WITH EFFECT FROM ACADEMIC YEAR 2016-17

Syllabus of B.E. IV YEAR
OF

FOUR YEAR DEGREE COURSE
IN

COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)
Hyderabad – 500 075

WITH EFFECT FROM ACADEMIC YEAR 2016-17

Chaitanya Bharathi Institute of Technology (Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION
B.E - IV Year

COMPUTER SCIENCE & ENGINEERING

SEMESTER-I

Sl.No	Syllabus Ref. No	SUBJECT	Scheme of Instructions		Scheme of Examination			Credits
			Per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		Uni. Exam	Sessional	
THEORY								
1	CS 411	Artificial Intelligence	4	-	3	75	25	3
2	CS 412	Distributed Computing	4	-	3	75	25	3
3	CS 413	Data Mining	4	-	3	75	25	3
4	CS 414	OOSD	4	-	3	75	25	3
5		Elective - II	4	-	3	75	25	3
PRACTICALS								
6	CS 415	Data Mining Lab	-	3	3	50	25	2
7	CS 416	OOSD Lab	-	3	3	50	25	2
8	CS417	Project Seminar	-	3	3	-	25	1
		TOTAL	**20**	**09**	**24**	**475**	**200**	**20**

Elective-II:

CS 461 Mobile Computing
CS 462 Adhoc Sensor Networks
CS 463 Optimization Techniques
CS 464 Open Source Technologies
CS 465 Software Project Management
ME 464 Entrepreneurship

WITH EFFECT FROM ACADEMIC YEAR 2016-17

Chaitanya Bharathi Institute of Technology (AUTONOMOUS)

SCHEME OF INSTRUCTION & EXAMINATION

B.E - IV Year
COMPUTER SCIENCE & ENGINEERING

SEMESTER-II

	Syllabus Ref. No	SUBJECT	Scheme of Instructions per Week		Scheme of Examination			Credits
					Duration in Hrs.	Maximum Marks		
			L/T	D/P		Uni. Exam	Sessionals	
THEORY								
1	CS 421	Information and Network Security	4	-	3	75	25	3
2		Elective-III	4	-	3	75	25	3
3		Elective-IV	4	-	3	75	25	3
PRACTICALS								
4	CS 422	Information and Network Security Lab	-	3	3	50	25	2
5	CS 423	Seminar	-	3	-	-	25	1
6	CS 424	Project	-	6	Viva Voce	100	50	9
		TOTAL	**12**	**12**	**12**	**275**	**175**	**21**

Elective-III:

CS 471 Data science and big data analytics
CS 472 Cloud Computing
CS 473 Semantic Web & Social Networks
CS 474 Cyber Forensics
CS 475 Human Machine Interaction
CS 476 Software Reuse Techniques

Elective-IV:

CS 481 Pattern Recognition
CS 482 Bio Informatics
CS 483 Machine Learning
CS 484 Business Intelligence
ME472 Intellectual Property Rights
CE 422 Disaster Mitigation and Management

SEMESTER-I

WITH EFFECT FROM ACADEMIC YEAR 2016-17

CS 411

ARTIFICIAL INTELLIGENCE

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To list the significance of AI.
2. To discuss the various components that are involved in solving an AI problem.
3. To analyze the various knowledge representation schemes, Reasoning and Learning techniques of AI.
4. Apply the AI concepts to build an expert system to solve the real world problems.

Course Outcomes:

After completion of the course, student should be able to:

1. Differentiate between a rudimentary Problem and an AI problem, it's Characteristics and problem solving Techniques.
2. Determine and evaluate the various search strategies.
3. Compare and contrast the various "knowledge representation" schemes of AI.
4. Understand and Analyze the various reasoning techniques involved in solving AI problems.
5. Understand the different learning techniques.
6. Apply the AI techniques to solve the real world problems.

UNIT I

Introduction & Problem Solving: AI problems, AI Technique, Defining problem as a State-Space Search, Production Systems, Problem Characteristics, Production System Characteristics.
Heuristic Search Techniques: Generate – and – test, Hill Climbing, Best – First Search, Problem Reduction, Constraint Satisfaction, Means-ends Analysis.

UNIT II

Game Playing: Overview, Min-Max search Procedure, Adding Alpha-beta Cutoffs, Additional Refinements, Iterative Deepening.
Knowledge Representation Issues: Approaches, Issues, Frame Problem,
Using Predicate Logic: Representing simple facts in logic, Representing Instance and ISA Relationships, Computable Functions and predicates, Resolution, Natural Deduction.

UNIT III

Uncertainty and Reasoning Techniques: Non monotonic reasoning, Logics for Non monotonic reasoning, Implementation issues, Augmenting a problem solver, implementation of Depth First Search and Breadth first search.

Statistical reasoning: Probability and Bayes theorem, Certainty factors and Rule-based systems, Bayesian Networks, Dempster-Shafer Theory.

UNIT IV

Learning: What is Learning, Rote learning, Learning by taking advice, Learning in problem solving, learning from examples: Induction, Learning by Decision trees.

Expert System: Representing and Using Domain Knowledge, Expert systems shells, Explanation, Knowledge Acquisition.

UNIT V

Perception and Action: Real Time Search, Vision, Speech Recognition, ACTION: Navigation, Manipulation, Robot architectures.

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Statistical NLP, Spell Checking.

TEXT BOOKS:

1. Elaine Rich, Kevin Night, Shivashankar B Nair, "Artificial Intelligence",3rd Edition.,2008
2. Russell Norvig, "Artificial Intelligence-Modern Approach", 3rd edition, 2009.

SUGGESTED READINGS:

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2012.
2. Nelson M. Mattos , "An Approach to Knowledge Base Management", Springer Berlin Heidelberg, 1991.

WITH EFFECT FROM ACADEMIC YEAR 2016-17

CS 412

DISTRIBUTED COMPUTING

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Present the principles underlying the function of distributed computing.
2. Create an awareness of distributed computing design and implementation.
3. Describe and distinguish synchronization and concurrency control in distributed computing system.
4. Understanding distributed transaction and control of distributed deadlocks.
5. Understanding distributed computing in cloud and grid computing.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the characteristics and models in distributed computing.
2. Understand key mechanisms of remote execution.
3. Get familiar with synchronization of processes in distributed environment.
4. Acquire the knowledge of distributed transaction, concurrency and deadlock.
5. Acquire the knowledge of working of grid and cloud computing.
6. Identify the problems in developing distributed applications.

UNIT I

Characterization of Distributed Systems: Introduction, Examples of distributed systems, Resource sharing and the web, Challenges.
System Models: Introduction, Architectural models, Fundamental models.
Operating System Support: Introduction, The operating system layer, Protection, Processes and threads, Communication and invocation, Operating system architecture.

UNIT II

Interprocess communication: Introduction, The API for the internet protocols, External data representation and marshalling, Client Server communication, Group Communication.
Case study: Interprocess communication: Introduction to UNIX.
Distributed objects and Remote Invocation: Introduction, Communication between distributed objects.
Remote procedure call, Events and notifications.
Case study: Java RMI.
Name Services: Introduction, Name services and the Domain Name System.

UNIT III

Time and Global States: Introduction, Clocks events and process states, Synchronizing physical clocks, Logical clocks, Global states, Distributed debugging.

Coordination and Agreement: distributed mutual exclusion, Election, Multicast communication, Consensus and related problems.

UNIT IV

Transactions and Concurrency Control: Introduction, Transactions, Nested transactions, Locks Optimistic concurrency control. Timestamp ordering, Comparison of methods for concurrency control.

Distributed Transactions: Introduction, Flat and nested distributed transactions, Atomic commit process, Concurrency control in distributed transactions.

Distributed deadlocks, Transaction recovery.

Replication: Introduction, System model and group communication, Fault-tolerant services.

UNIT V

Grid Computing: How Grid Computing Works, Grid Middleware, Grid Architecture, Types of Grids, Grid Computing Applications.

Service Oriented Architecture, Web Services , Service-Oriented Grid, SOA Design and Development, Advantages and the Future of SOA.

Cloud Computing: Features and Architecture, Cloud Computing Landscape.

TEXT BOOKS:

1. Colouris, Dollimore, Kindberg, " Distributed Systems concepts and Design", 5th Ed. Pearson Education, 2016.
2. Andrew S. Tanenbaum, Van Steen, " Distributed Systems" , Pearson Education , 2002.

SUGGESTED READINGS:

1. Sunita Mahajan and Seema Shah ,"Distributed Computing", Oxford University Press, 2013.
2. S.Ghosh, Chapman and Hall/CRC ,"Distributed Systems" , Taylor & Francis Group, 2010.
3. Pradeep K.Sinha ,"Distributed Operating Systems Concepts and Design" , PHI.

CS 413

DATA MINING

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Understand data mining principles and techniques: Introduce DM as a cutting edge business intelligence method and acquaint the students with the DM techniques for building competitive advantage through proactive analysis, predictive modeling, and identifying new trends and behaviors.
2. Building basic terminology.
3. Learn how to gather and analyze large sets of data to gain useful business understanding.
4. Learn how to produce a quantitative analysis report/memo with the necessary information to make decisions.
5. Describing and demonstrating basic data mining algorithms, methods, and tools
6. Identifying business applications of data mining
7. Develop and apply critical thinking, problem-solving, and decision-making skills.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand operational database, warehousing and multidimensional need of data base to meet industrial needs.
2. Apply the association rules for mining the data.
3. Design and deploy appropriate classification techniques.
4. Cluster the high dimensional data for better organization of the data.
5. Compare and contrast the dominant data mining algorithms.
6. Introduce knowledge gain about data mining, decision tree, neural networks and clustering.

UNIT I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT II

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Usage of Data Warehousing Online Analytical Processing and Mining Data Cube Computation: Efficient Methods for simple Data Cube Computation (Full Cube, Iceberg Cube, Closed Cube and Shell

Cube), Discovery Driven exploration of data cubes, Attribute-Oriented Induction for data characterization and its implementation.

UNIT III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, The Apriori algorithm for finding frequent itemsets using candidate generation, Generating association rules from frequent itemsets, Mining frequent itemsets without candidate generation, Mining various kinds of Association Rules, Correlation Analysis.

UNIT IV

Classification and Prediction: Description and comparison of classification and prediction, preparing data for Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation Prediction, linear and non-linear regression, evaluating accuracy of a Classifier or a Predictor.

UNIT V

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, k-means and k-mediod methods, CLARANS, Agglomerative and divisive hierarchical clustering, chameleon dynamic modeling, Constraint-Based Cluster Analysis, Outlier Analysis.

TEXT BOOKS:

1. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining – Concepts and Techniques" , 3rd edition, Morgan Kaufmann Publishers, ELSEVIER,2012.
2. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2005.

SUGGESTED READINGS:

1. Sam Aanhory & Dennis Murray "Data Warehousing in the Real World" , Pearson Edn Asia.
2. K.P.Soman, S.Diwakar, V.Ajay ,"Insight into Data Mining", PHI, 2008.
3. Ralph Kimball Wiley "The Data Warehouse Life cycle Tool kit",student edition
4. William H Inmon, John Wiley & Sons Inc "Building the Data Warehouse", 2005.
5. Margaret H Dunham "Data Mining Introductory and advanced topics", Pearson education.
6. Arun K Pujari "Data Mining Techniques", 2nd edition, Universities Press.

CS 414

OBJECT ORIENTED SYSTEM DEVELOPMENT(OOSD)

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Understanding object basics, classes and objectives, inheritance.
2. How software objects are altered to build software systems that are more robust.
3. To understand and to gain the level of competence in the area of OOSD.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the importance of modeling.
2. Understand the basic, advanced structural modeling and basic behavioral modeling.
3. Understand the advanced behavioral modeling.
4. Understand the architectural modeling.
5. Get familiar with the Unified Software Development Approach.
6. Get familiar with the concepts and various diagrams using UML.

UNIT I

UML Introduction: Necessity of a model, Introducing the UML, Hello World.
Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class diagrams.

UNIT II

Advanced Structural Modeling: Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages, Instances, Object diagrams.
Behavioral Modeling: Use Cases, Use case diagrams, Interactions, Interaction diagrams, Activity diagrams.

UNIT III

Advanced Behavioral Modeling: Events and Signals, State machines, Processes and Threads, State Chart diagrams.

UNIT IV

Architectural Modeling: Components, Component diagrams, Deployment, Deployment diagrams, Patterns and Frameworks.

UNIT V

Unified Software Development Process: The Unified Process, The Four Ps, A Use-Case Driven Process, An Architecture-Centric Process, An Iterative and Incremental Process.

TEXT BOOKS:

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education, 2007.
2. Ivar Jacobson, Grady Booch, James Rumbaugh, "The Unified Software Development Process", Rational Software Corporation,2014.

SUGGESTED READINGS:

1. Simon Bennet, Steve Mc. Robb, Ray Farmer, "Object Oriented System Analysis and Design using UML", McGraw Hill, 2002.
2. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.
5. Ali Bahrami, "Object Oriented System Development", Tata McGraw Hill, 2015.

CS 415

DATA MINING LAB

Instruction	3L per week
Duration of SEE	3 Hours
SEE	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. Understand basic data mining principles, to apply data mining algorithms to huge data.
2. To provide a practical exposure on data warehouse operations and schemas.
3. To be able to understand the requirements of information and knowledge gain.

Course Outcomes:

After completion of the course, student should be able to:

1. Describe the usage of data mining tools
2. Analyze the data using data mining algorithms.
3. Master on the data warehouse methods and schemas.
4. Master on the gain the knowledge using the data mining from large data.

List of programs:

1. Implement the following Multidimensional Data Models

i. Star Schema

ii. Snowflake Schema

iii. Fact Constellation

2. Implement Apriori algorithm to generate frequent Item Sets
3. Implement the following clustering algorithms

i. K-means

ii. K-mediods

4. Implement the following classification algorithms

i. Decision Tree Induction

ii.KNN

5. Perform Data Preprocessing using WEKA
6. Perform Discretization of data using WEKA
7. Classification algorithms using WEKA

8. Apriori algorithm using WEKA.

9. Perform data transformations using an ETL Tool.

10. A small case study involving all stages of KDD. (Datasets are available online like UCI Repository etc.).

11. Introduction to Informatica Tool for ETL operations.

TEXT BOOK:

1. Roiger, Richard, "Data Mining : A Tutorial Based Primer".

SUGGESTED READINGS:

1. K.P.Somen, Shyam Diwakar and V.Aja,"Insight into Data Mining theory and practice", Eastern Economy Edition, Prentice Hall of India, 2006.

CS 416

OOSD LAB

Instruction	3L per week
Duration of SEE	3 Hours
SEE	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. Develop a problem statement.
2. Develop an standard SRS document.
3. Design various UML diagrams.

Course Outcomes:

After completion of the course, student should be able to:

1. Identity the conceptual classes and develop a domain model with UML Class diagram.
2. Identify Use Cases and develop the Use Case model.
3. Usethe identified scenarios find the interaction between objects and represent those using UML Interaction diagrams.
4. Identify the business activities and develop an UML Activity diagram.
5. Draw the State Chart diagram.
6. Draw Component and Deployment diagrams.

List of Programs:

Select one Information System/Approach and device the following using UML tool:

1. Structured Diagrams (Data Flow Diagrams, Entity-Relationship Diagrams etc..)
2. Preparation of Software Requirement Specification Document for a given Case Study.

UML Diagrams

1. Use Case Diagrams
2. Class Diagrams
3. Object Diagrams
4. Sequence Diagrams
5. Collaboration Diagrams
6. Activity Diagrams
7. State Chart Diagrams
8. Component Diagrams
9. Deployment Diagrams

TEXT BOOKS:

1. Simon Bennet, Steve Mc. Robb, Ray Farmer, "Object Oriented System Analysis and Design using UML", McGraw Hill, 2002.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.

CS 417

PROJECT SEMINAR

Instruction	3L per week
Sessionals	25 Marks
Credits	1

Dealing with a real time problem should be the focus of under graduate project.

Faculty members should prepare project briefs (giving scope and references) well in advance, which should be made available to the students in the department.
The project may be classified as hardware / software modeling / simulation. It may comprise any or all elements such as analysis, design and synthesis.

The department should appoint a project coordinator who will coordinate the following.

- Grouping of students (a maximum of 3 in group)
- Allotment of projects and project guides
- Project monitoring at regular intervals.

All project allotment are to be completed by the 3rd week of IV–Year, I-Semester, so that the students get sufficient time for completion of the project by the end of II-semester.

Efforts be made the some of the projects are carried out in reputed industries / research organizations with the help of industry coordinators. Problems can also be invited from the industries to be worked out through undergraduate projects.

Oral presentation is an important aspect of engineering education. The students have to deliver a seminar on the 'project' they have chosen or allotted by the department, on the advice and approval from the faculty members. Students are exposed to the following aspects for seminar presentation.

- Literature Survey
- Organization of the material
- Power point presentation
- Technical writing

Each student project batch is required to:

1. Submit a one-page synopsis before the seminar talk for display on the notice board.
2. Give a 20-30 minutes presentation through power point presentation.
3. Submit a report on the project with list of references and slides used.

Project Seminars are to be scheduled from the 4th week of the I-semester to the last week of the I-semester.

For award of Sessional marks students are judged by the project coordinator and guide on the basis of an oral and written presentation as well as their involvement in the discussions.

Elective II:

WITH EFFECT FROM THE ACADEMIC YEAR 2016 - 2017

CS 461

MOBILE COMPUTING

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Understand and identify the GSM, GPRS and Bluetooth software model for mobile computing.
2. Understand, analyze and explain problems associated to localization and movements, the wireless and wired communication architecture, handling of data and business application over slow wireless networks.
3. Understand and identify business data management and security issues over slow wireless media.
4. Understand, analyze and explain working of software mobile agents over long distances, transaction processing over wire and wireless media.
5. Introduce with ad-hoc networks, clustering and their usage in practical world.
6. Understand various routing and communication protocols and QoS over wire and wireless channels.
7. Understand and recognize CDMA and other network applications.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand working, characteristics and limitations of mobile hardware devices including their user-interface modalities.
2. Understand and learn frequency band, spectrum, air interface and channel structure.
3. Understand the necessary knowledge of cellular communication, infrastructure-less networks.
4. Analyze TCP, MAC protocols and their technical feasibility.
5. Work as a part of team on multidisciplinary and device independent application projects.
6. Understand and implement the hardware components/architectures/databases/operating system of mobile networks that is necessary to built self confidence to develop novel products and solutions for real world.

UNIT I

Introduction: History of wireless communication, Applications, Wireless transmission. Frequencies for radio transmission, Regulations, Signals, Antennas, Signal propagation, Multiplexing, Spread spectrum, Cellular Systems.

UNIT II

Medium access control : motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA . Telecommunication Systems : GSM, GPRS, DECT.

Satellite Networks – Applications, Basics, Routing, Localization, Handover, Examples.

UNIT III

Broadcast Systems: DAB , DVB.

Wireless LAN :IEEE 802.11 , Architecture ,services ,MAC ,Physical layer.

IEEE 802.11 a , 802.11 b standards ,HIPERLAN , Bluetooth.

UNIT IV

Mobile IP, Dynamic Host Configuration Protocol, Routing in MANETs – Routing, DSDV, DSR, Alternative metrics, Overview ad-hoc routing protocols.

UNIT V

Traditional TCP – Classical TCP improvements – WAP, and WAP 2.0., File Systems and Mobility Management, Windows CE, Palm OS, Symbian OS.

TEXT BOOKS:

1. Jochen H. Schiller, "Mobile Communications", Addison Wesley, Second Edition, 2003.
2. William Stallings, "Wireless Communications and Networks", PHI/Pearson Education, 2002.

SUGGESTED READINGS:

1. Asoke K Talukder, et al, "Mobile Computing", Tata McGraw Hill, 2008.
2. Raj Kamal, "Mobile Computing", Oxford University press.

CS 462

ADHOC SENSOR NETWORKS

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To impart knowledge of adhoc networks, design and implementation issues, and available solutions.
2. To impart knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid.
3. To provide knowledge of sensor networks and their characteristics.
4. Study the Applications of Sensor Networks.

Course Outcomes:

After completion of the course, student should be able to:

1. Describe the unique issues in ad-hoc/sensor networks.
2. Understand current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks.
3. Explain the challenges in designing MAC, routing and transport protocols for wireless ad-hoc sensor networks.
4. Gain knowledge on implementation of protocols on a sensor test bed network.
5. Explain the principles of mobile ad hoc networks (MANETs)
6. Explain the principles and characteristics of wireless sensor networks (WSNs).

UNIT I

Introduction to Ad-Hoc networks, Wireless LANs, Wireless PANs, Wireless Mesh Networks, Topology Control in Wireless Ad Hoc Networks, Broadcasting and Activity Scheduling in Ad Hoc Networks, Location Discovery, Mobile Ad Hoc Networks (MANETs): Routing Technology for Dynamic Wireless Networking, Congestion Control in ad hoc wireless networks.

UNIT II

Introduction, Routing in Ad Hoc Networks, Broadcasting, Multicasting and Geocasting, Mobile Ad-Hoc Networking with a View of 4G Wireless: Imperatives and Challenges, Off-the-Shelf Enables of Ad Hoc Networks, IEEE 802.11 in Ad Hoc Networks: Protocols, Performance and Open Issues.

UNIT III

Media Access Control (MAC) Protocols: Issues in designing MAC protocols, Classifications of MAC protocols, MAC protocols, Cognitive Radio and Networks, TCP over Ad Hoc Networks, Energy-Efficient Communication in Ad Hoc Wireless Networks, Ad Hoc Networks Security, Self-Organized and Cooperative Ad Hoc Networking, Security in Ad Hoc and Sensor Networks.

UNIT IV

Introduction to Sensor networks, Introduction and Overview of Wireless Sensor Networks: Applications of Wireless Sensor Networks, Examples of Category 1 WSN Applications, Basic Wireless Sensor Technology: Sensor Node Technology, Sensor Taxonomy, WSN Operating Environment, WSN Trends.

UNIT V

Sensor Networks Design Considerations, Sensor Networks in Controlled Environment, Wireless Transmission Technology and Systems: Radio Technology Primer, Available Wireless Technologies. Medium Access Control Protocols for Wireless Sensor Networks: Fundamentals of MAC Protocols, MAC Protocols for WSNs, Sensor-MAC Case Study, IEEE 802.15.4 LR-WPANs Standard Case Study.

Integrating MANETs, WLANs and Cellular Networks, Networking Sensors: Unique features, Deployment of ad-hoc/sensor network, Sensor tasking and control, Transport layer and security protocols, Applications of Sensor Networks.

TEXT BOOKS:

1. Carlos de Morais Cordeiro and Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks : Theory and Applications", Second Edition, World Scientific Publishers, 2011
2. Prasant Mohapatra and Sriramamurty, "Ad Hoc Networks: Technologies and Protocols", Springer International Edition, 2009
3. Kazem Sohraby, Daniel Minoli, Taieb Znati, "Wireless Sensor Networks', A John Wiley & Sons Inc. Publication, 2007

SUGGESTED READINGS:

1. C. Siva Ram Murthy & B. S. Manoj, "Ad hoc Wireless, Networks – Architecture and Protocols", Prentice Hall, 2004.
2. Jagannathan Sarangapani, Wireless Ad hoc and Sensor Networks: Protocols, Performance, and Control, CRC Press, 2007.

CS 463

OPTIMIZATION TECHNIQUES

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems.
2. To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology
3. To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems**.**

Course Outcomes:

After completion of the course, student should be able to:

1. Get awareness about the real world problems, their understanding and ability to formulate mathematical models of these problems.
2. Understand the Transportation model, Traveling salesman and ability to find optimal solution.
3. Understand the major limitations and capabilities of deterministic operations research modeling as applied to problems in industry or government.
4. Learn to handle, solve and analyze problems using linear programming and other mathematical programming algorithms.
5. Learn how to deal with real world problems of Network analysis, Project Management, for their optimal solutions; for example, they understand how much optimum cable wire is required to give cable connection to some buildings connected by a network.
6. Learn different techniques to solve Non- Linear Programming Problems.

UNIT I

Operation Research – Introduction, Models, Areas of Application. Linear Programming (L.P.): Mathematical Formulation of L.P. problem. Graphical Method. Simplex Method – Concept of slack, surplus & artificial variables. Manual solutions of L.P.P. Minimization & Maximization Problems. Special Cases – (i) Alternative optima (ii) Unbounded solutions & (iii) Infeasible solutions to be shown graphically & also by simplex method.

UNIT II

Definition of the transportation model. Balanced / Unbalanced, Minimization / Maximization. Determination of the initial basic feasible solution using (i) North – West Corner Rule (ii) Least Cost method & (iii) Vogel's approximation method for balanced & unbalanced transportation problems. Optimality Test & Obtaining of optimal solution. (considering per unit transportation cost)

UNIT III

Assignment model. Assignment problem Formulation. Hungarian method for optimal solution. Solving unbalanced problem. Travelling Salesman problem and assignment problem.

Sequencing models, solution of sequence problem-processing n jobs through 2 Machines, processing n jobs through 3 machines, processing 2 jobs through m Machines, processing n jobs through m Machines.

UNIT IV

Integer Programming Problem: Introduction, Types of integer programming problems, Gomory's AII IPP Method, All IPP Algorithm, Branch and Bound Technique Game Theory: Introduction, Game with pure Strategies, Game with Mixed Strategies, Dominance property, Graphical method for 2Xn or mX2 Games, Linear programming Approach for Game Theory.

UNIT V

Construction of Network-Rules & Precautions C.P.M. & P.E.R.T. Networks. Obtaining of critical path, Time estimates for activities, Probability of completion of project. Determination of floats (total, free, independent &interfering).

TEXT BOOKS:

1. Kantiswarup,Gupta P.K.& Sultan Chand & Sons Manmohan, "Operations Research" 9th Edition, ,2013.
2. Taha H.A.,"Operations Research-An Introduction" 6th Edition, Hall of India, 2014.

SUGGESTED READINGS:

1. R. Panneerselvam**, "**Operations research**",** PHI Learning Pvt. Ltd.,2006.

CS 464

OPEN SOURCE TECHNOLOGIES

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course objectives:

1. Understand the difference between open source software and commercial software.
2. Familiarity with Linux operating system.
3. Understanding and development of web applications using open source web technologies like Apache, MySql and PHP (LAMP/XAMP).

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the difference between open source software and commercial software.
2. Identify, install and run Linux operating system.
3. Install and manage applications.
4. Identify, install open source web technologies Apache, MySql, PHP.
5. Develop web applications using LAMP.
6. Write session control PHP code for a website.

UNIT I

OPEN SOURCE: Introduction to Open Source – Open Source vs. Commercial Software – What is Linux? - Free Software – Where I can use Linux? Linux Kernel – Linux Distributions

UNIT II

LINUX: Introduction to Linux Essential Commands - Filesystem Concept - Standard Files
1. The Linux Security Model - Vi Editor - Partitions creation - Shell Introduction
2. String Processing - Investigating and Managing Processes - Network Clients - Installing Application

UNIT III

APACHE: Apache Explained - Starting, Stopping, and Restarting Apache - Modifying the Default Configuration - Securing Apache - Set User and Group - Consider Allowing Access to Local Documentation - Don't Allow public html Web sites - Apache control with .htaccess

UNIT IV

MYSQL: Introduction to MYSQL - The Show Databases and Table - The USE command - Create Database and Tables - Describe Table - Select, Insert, Update, and Delete statement - Some Administrative detail - Table Joins - Loading and Dumping a Database.

UNIT V

PHP: Introduction- General Syntactic Characteristics - PHP Scripting - Commenting your code - Primitives, Operations and Expressions - PHP Variables - Operations and Expressions Control Statement - Array - Functions - Basic Form Processing - File and Folder Access - Cookies - Sessions - Database Access with PHP - MySQL - MySQL Functions - Inserting Records - Selecting Records - Deleting Records - Update Records.

TEXT BOOK:

1. James Lee and Brent Ware ,"Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", , Dorling Kindersley(India) Pvt. Ltd, 2008.

SUGGESTED READINGS:

1. Eric Rosebrock, Eric Filson ,"Setting Up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together", Published by John Wiley and Sons, 2004.

WITH EFFECT FROM THE ACADEMIC YEAR 2016 - 2017

CS 465

SOFTWARE PROJECT MANAGEMENT

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Understand the fundamental principles of Software Project management & will also have a good knowledge of responsibilities of project manager and how to handle these.
2. Be familiar with the different methods and techniques used for project management.
3. To have good knowledge of the issues and challenges faced while doing the Software project Management.
4. Will be able to understand why majority of the software projects fails and how that failure probability can be reduced effectively.
5. Will be able to do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand and practice the process of project management and its application in delivering successful IT projects.
2. Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities.
3. Understand and use risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on project timescales.
4. Identify the resources required for a project and to produce a work plan and resource schedule.
5. Monitor the progress of a project and to assess the risk of slippage, revising targets or counteract drift.
6. Distinguish between the different types of project and follow the stages needed to negotiate an appropriate contract.

UNIT I

Conventional Software Management: The Waterfall Model, Conventional software Management Performance.

Evolution of Software Economics: Software Economics, Pragmatic Software Cost Estimation.

Improving Software Economics: Reducing Software Product Size, improving software processes, improving team effectiveness, Improving Automation through Software Environments, Achieving Required Quality.
Old way and the new: The Principles of Conventional Software Engineering and Moden Software Management.

UNIT II
Life cycle phases: Engineering and Production Stages,Inception Phase, Elaboration Phase,Construction Phase, Transition Phase.
Artifacts of the process: The Artifact Sets, Management Artifacts, Engineering Artifacts, Pragmatic Artifacts.
Model based software architectures: Management Perspective,Technical Perspective.
Work Flows of the process, Checkpoints of the process.

UNIT III
Iterative Process Planning, Project Organizations and Responsibilities, Process Automation, Project Control of Process instrumentation, tailoring the Process.

UNIT IV
Modern Project Profiles, Next generation Software economics, modern process transitions, Managing Contracts, Managing People and Organizing Teams.

UNIT V
Process Improvement and Managing to the CMM, ISO 12207- an Overview, Program Management. A Case Study.

TEXT BOOK:

1. Walker Royce ,"Software Project Management" , Pearson Education, 2005.
2. Bob Hughes and Mike Cotterell ,"Software Project Management", Tata McGraw-Hill Edition-2011.

SUGGESTED READINGS:

1. Joel Henry "Software Project Management" , Pearson Education, First Edition, 2004.
2. Pankaj Jalote "Software Project Management in practice" , Pearson Education,2005.

SEMESTER-II

WITH EFFECT FROM THE ACADEMIC YEAR 2016 - 2017

CS 421

INFORMATION AND NETWORK SECURITY

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Deal with the underlying principles of information and network security.
2. Deal with the construction and cryptanalysis of block ciphers, stream ciphers and hash functions.
3. Define one way functions and trap-door functions and presents the construction and cryptanalysis of public key ciphers, namely RSA.
4. Deal with the key exchange problem and solutions using the Diffie-Hellman and Message Authentication Codes (MAC) and signature schemes.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the most common type of information and network threat sources.
2. Understand the Public-Key Infrastructure.
3. Understand security protocols for protecting data on networks.
4. Understand the information and network security issues and apply the related concepts for protection and communication privacy.
5. Understand application security using smart- cards.
6. Understand the operation of e-payments, micro- payments and related security issues, protocols.

UNIT 1

Planning for Security: Introduction, Information Security Policy, Standards, and Practices; The Information Security Blue Print; Contingency plan and a model for contingency plan
Security Technology: Introduction; Physical design; Firewalls; Protecting Remote Connections Intrusion Detection Systems (IDS); Honey Pots, Honey Nets, and Padded cell systems; Scanning and Analysis Tools.

UNIT II

Cryptography: Introduction; A short History of Cryptography; Principles of Cryptography; Cryptography Tools; Attacks on Cryptosystems.

UNIT III

Introduction to Network Security, Authentication Applications: Attacks, services, and Mechanisms; Security Attacks; Security Services; A model for Internetwork Security; Internet Standards and RFCs Kerberos, X.509 Directory Authentication Service.

UNIT IV

Electronic Mail Security: Pretty Good Privacy (PGP); S/MIME

IP Security: IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating Security Payload; Combining Security Associations; Key Management.

UNIT V

Web Security: Web security requirements; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET).

TEXT BOOKS:

1. Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, 2nd Edition, Cengage Learning, 2005.

2. William Stallings: Network Security Essentials: Applications and Standards, 3rd Edition, Pearson Education, 2007.

SUGGESTED READINGS:

1. Behrouz A. Forouzan "Cryptography and its principles".

CS 422

INFORMATION AND NETWORK SECURITY LAB

Instruction	3 per week
Duration of SEE	3 Hours
SEE	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. Understand basic cryptography principles, including some well known algorithms for symmetric and public key encryption, digital signatures, key management.
2. To provide a practical exposure of both the principles and practice of advanced cryptography.
3. Understand and fulfill the requirements C.I.A .
4. Understand the underlying principles of information and network security.

Course Outcomes:

After completion of the course, student should be able to:

1. Demonstrate detailed knowledge of the role of encryption to protect data.
2. Analyze security issues arising from the use of certain types of technologies.
3. Master protocols for security services.
4. Master on the key exchange and Authentication protocols.

List of Programs:

3. Java program to perform encryption and decryption using the following algorithms
   a. Ceaser cipher b. Substitution cipher c. Hill Cipher
4. C program to implement the DES algorithm logic.
5. JAVA program to implement the DES algorithm logic.
6. JAVA program that contains functions, which accept a key and input text to be encrypted/decrypted. This program should use the key to encrypt/decrypt the input by using the triple DES algorithm. Make use of Java Cryptography package.
7. C/JAVA program to implement the Blowfish algorithm logic
8. Java program to implement RSA algorithm.
9. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
10. Calculate the message digest of a text using the MD5 algorithm in JAVA.
11. Explore the Java classes related to digital certificates.
12. Create a digital certificate of your own by using the Java key tool

TEXT BOOKS:

1. Michael Gregg "Build Your Own Security Lab" , Wiley India.

SUGGESTED READINGS:

1. Alfred Basta, Wolf Halton, "Computer Security, concepts, issues and implementation:, Cengage Learning".

CS 423

SEMINAR

Instruction	3L per week
Sessional	25 Marks
Credits	1

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for a systematic and independent study of the state of the art topics in a broad area of the specialization.

Seminar topics may be chosen by the student with advice and approval from the faculty members. Students are to be exposed to the following aspects of seminar presentation.

- Literature Survey
- Consolidation of available information
- Power point presentation
- Technical writing

Each student is required to:

1. Submit a one-page synopsis before the seminar talk for display on the notice board.
2. Give a 20 minutes presentation through power point followed by a 10 minutes discussion.
3. Submit a report on the seminar topic with list of references.

Seminars are to be scheduled from the 3rd week of to the last week of the II-semester.

For award of Sessional marks students are judged on the basis of an oral and written presentation as well as their involvement in the discussions by at least two faculty members.

CS 424

PROJECT

Instruction	6L per week
University Examination	Viva-voce
University Examination	100 Marks
Sessional	50 Marks
Credits	9

Dealing with a real time problem should be the focus of under graduate project.

All projects will be monitored at least four times in the II-semester through individual presentations (Project batch wise).

Every student should maintain a project dairy, wherein he/she needs to record the progress of his/her work and get it signed at least once in a week by the guide(s). If working outside and college campus, both the external and internal guides should sign the same.

Problems can also be invited from the industries to be worked out through undergraduate projects. Efforts may be made such that the projects may be carried out in reputed industries/ research organizations/PSUs.

Sessional marks should be based on the marks, awarded by a monitoring project committee of faculty members as well as the marks given by the guide.

Common norms should be established for final documentation of the project report by the respective department on the following lines:

1. The project title should be task oriented for example "Design and Analysis of ……."
2. Objectives of the project should be identified clearly and each student of the project batch should fulfill at least one of the objectives identified. The chapters of the project report should reflect the objectives achieved.

3. Contents of the report should include the following
    a. Title page
    b. Certificate
    c. Acknowledgements
    d. Abstract (limited to one/two paragraphs, page no.1 should start from this)
    e. Contents (Ch. No. Title of the chapter/section Page No.)
    f. List figures (Fig. No. caption of the figure Page No.)
    g. List of Tables (Table. No. Caption of the table Page No.)
    h. List of Symbols (ex. C: Velocity of light 3×10^8 m/s)

i. Chapter I should be introduction . This should contain sections as objectives of the project, technical approach, literature survey, the importance of the project and organization of the report.
j. The remaining chapters should include regarding the implementation of the project, results with discussions and conclusions. Students are expected to write about future scope of the project.
k. References should be indicated as per IEEE or standard format, which should be duly referred in the report.
l. The algorithms related to the software developed should be thoroughly discussed in Appendices

etc..

4. The project reports should be hard bound.

The project report should be evaluated for 100 Marks by the External Examiner.

The project work, if found inadequate in the external examination, the candidate should repeat the project work with a new problem or improve the quality of work and report it again.

Elective - III

WITH EFFECT FROM THE ACADEMIC YEAR 2016 - 2017

CS 471

DATA SCIENCE AND BIG DATA ANALYTICS

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Applying and understanding the big data flow for the actual projects.
2. Understands the lifecycle of the data analytics & big data ecosystem and able to apply for real world problems.
3. Acquires knowledge on the tools and techniques for solving big data analytics.
4. Learns how to apply the mining techniques on big data.

Course Outcomes:

After completion of the course, student should be able to:

1. Have a clear idea about the big data flow and its ecosystem.
2. Apply the tools and techniques on big data while applying data mining techniques.
3. Use statistical tool and statistical methods that can be applied on big data.
4. Have a clear idea about how to represent the unstructured data in the data bases.
5. Understand the common Hadoop ecosystem components, Hadoop Architecture, HDFS, Anatomy of File Write and Read, Rack Awareness.
6. Understand Hadoop Map Reduce framework and the working of MapReduce on data stored in HDFS.

UNIT 1

Introduction to Big Data Analytics: Big Data Overview, State of the Practice in Analytics, Key Roles for the New Big Data Ecosystem, Examples of Big Data Analytics.

Data Analytics Lifecycle: Data Analytics Lifecycle Overview, Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize, Case Study: Global Innovation Network and Analysis (GINA).

Review of Basic Data Analytic Methods Using R: Introduction to R, Exploratory Data Analysis, Statistical Methods for Evaluation.

UNIT II

Advanced Analytical Theory and Methods- Clustering: Overview of Clustering, K-means, Additional Algorithms.

Advanced Analytical Theory and Methods-Association Rules: Overview, Apriori Algorithm, Evaluation of Candidate Rules , Applications of Association Rules, An Example: Transactions in a Grocery Store , Validation and Testing , Diagnostics.

UNIT III

Advanced Analytical Theory and Methods- Regression : Linear Regression, Logistic Regression, Reasons to Choose and Cautions, Additional Regression Models.

Advanced Analytical Theory and Methods-Classification: Decision Trees , Naïve Bayes , Diagnostics of Classifiers, Additional Classification Methods.

UNIT IV

Advanced Analytical Theory and Methods-Time Series Analysis: Overview of Time Series Analysis, ARIMA Model, Additional Methods.

Advanced Analytical Theory and Methods-Text Analysis: Text Analysis Steps, A Text Analysis Example, Collecting Raw Text , Representing Text, Term Frequency--Inverse Document Frequency (TFIDF), Categorizing Documents by Topics, Determining Sentiments, Gaining Insights.

UNIT V

Advanced Analytics--Technology and Tools-MapReduce and Hadoop: Analytics for Unstructured Data, The Hadoop Ecosystem, NoSQL.

Advanced Analytics--Technology and Tools-In-Database Analytics: SQL Essentials, In-Database Text Analysis, Advanced SQL.

The Endgame or Putting It All Together: Communicating and Operationalizing an Analytics Project, Creating the Final Deliverables, Data Visualization Basics.

TEXT BOOKS:

1. EMC Education Services "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data" Wiley Publishers
2. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
3. Tom White " Hadoop: The Definitive Guide" Third Edition, O" reilly Media, 2011.
4. Prajapati, "V. Big data analytics with R and Hadoop", Packt Publishing Ltd, 2013.

SUGGESTED READINGS:

1. Frank J. Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley Publishers.
2. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
3. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007 5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.

CS 472

CLOUD COMPUTING

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To impart the fundamentals and essentials of Cloud Computing.
2. To provide students a sound foundation of the Cloud Computing so that they can adopt Cloud Computing services and tools in their real life scenarios.
3. To provide knowledge about secutrity and privacy issues related to cloud computing environments.
4. To enable students explore cloud computing driven commercial systems such as Google App Engine, Microsoft Azure and Amazon Web Services and others.

Course Outcomes:

After completion of the course, student should be able to:

1. Define Cloud Computing and related concepts and describe the characteristics, advantages, risks and challenges associated with cloud computing.
2. Explain and characterize various cloud service models, cloud deployment models and explore virtualization techniques that serve in offering software, computation and storage services on the cloud.
3. Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.
4. Illustrate the concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.
5. Understand the security and privacy issues related to cloud computing environments.
6. Analyze various cloud programming models and apply them to solve problems on the cloud.

UNIT I

Introduction to Cloud Computing: Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

UNIT II

Virtual Machines and Virtualization of Clusters and Data Centers: Levels of Virtualization, Virtualization Structures//Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation.

Case studies: Xen Virtual machine monitors- Xen API. VMware - VMware products-Vmware Features. Microsoft Virtual Server - Features of Microsoft Virtual Server.

UNIT III

Cloud computing architectures over Virtualized Data Centers: Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management.

UNIT IV

Cloud Security and Trust Management, Data Security in the Cloud : An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, CryptDb:Onion Encryption layers-DET,RND,OPE,JOIN,SEARCH, HOM, and Homomorphic Encryption, FPE. Trust, Reputation and Security Management.

UNIT V

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Common Standards in Cloud Computing: The Open Cloud Consortium, the Distributed Management Task Force, Standards for Application Developers, Standards for Messaging. Internet Messaging Access Protocol (IMAP), Standards for Security, Examples of End-User Access to Cloud Computing.

TEXT BOOKS:

1. John W. Rittinghouse, "Cloud Computing: Implementation, Management, and Security ". James F. Ransome, CRC Press 2009.
2. Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, "Distributed and Cloud Computing From Parallel Processing to the Internet of Things", Elsevier, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski," Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing), Wiley *Publishing* ©2011.

SUGGESTED READINGS:

1. Raluca Ada Popa, Catherine M.S. Redfield, Nickolai Zeldovich, and Hari Balakrishnan, "CryptDB: Protecting Confidentiality with encrypted Query Processing"23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
2. A Fully Homomorhic Encryption Scheme, Craig Gentry, September 2009.
3. David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.
4. Web resources:

a. http://aws.amazon.com
b. http://code.google.com/appsengine
c. http://www.buyya.com/

CS 473

SEMANTIC WEB AND SOCIAL NETWORKS

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To learn Web Intelligence.
2. To explain Knowledge Representation for the Semantic Web.
3. To learn Ontology Engineering.
4. To learn Semantic Web Applications, Services and Technology.
5. To learn Social Network Analysis and semantic web.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the evolution of the web and the need of the semantic web
2. Understand the semantic web technologies such as RDF, OWL to represent knowledge
3. Understand and analyze the ontology and apply for the application with appropriate methods and tools.
4. Understand the need and applications of social network analysis and the scope of these applications in the web.
5. Analyze and explain how technical changes affect the social aspects of web based computing.
6. Create an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

UNIT I

Web Intelligence

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT II

Knowledge Representation for the Semantic Web

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT III

Ontology Engineering:

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT IV

Semantic Web Applications, Services and Technology:

Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT V

Social Network Analysis and semantic web:

What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

TEXT BOOKS:

1. Berners Lee, Godel and Turing, "Thinking on the Web ", Wiley inter science, 2008.
2. Peter Mika ,"Social Networks and the Semantic Web" , Springer, 2007.

SUGGESTED READINGS:

1. J.Davies, R.Studer, P.Warren ,"Semantic Web Technologies, Trends and Research in Ontology Based Systems" , John Wiley & Sons, 2006.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Heiner Stuckenschmidt; Frank Van Harmelen "Information Sharing on the semantic Web" , Springer Publications, 2005.
4. T.Segaran, C.Evans, J.Taylor, O'Reilly "Programming the Semantic Web" , SPD,2009.

CS 474

CYBER FORENSICS

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Identify and present indicators that a cybersecurity incident has occurred.
2. Apply criminal justice methods to cybersecurity and computer forensic investigations.
3. Plan, implement, and evaluate penetration testing and ethical hacking of computer systems.
4. Identify, analyze, and mitigate threats to internal computer systems.
5. Collect, process, analyze, and present computer forensic evidence.

Course Outcomes:

After completion of the course, student should be able to:

1. Help the organization to continue its commercial activities in the event of significant information security incidents.
2. Be proficient in various forensic tools and usage of tools for disk imaging and recovery processes.
3. Design security procedures and policies.
4. Well versed in various security standards and security testing techniques.
5. Work in teams to analyze and resolve cyber security issues.
6. Apply critical thinking skills to risk analysis of computer systems.

UNIT 1

Introduction: Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology – Steps - Activities in Initial Response, Phase after detection of an incident.

UNIT II

Initial Response and forensic duplication: Initial Response & Volatile Data Collection from Windows system - Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic.
Duplicate/Qualified Forensic Duplicate of a Hard Drive.

UNIT III

Preserving and Recovering Digital Evidence: File Systems: FAT, NTFS - Forensic Analysis of File Systems – Storage Fundamentals: Storage Layer, Hard Drives Evidence Handling: Types of Evidence, Challenges in evidence handling, Overview of evidence handling procedure.

UNIT IV

Network Forensics and System investigation: Intrusion detection; Different Attacks in network, analysis Collecting Network Based Evidence - Investigating Routers - Network Protocols - Email Tracing- Internet Fraud.

Data Analysis Techniques - Investigating Live Systems (Windows & Unix) Investigating.

Hacker Tools - Ethical Issues – Cybercrime.

UNIT V

Bodies of law: Constitutional law, Criminal law, Civil law, Administrative regulations, Levels of law: Local laws, State laws, Federal laws, International laws , Levels of culpability: Intent, Knowledge, Recklessness, Negligence Level and burden of proof : Criminal versus civil cases ,Vicarious liability, Laws related to computers: CFAA, DMCA, CAN Spam, etc. Right to Information Act.

TEXT BOOKS:

1. Kevin Mandia, Chris Prosise, “Incident Response and computer forensics”, Tata McGrawHill, 2006.

2. Peter Stephenson, "Investigating Computer Crime: A Handbook for Corporate Investigations", Sept 1999.

3. Eoghan Casey, "Handbook Computer Crime Investigation's Forensic Tools and Technology", Academic Press, 1st Edition, 2001.

SUGGESTED READINGS:

1. Skoudis. E., Perlman. R. Counter Hack: A Step-by-Step Guide to Computer Attacks and Effective Defenses.Prentice Hall Professional Technical Reference. 2001.

2. Norbert Zaenglein, "Disk Detective: Secret You Must Know to Recover Information From a Computer", Paladin Press, 2000.

3. Bill Nelson, Amelia Philips and Christopher Steuart, “Guide to computer forensics investigation “Course technology, 4th edition.

CS 475

HUMAN MACHINE INTERACTION

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Design, evaluate and deploy usable, effective technologies
2. Produce a low-fidelity prototype for an interactive product based upon a simple list of interaction design principles.
3. To understand the importance of human Psychology in designing good interfaces.

Course Outcomes:

After completion of the course, student should be able to:

1. Think constructively & analytically about how to design and evaluate interactive technologies.
2. Determine the most appropriate HCI methods to meet the needs of a practical software development project.
3. Design effective interactive systems that are usable due to adherence to established guidelines.
4. Select and apply the appropriate design methodology.
5. Demonstrate understanding of Interaction between the human and computer components.
6. Design innovative, user centric and user friendly interfaces.

UNIT I

Interaction Paradigms: Computing Environments, Analyzing Interaction Paradigms.
Interaction Frameworks and Styles: Frameworks for Understanding Interaction, Coping with Complexity, Interaction Styles.

UNIT II

Interaction Design Process: Iterative Design, User-Centered Design, Interaction Design Models, Overview of Interaction Design Models.
Discovery: Discovery Phase Framework, Collection, Interpretation , Documentation.
Design: Conceptual Design, Physical Design, Evaluation, Interface Design Standards, Designing the Facets of the Interface.

UNIT III

Design Principles: Principles of Interaction Design, Comprehensibility, Learnability, Effectiveness/Usefulness, Efficiency/Usability, Grouping, Stimulus Intensity , Proportion , Screen Complexity, Resolution/Closure, Usability Goals.

Interaction Design Models: Model Human Processor , Keyboard Level Model, GOMS, Modeling Structure, Modeling Dynamics, Physical Models.

Usability Testing: Usability, Usability Test, Design the Test, Prepare for the Test, Perform the Test, Process the Data.

UNIT IV

Interface Components: The WIMP Interface, Other Components.

Icons : Human Issues Concerning Icons, Using Icons in Interaction Design, Technical Issues Concerning Icons.

Color: The Human Perceptual System, Using Color in Interaction Design, Color Concerns for Interaction Design, Technical Issues Concerning Color.

UNIT V

Text : Human Issues Concerning Text, Using Text in Interaction Design, Technical Issues Concerning Text.

Speech and Hearing : The Human Perceptual System, Using Sound in Interaction Design, Technical Issues Concerning Sound.

Touch and Movement: The Human Perceptual System, Using Haptics in Interaction Design, Technical Issues Concerning Haptics.

TEXT BOOKS:

1. Steven Heim, "The Resonant Interface: HCI Foundations for Interaction Design", Addison-Wesley, 2007.
2. J. Preece, Y. Rogers, and H. Sharp, Interaction Design: "Beyond Human-Computer Interaction", Wiley & Sons, 2nd Ed., 2007.

SUGGESTED READINGS:

1. Ben Shneiderman , Catherine Plaisant, "Designing the User Interface: Strategies for Effective Human-Computer Interaction", 5th edition, , Addison-Wesley, 2009.
2. Alan Dix, “Human-computer Interaction” Pearson/Prentice-Hall, 2004.

CS 476

SOFTWARE REUSE TECHNIQUES

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To explain the benefits of software reuse.
2. To discuss several different ways to implement software reuse.
3. To explain how reusable concepts can be represented as patterns.
4. To comprehend the nature of design patterns.
5. To provide a specific context for each pattern in which it is applied.

Course Outcomes:

After completion of the course, student should be able to:

1. Identify and describe the different approaches and techniques to the software reuse development.
2. Determine and apply the knowledge acquired on software reuse techniques.
3. Apply the design patterns in creating an object oriented design.
4. Use design patterns for real world situations.
5. List consequences of applying each pattern.

UNIT I

Software reuse success factors: Reuse driven software engineering as business, object oriented software engineering, Applications and Component subsystems, Use case components, Object components.

UNIT II

Design Patterns : Introduction, Creational Patterns – Factory, factory method, abstract factory, singleton, builder, prototype.

UNIT III

Structural Patterns : Adapter, bridge, composite, decorator, façade, flyweight, proxy. Behavioral Patterns : Chain of responsibility, command, interpreter.

UNIT IV

Behavioral Patterns : Iterator, mediator, memento, observer, state, strategy, template, visitor. Other design patterns : Whole – part, master – slave, view handler, forwarder – receiver, client dispatcher – server, publisher – subscriber.

UNIT V

Architectural Patterns – Layers, pipes and filters, black board, broker, model-view controller, presentation – abstraction – control, micro kernel, reflection.

TEXT BOOKS:

1. Ivar Jacabson, Martin Griss, Patrick Johnson, "Software Reuse: Architecture, Process and Organization for Business Success", ACM Press 1997.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides – " Design Patterns", Pearson Education, 1995.

SUGGESTED READINGS:

1. Frank Buschmann etc., - "Pattern Oriented Software Architecture – Volume I", Wiley 1996.
2. James W Cooper, "Java Design Patterns, a tutorial", Pearson Education, 2000.

Elective – IV

WITH EFFECT FROM THE ACADEMIC YEAR 2016 - 2017

CS 481

PATTERN RECOGNITION

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To introduce the students about fundamentals of image formation.
2. To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition.
3. To develop an appreciation for various issues in the design of computer vision and object recognition systems.
4. To provide the students with computer vision and object recognition applications.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the fundamentals of image formation.
2. Comprehend the major ideas, methods and techniques of image processing and computer vision.
3. Understand typical pattern recognition techniques for object recognition.
4. Implement the basic image processing and computer vision techniques.
5. Develop simple object recognition systems.
6. Implement simple pattern classifier, classifier combination and structural pattern recognizers.

Unit I

Classifiers Based on Bayes Decision Theory: Introduction , Bayes Decision Theory, Discriminant Functions and Decision Surfaces , Bayesian Classification for Normal Distributions.

Estimation of Unknown Probability Density Functions: Maximum Likelihood Parameter Estimation , Maximum a Posteriori Probability Estimation, Bayesian Inference , Maximum Entropy Estimation , Mixture Models , Nonparametric Estimation ,The Naive-Bayes Classifier , The Nearest Neighbor Rule, Bayesian Networks.

Unit II

Linear Classifiers: Linear Discriminant Functions and Decision Hyperplanes, The Perceptron Algorithm , Least Square Methods.

Mean Square Estimation Revisited: Logistic Discrimination, Support Vector Machines.

Unit III

Non Linear Classifiers: The XOR Problem , The Two-Layer Perceptron , Three Layer Perceptrons.

Algorithms Based on Exact Classification of the Training Set: The Backpropagation Algorithm , Variations on the Backpropagation Theme, The Cost Function Choice, Choice of the Network Size, A Simulation Example , Networks with Weight Sharing, Generalized Linear Classifiers, Capacity of the *l*-Dimensional Space in Linear Dichotomies, Polynomial Classifiers, Radial Basis Function Networks, Universal Approximators.

Support Vector Machines: The nonlinear Case, Decision Trees, Combining Classifiers , The Boosting Approach to Combine Classifiers.

Unit IV

Feature Selection: Preprocessing, Feature Selection Based on Statistical Hypothesis Testing, The Receiver Operating Characteristics (ROC) Curve , Class Separability Measures , Feature Subset Selection , Optimal Feature Generation , Neural Networks and Feature Generation / Selection, The Bayesian Information Criterion.

Feature Generation: Linear Transforms, Regional Features, Features for Shape and Size Characterization, Typical Features for Speech and Audio Classification.

Unit V

Template Matching: Introduction, Similarity Measures Based on Optimal Path Searching Techniques, Measures Based on Correlations, Deformable Template Models.

Context Dependent Classification: Markov Chain Models, Hidden Markov Models.

Clustering Algorithms: Clustering Algorithms Based on Graph Theory, Competitive Learning Algorithms: Supervised Learning Vector Quantization.

TEXT BOOKS:

1. S Theodoridis and K Koutroumbas ,"Pattern Recognition", 4th Edition, Academic Press, 2009.
2. C Bishop ," Pattern Recognition and Machine Learning" ,Springer , 2006.

SUGGESTED READINGS:

1. Theodoridis & Koutroumbas, **"**Pattern Recognition**",** Academic Press, 4th Edition,2014.

CS 482

BIO INFORMATICS

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand the basic concepts.
2. To search information, visualize it.
3. To learn various bioinformatics algorithms.
4. To understand data mining techniques.
5. To study various pattern matching techniques.

Course Outcomes:

After completion of the course, student should be able to:

1. Have a basic idea of BioInformatics.
2. Retrieve information using various algorithms.
3. Apply data mining and pattern matching techniques.
4. Sequence the databases.
5. Do modeling and simulation.
6. Understand social, legal, and privacy implications of electronic storage and sharing of biological information.

UNIT I

Introductory concepts:

The Central Dogma – The Killer Application – Parallel Universes – Watson's Definition – Top Down Versus Bottom up – Information Flow – Convergence – Databases – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks – Geographical Scope – Communication Models – Transmissions Technology – Protocols – Bandwidth – Topology – Hardware – Contents – Security – Ownership – Implementation – Management.

UNIT II

Search engines, visualization and algorithms:

The search process – Search Engine Technology – Searching and Information Theory – Computational methods – Search Engines and Knowledge Management – Data Visualization – sequence visualization – structure visualization – user Interface –Animation Versus simulation – General Purpose Technologies - Exhaustive search – Greedy – Dynamic programming – divide and Conquer – graph algorithms.

UNIT III

Statistics and data mining:

Statistical concepts – Microarrays – Imperfect Data – Randomness – Variability – Approximation – Interface Noise – Assumptions – Sampling and Distributions – Hypothesis

Testing – Quantifying Randomness – Data Analysis – Tool selection statistics of Alignment – Clustering and Classification – Data Mining – Methods –Selection and Sampling – Preprocessing and Cleaning – Transformation and Reduction – Data Mining Methods – Evaluation – Visualization – Designing new queries – Pattern Recognition and Discovery – Machine Learning – Text Mining – Tools.

UNIT IV

Pattern matching:

Pairwise sequence alignment – Local versus global alignment – Multiple sequence alignment – Computational methods – Dot Matrix analysis – Substitution matrices –Dynamic Programming – Word methods – Bayesian methods – Multiple sequence alignment – Dynamic Programming – Progressive strategies – Iterative strategies –Tools – Nucleotide Pattern Matching – Polypeptide pattern matching – Utilities –Sequence Databases.

UNIT V

Modeling and simulation:

Drug Discovery – components – process – Perspectives – Numeric considerations – Algorithms – Hardware – Issues – Protein structure – Abinitio Methods – Heuristic methods – Systems Biology – Tools – Collaboration and Communications – standards -Issues – Security – Intellectual property.

TEXT BOOKS:

1. Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2015.
2. T.K.Attwood and D.J. Perry Smith, "Introduction to Bio Informatics, Longman Essen,1999.

SUGGESTED READINGS:

1. Neil C.Jones, PaveA. Pevzner, "An Introduction to, Bioinformatics Algorithms (Computational Molecular Biology)" , MIT Press 2004.

CS 483

MACHINE LEARNING

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Understand the basic underlying concepts for supervised discriminative and generative learning.
2. Understand the concepts of cross-validation and regularization, be able to use them for estimation of algorithm parameters.
3. Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
4. Understand algorithms for learning Bayesian networks.
5. Understand genetic algorithm , operators and programming techniques.
6. Understand and apply unsupervised algorithms for clustering.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand a wide variety of learning algorithms.
2. Understand how to apply a variety of learning algorithms to data.
3. Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
4. Understand how to perform evaluation of learning algorithms and model selection.
5. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
6. Gets a knowledge of clustering concepts.

UNIT I

Introduction: Learning, Types of Machine Learning. Concept learning: Introduction, Version Spaces and the Candidate Elimination Algorithm. Learning with Trees: Constructing Decision Trees, CART, Classification example.

UNIT II

Linear Discriminants: The Perceptron, Linear Separability. Linear Regression.
Multilayer Perceptron (MLP): Going Forwards, Backwards, MLP in practices, Deriving back. Propagation SUPPORT Vector Machines: Optimal Separation, Kernels.

UNIT III

Some Basic Statistics: Averages, Variance and Covariance, The Gaussian.
The Bias-Variance Tradeoff Bayesian learning: Introduction, Bayes theorem, Bayes Optimal Classifier, Naive Bayes Classifier.

Graphical Models: Bayesian networks, Approximate Inference, Making Bayesian Networks, Hidden Markov Models, The Forward Algorithm.

UNIT IV

Evolutionary Learning: Genetic Algorithms, Genetic Operators.
Genetic Programming Ensemble learning: Boosting, Bagging.
Dimensionality Reduction: Linear Discriminant Analysis, Principal Component Analysis

UNIT V

Clustering: Introduction, Similarity and Distance Measures, Outliers, Hierarchical Methods, Partitional Algorithms, Clustering Large Databases, Clustering with Categorical Attributes, Comparison.

TEXT BOOKS:

1. Tom M. Mitchell, "Machine Learning ",MacGraw Hill, 1997.
2. Stephen Marsland, "Machine Learning - An Algorithmic Perspective ", CRC Press, 2009.

SUGGESTED READINGS:

1. Margaret H Dunham, "Data Mining", Pearson Edition, 2003.
2. Galit Shmueli, Nitin R Patel, Peter C Bruce, "Data Mining for Business Intelligence", Wiley India Edition, 2007.
3. Rajjall Shinghal, "Pattern Recognition ", Oxford University Press, 2006.

CS 484

BUSINESS INTELLIGENCE

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. This course focuses on how to design and build a Business Intelligence solution.
2. Students will also learn how to design and build a Data Warehouse
3. Students can develop their own projects within collaborative teams or can be assigned an existing data source to develop a project.
4. To ensure success during the implementation phase, students will plan for and gather business requirements, as well as design the data warehouse in order to develop an effective BI plan.

Course Outcomes:

After completion of the course, student should be able to:

1. Design and implementation of OLTP, OLAP and Warehouses.
2. Use ETL concepts, tools and techniques to perform Extraction, Transformation, and Loading of data.
3. Report the usable data by using various reporting concepts, techniques/tools, and use charts, tables.
4. Use Analytics concepts like data mining, Exploratory and statistical techniques for predictive analysis in Business Intelligence.
5. Acquire the knowledge of data visualization techniques.
6. Get a view of future trends of business intelligence.

UNIT I

An Overview of Business Intelligence, Analytics, and Decision Support-Changing Business Environments and Computerized Decision Support, A Framework for Business Intelligence (Bl), Intelligence Creation, Use, and Bl Governance, Transaction Processing Versus Analytic Processing, Successful Bl Implementation, Analytics Overview, Brief Introduction to Big Data Analytics.

UNIT II

Data Warehousing Definitions and Concepts, Data Warehousing Architectures, Data Integration and the Extraction, Transformation, and Load (ETL) Processes, Data Warehouse Development, Data Warehousing Implementation Issues, Real-Time Data Warehousing, Data Warehouse Administration, Security Issues, and Future Trends, Business Reporting, Visual Analytics, and Business Performance Management- Business Reporting Definitions and Concepts, Data and Information Visualization, Different Types of Charts and Graphs, The Emergence of Data Visualization and Visual Analytics, Performance Dashboards, Business Performance Management, Performance Measurement.

UNIT III

Data Mining- Data Mining Concepts and Applications, Data Mining Applications, Data Mining Process, Data Mining Methods, Data Mining Software Tools, Data Mining Privacy Issues, Myths, and Blunders, Text and Web Analytics, Text Analytics and Text Mining Overview- Natural Language Processing, Text Mining Applications, Text Mining Proces, Sentiment Analysis, Web Mining Overview, Search Engines, Web Usage Mining (Web Analytics), Social Analytics.

UNIT IV

Big Data and Analytics, Definition of Big Data- Fundamentals of Big Data Analytics, Big Data Technologies, Data Scientist, Big Data and Data Warehousing, Big Data Vendors, Big Data And Stream Analytics, Applications of Stream Analytics.

UNIT V

Business Analytics: Emerging Trends and Future Impact- Location-Based Analytics for Organizations, Analytics Applications for Consumers, The Web 2.0 Revolution and Online Social Networking, Cloud Computing and Bl, Impacts of Analytics In Organizations, Issues of Legality, Privacy, and Ethics, An Overview of the Analytics Ecosystem.

TEXT BOOKS:

1. Ramesh Sharda Oklahoma State University, et.all "BUSINESS INTELLIGENCE" Pearson education, Third edition, 2014.
2. R.N. Prasad, Seema Acharya, "Fundamentals of Business Analytics", Weily First Edition, 2011.

SUGGESTED READINGS:

1. William Inmon, "Building the Data Warehouse", Wiley publication 4 th edition, 2004.
2. Efrem G. Mallach, "Decision Support And Data Warehouse Systems", 1st Edition Publisher: Tata McGraw-Hill Education,. ISBN-10: 0072899816, 2002.
3. Efraim Turban, Ramesh Sharda, Dursun Delen, David King, "Business Intelligence", ISBN-10: 013610066X Publisher: Prentice Hall.ISBN-13: 9780136100669, 2010.
4. Dorian Pyle, "Business Modeling and Data Mining", Elsevier Publication MK, 2003.
5. Reema Thareja, "Data Warehouse", Publisher: Oxford University Press, 2009.

With Effect from the Academic Year 2016 - 2017

ME 472

INTELLECTUAL PROPERTY RIGHTS

Instruction	4	Periods per week
Duration of End Examination	3	Hours
End examination	75	Marks
Sessionals	25	Marks
Credits	3	

Course Objectives:

1. To introduce fundamental aspects of IP
2. Introducing all aspects of IPR acts.
3. Creating awareness of multi disciplinary audience
4. Creating awareness for innovation and its importance
5. Exposing to the changes in IPR culture
6. Awareness about techno-business aspects of IPR

Course Outcomes:

After completion of the course, student should be able to:

1. Respect intellectual property of others
2. Learn the art of understanding IPR
3. Develop the capability of searching the stage of innovations.
4. Capable of filing a patent document independently.
5. Completely understand the techno-legal business angle of IP. .
6. Capable of converting creativity into IP and effectively protect it.

UNIT-I

Overview of Intellectual Property: Introduction and the need for intellectual property right (IPR), IPR in India – Genesis and Development, IPR abroad, Some important examples of IPR. Importance of WTO, TRIPS agreement, International Conventions and PCT

Patents: Macro economic impact of the patent system, Patent and kind of inventions protected by a patent, Patent document, How to protect your inventions? Granting of patent, Rights of a patent, how extensive is patent protection? Why protect inventions by patents? Searching a patent, Drafting of a patent, Filing of a patent, the different layers of the international patent system, (national, regional and international options), compulsory licensing and licensers of right & revocation, Utility models, Differences between a utility model and a patent? Trade secrets and know-how agreements

UNIT-II

Industrial Designs: What is an industrial design? How can industrial designs be protected? What kind of protection is provided by industrial designs? How long does the protection last? Why protect industrial designs?

UNIT-III

Trademarks: What is a trademark? Rights of trademark? What kind of signs can be used as trademarks? Types of trademark, function does a trademark perform, How is a trademark protected? How is a trademark registered? How long is a registered trademark protected for? How extensive is trademark protection? What are well-known marks and how are they protected? Domain name and how does it relate to trademarks? Trademark infringement and passing off.

UNIT-IV

Copyright: What is copyright? What is covered by copyright? How long does copyright last? Why protect copyright? Related Rights: what are related rights? Distinction between related rights and copyright? Rights covered by copyright? Copy rights in computer programming.

UNIT-V

Enforcement of Intellectual Property Rights: Infringement of intellectual property rights Enforcement Measures Emerging issues in Intellectual property protection. Case studies of patents and IP Protection.

Unfair Competition: What is unfair competition? Relationship between unfair competition and intellectual property laws?

TEXT BOOKS:

1. Ajit Parulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd , 2006
2. B. L.Wadehra; Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000
3. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi 2010

SUGGESTED READING:

4. Cronish W.R1 Intellectual Property; Patents, copyright, Trad and Allied rights, Sweet & Maxwell, 1993.
5. P. Narayanan, Intellectual Property Law, Eastern Law Edn., 1997.
6. Robin Jacob and Daniel Alexander, A Guide Book to Intellectual Property Patents, Trademarks, Copy rights and designs, Sweet, Maxwell 4th Edition.

CE-422

DISASTER MITIGATION AND MANAGEMENT

Instruction	4 Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To equip the students with the basic knowledge of hazards, disasters, risks and vulnerabilities including natural, climatic and human induced factors and associated impacts.
2. To impart knowledge in students about the nature, mechanism causes, consequences and mitigation measures of the various natural disasters including hydro metrological and geological based disasters.
3. To enable the students to understand risks, vulnerabilities and human errors associated with human induced disasters including chemical, biological and nuclear warfare agents.
4. To equip the students with the knowledge of various chronological phases in the disaster management cycle.
5. To create awareness about the disaster management framework and legislations in the context of national and global conventions.
6. To enable students to understand the applications of geospatial technologies like remote sensing and geographical information systems in disaster management.

Course Outcomes:

After completion of the course, student should be able to:

1. Analyse and critically examine existing programs in disaster management regarding vulnerability, risk and capacity at local level
2. Choose the appropriate activities and tools and set up priorities to build a coherent and adapted disaster management plan.
3. Understand various mechanisms and consequences of natural and human induced disasters for the participatory role of engineers in disaster management.
4. Develop an awareness of the chronological phases of disaster preparedness, response and relief operations for formulating effective disaster management plans
5. Understand various participatory approaches/strategies and their application in disaster management
6. Understand the concepts of remote sensing and geographical information systems for their effective application in disaster management.

UNIT-I

Introduction to Natural, human induced and human made disasters – Meaning, nature, types and effects; International decade of natural disaster reduction (IDNDR); International strategy of natural disaster reduction (ISDR).

UNIT-II

Natural Disasters– Hydro meteorological disasters: Causes, impacts, Early warning systems, structural and non-structural measures for floods, drought and cyclones; Tropical cyclones: Overview, cyclogenesis, drought monitoring and management.; Geographical based disasters: Earthquakes and Tsunami- Overview, causes, impacts, zoning, structural and non-structural mitigation measures; Tsunami generation; Landslides and avalanches: Overview, causes, impacts, zoning and mitigation measures. Case studies related to various hydro meteorological and geographical based disasters.

UNIT III

Human induced hazards: Risks and control measures in a chemical industry**,** Causes, impacts and mitigation measures for chemical accidents, chemical disaster management, current status and perspectives; Case studies related to various chemical industrial hazards eg: Bhopal gas tragedy; Management of chemical terrorism disasters and biological disasters; Radiological Emergencies and case studies; Case studies related to major power break downs, fire accidents and traffic accidents.

UNIT IV

Use of remote sensing and GIS in disaster mitigation and management; Scope of application of ICST (Information, communication and space technologies in disaster management, Critical applications& Infrastructure; Potential application of Remote sensing and GIS in disaster management and in various disastrous conditions like earthquakes, drought, Floods, landslides etc.

UNIT V

Concept of Disaster Management: Introduction to disaster management, Relationship between Risk, vulnerability and a disaster, Disaster management cycle, Principles of disaster mitigation: Hazard identification and vulnerability analysis, Early warning systems and forecasting; Infrastructure and development in disaster management; Disaster management in India: National disaster management framework at central, state, district and local levels. Community based disaster management.

TEXT BOOKS :

1. Rajib, S and Krishna Murthy, R.R (2012), "Disaster Management Global Challenges and Local Solutions" Universities Press Hyderabad.
2. Notes / Reading material published by National Disaster Management Institute, Ministry of Home Affairs, Govt. of India.

SUGGESTED READING:

1. Navele, P & Raja, C.K. (2009), Earth and Atmospheric Disasters Management, Natural and Manmade. B.S. Publications, Hyderabad.
2. Fearn-Banks, K (2011), Crises computations approach: A case book approach. Route ledge Publishers, Special Indian Education, New York & London.
3. Battacharya, T. (2012), Disaster Science and Management. Tata McGraw Hill Company, New Delhi.

With Effect from the Academic Year 2016 - 2017

ME 464

Entrepreneurship (Elective – II) (for Mech, Prod, Civil, EEE & CSE)

Instruction	4 Periods per week
Duration of End Examination	3 Hours
End examination	75 Marks
Sessionals	25 Marks
Credits	3

Objectives:

1. To understand the essence of Entrepreneurship
2. To know the environment of industry and related opportunities and challenges
3. To know the concept a procedure of idea generation
4. To understand the elements of business plan and its procedure
5. To understand project management and its techniques
6. To know behavioral issues and Time management

Outcomes: After completing this course, students will be able to:

1. Apply the entrepreneurial process
2. Analyze the feasibility of a new business plan and preparation of Business plan
3. Evaluate entrepreneurial tendency and attitude
4. Brainstorm ideas for new and innovative products or services
5. Use project management techniques like PERT and CPM
6. Analyze behavioural aspects and use time management matrix

UNIT-I

Indian Industrial Environment: Competence, Opportunities and Challenges, Entrepreneurship and Economic growth, Small Scale Industry in India, Objectives, Linkage among small, medium and heavy industries, Types of enterprises, Corporate Social Responsibility.

UNIT-II

Identification and characteristics of entrepreneurs: First generation entrepreneurs, environmental influence and women entrepreneurs, Conception and evaluation of ideas and their sources, Selection of Technology, Collaborative interaction for Technology development.

UNIT-III

Business plan: Introduction, Elements of Business Plan and its salient features, Technical Analysis, Profitability and Financial Analysis, Marketing Analysis, Feasibility studies, Executive Summary.

UNIT-IV

Project Management: During construction phase, project organization, project planning and control using CPM, PERT techniques, Human aspects of project management, Assessment of tax burden

UNIT-V

Behavioral aspects of entrepreneurs: Personality, determinants, attributes and models, Leadership concepts and models, Values and attitudes, Motivation aspects, Change behavior

Time Management: Approaches of time management, their strengths and weaknesses. Time management matrix and the urgency addiction

Text Books:

1. Vasant Desai, "Dynamics of Entrepreneurial Development and Management", Himalaya Publishing House, 1997.
2. Prasanna Chandra, "Project-Planning, Analysis, Selection, Implementation and Review", Tata Mcgraw-Hill Publishing Company Ltd. 1995.
3. S.S. Khanka, "Entrepreneurial Development", S. Chand & Co. Pvt. Ltd., New Delhi

Suggested Reading:

1. Robert D. Hisrich, Michael P. Peters, "Entrepreneurship", Tata Me Graw Hill Publishing Company Ltd., 5lh Ed., 2005
2. Stephen R. Covey and A. Roger Merrill, "First Things First", Simon and Schuster Publication, 1994.
3. Sudha G.S., "Organizational Behavior", National Publishing House, 1996.