieval model and evaluate the performance of information retrieval systems.
- 2. Implement different indexing structure like inverted index, hash files, suffix arrays for given collection of documents.
- 3. Implement different sequential searching and pattern matching algorithms.
- 4. Implement multimedia IR system and indexing on multimedia data.
- 5. Implement ranking algorithms to assign ranking to the documents.

SECTION – I

1. Introduction

Information retrieval vs. data retrieval, User Task, Logical View of the documents, Information retrieval process, Text Operations: Introduction, document pre-processing, Document Clustering, Text Compression, Comparing text compression techniques

2. Information Retrieval Models & Performance Evaluation

A Formal Characterization of IR Models, Classic Information Retrieval, Structured Text Retrieval Models, Models for Browsing, Recall and Precision, Alternative measures

3. Query Languages

Keyword based querying, Pattern Matching, Structural Queries, Query Protocols, Query operations

4. Indexing and Searching

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

(**10 Hrs**) ured Text

(8 Hrs)

(**10 Hrs**)

(7 Hrs)

SECTION-II

5. Multimedia IR - Models and Languages

Data Modelling & Query Languages, Indexing and searching

6. Multimedia IR - Indexing and Searching

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

7. Web Retrieval

Search Engine architecture, User interfaces, Ranking, Web Crawling, Browsing, Metasearchers, Searching using Hyperlinks

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

Assignments:

- 1. Study of different search engines
- 2. Creation of logical Views of documents
- 3. Implementation of IR system using Boolean model.
- 4. Implementation of IR system using Vector model
- 5. Implementation of IR system based on pattern matching.
- 6. Searching using inverted index (construction & Searching)
- 7. Sequential searching using Brute Force Algorithm
- 8. Sequential searching using Knuth-Morris-Pratt Algorithm
- 9. Sequential searching using Boyer- Moore Algorithm
- 10. Sequential searching using BDM (Backward DAWG Matching) Algorithm.
- 11. Sequential searching using Shift-OR Algorithm
- 12. Approximate matching using dynamic Programming
- 13. Implementation of Multimedia Information Retrieval System

(9 Hrs)

(6 Hrs)

(**10 Hrs**)



Punyashlok Ahilyadevi Holkar Solapur University Solapur **B.E. (INFORMATION TECHNOLOGY) SEMESTER - II IT422: MACHINE LEARNING**

Teaching Scheme Lecture: 3 Hours /Week, 3 Credits Practical: 2 Hours /Week, 1 Credits **Examination Scheme**

ISE – 30 Marks ICA - 25 Marks

Course Objectives:

- 1) To teach necessary fundamental concepts and terminologies used in Machine Learning
- 2) To develop sound understanding of mathematical fundamentals required to build, evaluate and analyze Machine learning models.

Course Outcomes:

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

- 1) understand the need of machine learning and applications of machine learning.
- 2) build machine learning models and validate them.
- 3) analyze machine learning models to improve their accuracy.

SECTION I

Unit 1: Introduction to Machine learning

Understanding Machine Learning: What Is Machine Learning?, Leveraging the Power of Machine Learning, The Roles of Statistics and Data Mining with Machine Learning, Putting Machine Learning in Context.

Applying Machine Learning: Getting Started with a Strategy, Applying Machine Learningto Business Needs, Understanding Machine Learning Techniques, Tying Machine Learning Methods to Outcomes

Unit 2: Offerings of Machine learning

Looking Inside Machine Learning: The Impact of Machine Learning on Applications, Data Preparation, The Machine Learning Cycle.

Getting Started with Machine Learning: Understanding How Machine Learning Can Help, Focus on the Business Problem, Requirement of Collaboration in Machine Learning, Executing a Pilot Project, Determining the Best Learning Model.

Unit 3: Basic mathematics for Machine Learning

Getting Started With The Math Basics: Working with Data, Exploring the World of Probabilities, Describing the Use of Statistics, Interpreting Learning As Optimization, Functions, Cost Descending the Error Exploring Curve, Updating by Mini-Batch and Online.

(4 Hrs)

(10 Hrs)

(4 Hrs)

ESE – 70 Marks

SECTION II

Unit 4: Validating Machine Learning Models

Validating Machine Learning:Checking Out-of-Sample Errors, Getting to Know the Limits of Bias, Keeping Model Complexity in Mind and Solutions Balanced, Training, Validating, and Testing, Resorting to Cross-Validation.Looking for Alternatives in Validation., Optimizing Cross-Validation Choices, Avoiding Sample Bias and Leakage Traps, Discovering the Incredible Perceptron,

Simplest learning strategies to learn from Data:Discovering the Incredible Perceptron, Growing Greedy Classification Trees, Taking a Probabilistic Turn

Unit 5: Improving Machine Learning Models

Improving Machine Learning Models: Studying Learning Curves, Using Cross-Validation Correctly, Choosing the Right Error or Score Metric, Searching for the Best Hyper-Parameters, Testing Multiple Models, Averaging Models, Stacking Models, Applying Feature Engineering, Selecting Features and Examples, Looking for More Data.

Unit 6: Applications of Machine Learning

Applying Learning to Real Problems: Classifying Images, Scoring Opinions and Sentiments, Recommending Products and Movies, Using Machine Learning to Provide Solutions to Business Problems. Future of Machine Learning.

Text Books:

- 1) Machine Learning For Dummies, IBM Limited Edition by Judith Hurwitz, Daniel Kirsch (Published by Wiley, First edition)
- 2) Machine Learning For Dummiesby John Paul Mueller , Luca Massaron (Published by For Dummies; First edition)

Reference Books:

1) Machine Learning by Tom M. Mitchell (Publisher: McGraw Hill Education; First edition + New Chapters from Second edition)

Teamwork:

Minimum 8 to 10 assignments requiring students to design implement and validate machine learning models using either R or Python scripts or any other machine learning toolkits and frameworks like MATLAB, Octave.

(12 Hrs)

(5 Hrs)

(10 Hrs)



Punyashlok Ahilyadevi Holkar Solapur University Solapur B. E. (INFORMATION TECHNOLOGY) SEMESTER – II INFORMATION ASSURANCE AND SECURITY

Teaching Scheme Lecture: 4 Hours /Week, 4 Credits

Examination Scheme

ESE – 70 Marks ISE–30 Marks ICA - 25 Marks

Course 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.

Course Outcomes:

At the end of the course, student will 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

Computer Security Concepts: The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security. **Classical Encryption Techniques:** Symmetric Cipher Model, Cryptography. **Substitution Techniques:** Caesar Cipher, Monoalphabetic Ciphers, Playfair Cipher, Hill Cipher, Polyalphabetic Ciphers, **Transposition Techniques**, Rotor Machines, Steganography

Unit 2: Block Ciphers and the Data Encryption Standard

Traditional Block Cipher Structure: Stream Ciphers and Block Ciphers, Motivation for the Feistel Cipher Structure, The Feistel Cipher The **Data Encryption Standard:** DES Encryption, DES Decryption, The Strength of DES. **Public-Key Cryptography and RSA :** Principles of Public Key Cryptosystems, RSA: Description of the Algorithm , Computational Aspects , The Security of RSA.

Unit 3: Key Management and Distribution

Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure.

(8 Hrs)

(8 Hrs)

(7 Hrs)

Unit 4: Network and Internet Security

Network Access Control and Cloud Security: Network Access Control, Extensible Authentication Protocol, IEEE 802.1X Port-Based Network Access Control Cloud Computing, Cloud Security Risks and Counter measures, Data Protection in the Cloud, Cloud Security as a Service.

Transport-Level Security: Web Security Considerations, Secure Sockets Layer, Transport Layer Security

HTTPS, Secure Shell (SSH)

SECTION II

Unit 5: Wireless Network Security

Wireless Security 559, Mobile Device Security, IEEE 802. Wireless LAN Overview, IEEE 802. Wireless LAN Security, Electronic Mail & IP Security: Pretty Good Privacy, S/MIME, IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload.

Unit 6: IP Security

IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange.

Unit 7: Introduction to Cybercrime

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals?, Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens, Cyber Offenses: How Criminals Plan Them, Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

Unit 8: Tools and Methods Used in Cybercrime

Introduction: Proxy Servers and Anonymizers, Phishing Password Cracking Keyloggers and Spywares,

Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft, Introduction, Phishing, Identity Theft (ID Theft) ,Cybercrimes and Cybersecurity: The Legal Perspectives : Introduction, Cybercrime and the Legal Landscape around the World, Why Do We Need Cyberlaws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act

(8 Hrs)

(7 Hrs)

(7 Hrs)

(8 Hrs)

(7 Hrs)

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

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)



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - II IT 424A ELECTIVE – II: BUSINESS INTELLIGENCE

Teaching Scheme

Lectures: 3 Hours /week, 3 Credits Tutorial: 2 Hours /week, 2 credits

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:

At the end of the course, student will 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:

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

Unit 2 : Decision Support System:

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:

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:

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:

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

Examination Scheme

ESE – 70 Marks ISE – 30 Marks ICA: 25 Marks

(8 Hrs)

(7 Hrs)

(10 Hrs)

(10 Hrs)

Unit 6 : Business Intelligence Applications:

(10 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





Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - II IT 424B: ELECTIVE – II: PATTERN RECOGNITION

Teaching Scheme

Lecture: 3 Hours /week, 3 credits Tutorial: 2 Hours /week, 2 credits **Examination Scheme**

ESE: 70 Marks ISE: 30 Marks ICA: 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:

At the end of the course, student 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

SECTION-I

Unit 1. Introduction :

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 :

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:

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

Unit 4: Pattern Classification by Likelihood Functions:

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.

(5 Hrs)

(5 Hrs)

(6 Hrs)

(6 Hrs)

SECTION II

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

Unit 6: Trainable Pattern Classifiers-The Statistical Approach:

Introduction, Stochastic Approximation Methods, Derivation of pattern classification algorithms, the method of potential functions.

Unit 7: Pattern Preprocessing and Feature Selection:

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:

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)

Assignments:

The assignments to be completed as Term Work consist of Programs to

- 1. Recognize line patterns in a given set of points.
- 2. Develop pattern recognition techniques to distinguish facial feature classes using a supervised learning paradigm.
- 3. Explore difference between color spaces and color-based image segmentation. Experiments with edge detection.
- 4. Explore different feature spaces using Fourier shape descriptors, experimenting with wavelet transform, template matching.
- 5. Use and interpretation of ROC curves, experiments with PCA and ICA.
- 6. Estimate and sampling from densities, learning video background models, building a simple object tracker.
- 7. Use LDA for image analysis. Experiments with Support Vector Machines.
- 8. Perform Image segmentation with K-means, EM and hierarchical clustering algorithms.
- 9. Demonstrate Image morphing.

34

(6 Hrs)

(6 Hrs)

(5 Hrs)



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - II IT424C Elective-II: 2. CLOUD COMPUTING

Teaching Scheme

Lecture: 3 Hours /Week, 3 Credits Tutorials: 2 Hours /Week, 2 Credits Examination Scheme ESE – 70 Marks ISE – 30 Marks ICA - 25 Marks

Course Objectives :

- 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 :

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

- 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

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

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

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

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

(5 Hrs)

(5 Hrs)

(7 Hrs)

(6 Hrs)

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SECTION-II

Unit 5: Privacy

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

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

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

List of Assignments

- 1. Study of Cloud Computing & Architecture
- 2. Virtualization in Cloud. Technology: KVM, VMware.
- **3.** Study and implementation of Infrastructure as a Service.(by using Open Stack) Technology: Quanta Plus /Aptana /Kompozer
- 4. Study and installation of Storage as Service. Concept: Storage as Service (SaaS) Technology: own Cloud
- 5. Implementation of identity management. Technology: OpenStack
- 6. Write a program for web feed. Technology: PHP, HTML
- 7. Securing Servers in Cloud. Technology: own Cloud
- **8.** Case study on Amazon EC2.
- 9. Case study on Microsoft azure

(8 Hrs)

(8 Hrs)

(6 Hrs)

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Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER - II IT 424D: ELECTIVE – II: Internet of Things

Teaching Scheme

Lectures: 3 Hours /week, 3 credits Tutorial 2 hrs/week, 2 credits **Examination Scheme**

ESE - 70 Marks ISE - 30 Marks ICA: -25 Marks

PREREQUISITES:

- 1. Fundamentals of Communication and computer network
- 2. Micro controller, Network Security and Web programming

COURSE OBJECTIVES:

- 1) To understand what Internet of Things is.
- 2) To identify the Architecture and various elements of an IoT System
- 3) To understand the IoT standards and connectivity protocols
- 4) To make students aware of security concerns and challenges while implementing IoT solutions

COURSE OUTCOMES:

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

- 1) explain what Internet of Things is
- 2) describe components of IoT Architecture and platforms of IoT ecosystem
- 3) describe and choose Sensors and Actuators

SECTION – I

Unit 1: Introduction to IoT

Definition, Applications and characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels

Unit 2: IoT Architecture and Communication Technologies

IoT Architecture by Oracle, Sources of IoT, M2M Communication, IoT/M2M systems, layers and design standards, Communication Technologies

Unit 3: Elements of IoT

Sensor Technology, Participatory Sensing – Industrial IoT and Automotive IoT, Actuator, Sensor Data Communication Protocols, RFID, WSN Technology

SECTION – II

Unit 4: IoT Standards and Connectivity

Constrained Application Protocols (CoAP), Representational State Transfer (REST), Zigbee / IEEE 802.15.4, Bluetooth and its low energy profile, IEEE 802.15 WPAN, 6LoWPAN

(7 Hrs)

(8 Hrs)

(8 Hrs)

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Unit 5: IoT Security and Business model

Introduction to IoT Privacy, Security and Vulnerabilities, Use case and Misuse cases, IoT Security Tomography and Layered attacker model, Business model and business model innovation for IoT, Value Creation in the IoT, Business model scenarios for IoT

Unit 6: Case Studies

Domain Specific IoTs: Home Automation, Smart Cities, Environments, Energy, Agriculture, Industry, Health and Lifestyle

Text Book :

- 1. Internet of Things: A Hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press (Unit 1 and 6)
- 2. IoT Architecture and Design Principles, Raj Kamal, McGraw Hill Education (Unit 2, 3 & 5)
- 3. Building the IoT with IPv6 and MIPv6, Daniel Minoli, Wiley Publication (Unit 4)

Reference Books:

1. The Internet of Things: Applications and Protocols, Wiley publications. Author(s): Oliver Hersent, David Boswarthick, Omar Elloumi

Term Work :

The Term Work should consist of design and implementing a mini project based on the techniques and tools covered in above chapters.



Punyashlok Ahilyadevi Holkar Solapur University Solapur **B.E. (INFORMATION TECHNOLOGY) SEMESTER - II** WEB TECHNOLOGY

Teaching Scheme

Lecture: 2 Hours /Week, 2 Credits Practical: 2 Hours/ week, 1 Credit

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.

COURSE OUTCOMES:

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

- 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: UI Design:

HTML5: What is HTML5 - Features of HTML5 - Semantic Tags - New Input Elements and tags -Media tags (audio and video tags) – Designing Graphics using Canvas API - Drag and Drop features - Geo-location API - Web storage (Session and local storage).

CSS3: What is CSS3 -Features of CSS3 - Implementation of border radius, box shadow, image border, custom web font, backgrounds - Advanced text effects(shadow) - 2D and 3D Transformations - Transitions to elements - Animations to text and elements

Unit 2: Responsive Web Design (RWD):

Responsive Design: What is RWD - Introduction to RWD Techniques - Fluid Layout, Fluid Images and Media queries- Introduction to RWD Framework

Twitter Bootstrap - Bootstrap Background and Features - Getting Started with Bootstrap-Demystifying Grids - Off-Canvas - Bootstrap Components - JS Plugins - Customization

Unit 3: Introduction to JavaScript

Introduction - Core features - Data types and Variables - Operators, Expressions and Statements -Functions & Scope - Objects - Array, Date and Math related Objects - Document Object Model -Event Handling – Browser Object Model - Windows and Documents - Form handling and validations. Object-Oriented Techniques in JavaScript - Classes - Constructors and Prototyping (Sub classes and Super classes) – JSON –Introduction to AJAX.

Examination Scheme

ISE - 50 Marks POE - 50 Marks ICA - 25 Marks

(3 Hrs)

(4 Hrs)

(4 Hrs)

Unit 4: RESTful Web Services

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: Introduction to Server-side JS Framework - Node.js

Introduction - What is Node JS – Architecture – Feature of Node JS - Installation and setup - Creating web servers with HTTP (Request & Response) – Event Handling - GET & POST implementation - Connect to NoSQL Database using Node JS – Implementation of CRUD operations.

Unit 6: Introduction to Client-side JS Framework – Basics of Angular 4.0(5 Hrs)Introduction to Angular 4.0 - Needs & Evolution – Features – Setup and Configuration – Componentsand Modules – Templates – Change Detection – Directives – Data Binding - Pipes – NestedComponents

Unit 7: Introduction to Client-side JS Framework – Forms and Routing in Angular 4.0 (3 Hrs) Template Driven Forms - Model Driven Forms or Reactive Forms - Custom Validators - Dependency Injection - Services - RxJS Observables - HTTP - Routing

Unit 8: PHP and MySQL

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

Internal Continuous Assessment :

- 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.

Text Books /Reference Books:

- 1. Harvey & Paul Deitel& Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web How To Program", Fifth Edition, Pearson Education, 2011.
- 2. Achyut S Godbole and Atul Kahate, "Web Technologies", Second Edition, Tata McGraw Hill, 2012.
- 3. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013.
- 4. David Flanagan, "JavaScript: The Definitive Guide, Sixth Edition", O'Reilly Media, 2011
- 5. Bear Bibeault and Yehuda Katz, "jQuery in Action", January 2008
- 6. Web link for Responsive Web Design https://bradfrost.github.io/this-is-responsive/
- 7. Ebook link for JavaScript https://github.com/jasonzhuang/tech_books/tree/master/js
- 8. Nathan Rozentals, "Mastering TypeScript", April 2015
- 9. Nate Murray, Felipe Coury, Ari Lerner and Carlos Taborda, "ng-book, The Complete Book on Angular 4" September 2016
- 10. AmolNayak, "MongoDB Cookbook Paperback", November 2014
- 11. KrasimirTsonev, "Node.js by Example Paperback", May 2015
- 12. Web link for TypeScript: https://www.typescriptlang.org/
- 13. Web link for Angular4.0: <u>https://angular.io/</u>
- 14. Web link for Node.js : https://nodejs.org/en/
- 15. Web link for MongoDB: <u>https://www.mongodb.com/</u>

(4 Hrs)

(3 Hrs)

(4 Hrs)



Punyashlok Ahilyadevi Holkar Solapur University Solapur B.E. (INFORMATION TECHNOLOGY) SEMESTER – II

PROJECT-II

Teaching Scheme Practical: 6 Hours/ week, 3 Credits Examination Scheme

ESE - 100 Marks ICA – 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:

At the end of the course, student 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.