With effect from Academic Year 2014-15

SCHEME OF INSTRUCTION & EXAMINATION
B.E. II YEAR
INFORMATION TECHNOLOGY

Semester - I

S.No	Syllabus Ref.No	Subject	Scheme of Instruction		Scheme of Examination			Credits
			Periods per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		Semester-End Examination	Sessional	
		THEORY						
1	IT 211	Discrete Structures	4	-	3	75	25	3
2	IT 212	Data Structures	4/1	-	3	75	25	3
3	IT 213	Digital Electronics & Logic Design	4	-	3	75	25	3
4	IT 214	Data Communications	4	-	3	75	25	3
5	EC 215	Basic Electronics	4	-	3	75	25	3
6	MB 214	Managerial Economics & Accountancy	4	-	3	75	25	3
		PRACTICAL						
7	IT 215	Data Structures Lab	-	3	3	50	25	2
8	EC 218	Basic Electronics Lab	-	3	3	50	25	2
9	IT 216	Mini Project - I	-	3	3	-	25	1
		TOTAL	24/1	9	-	550	225	23

With effect from Academic Year 2014-15

SCHEME OF INSTRUCTION & EXAMINATION
B.E. II YEAR
INFORMATION TECHNOLOGY

Semester - II

S.No	Syllabus Ref.No	Subject	Scheme of Instruction		Scheme of Examination			Credits
			Periods per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		Semester-End Examination	Sessional	
		THEORY						
1	MT 222	Probability and Random Processes	4	-	3	75	25	3
2	IT 221	Java Programming	4	-	3	75	25	3
3	IT 222	Design and Analysis of Algorithms	4/1	-	3	75	25	3
4	IT 223	Theory of Automata	4/1	-	3	75	25	3
5	IT 224	Software Engineering	4	-	3	75	25	3
6	IT 225	Computer Organization &Microprocessors	4	-	3	75	25	3
		PRACTICAL						
7	IT 226	Java Programming &Algorithms Lab	-	3	3	50	25	2
8	IT 227	Microprocessors Lab	-	3	3	50	25	2
9	IT 228	Mini Project - II	-	3	3	-	25	1
		TOTAL	24/2	9	-	550	225	23

With effect from Academic Year 2014-15

IT 211

DISCRETE STRUCTURES

Instruction	4 periods per week
Duration of Semester-End Examination	3Hours
Semester-End Examination	75Marks
Sessional	25Marks
Credits	3

Course Objectives:

1. Learn mathematical concepts like sets, functions, logic and be able to apply them in solving logic oriented problems and introduce useful abstractions in problem solutions and representations that have application in many areas of computer science
2. Students will be able to use graphs to model relationships, analyse data, apply probability concepts and use recursive functions and solve problems.
3. Further develop the mathematical concepts and technique which should serve as a preparation for more advanced quantitative courses.

Course Outcomes:

Upon successful completion of this course

1. Students get acquainted with the precise vocabulary and powerful notation used in formal computer science study
2. Improved thinking skills will enhance the quality of work in area of computer science.
3. Students will be able to solve complex problems using logic.

Prerequisites:

1. Elementary Algebra.
2. Introductory computer science course with C and C++

UNIT – I

Logic – Sets and Functions: Logic, Propositional equivalences – Predicates and Quantifiers – Nested Quantifiers-Rules of Inference-Sets-Set Operations, Functions.

Integers: The Integers and Division, Integers and Algorithms, Applications of Number Theory.

UNIT – II

Mathematical Reasoning, Induction, and Recursion: Proof Strategy, Sequence and Summation, Mathematical Induction, Recursive Definitions and Structural Induction, Recursive Algorithms.

Counting: Basics of Counting, Pigeonhole Principle, Permutations and Combinations– Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations.

UNIT – III

Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion–Exclusion, Applications of Inclusion – Exclusion.

UNIT – IV

Relations: Relations & their Properties, N-ary Relations and Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

Graphs: Graphs and Graph Models, Graph Terminology, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest Path Problems, Planar Graphs, Graph Coloring.

UNIT –V

Trees: Introduction to Trees, Application of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees.

Boolean Algebra: Boolean function, Representing Boolean functions, Logic Gates, Minimization of Circuits.

Textbook

1. Kenneth H Rosen, "Discrete Mathematics and its applications", Sixth Edition, McGraw Hill, 2006.

Suggested Reading

1. J. K. Sharma, "Discrete Mathematics", Second edition, Macmillan, 2005.
2. J.P.Trembly, R.Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw- Hill – 1997.
3. Joel. Mott. Abraham Kandel, T.P.Baker, "Discrete Mathematics for Computer Scientist &Mathematicans", Prentice Hail N.J.,
4. C.L. Liu, "Elements of Discrete mathematics", McGraw-Hill, Third Edition.
5. U.S. Gupta, "Discrete Mathematical Structures", Pearson, 2014.

With effect from Academic Year 2014-15

IT 212

DATA STRUCTURES

Instruction	4 periods per week
Tutorial	1 period per week
Duration of Semester- End Examination	3 Hours
Semester- End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To develop proficiency in the specification, representation, and implementation of abstract data types and data structures.
2. To get a good understanding of applications of data structures.
3. To develop a base for advanced computer science study.

Course Outcomes:

Upon successful completion of this course, student will be able to

1. Choose the data structures that effectively model the information in a problem.
2. Design, implement, test, and debug programs using a variety of data structures including hash tables, binary and general tree structures, search trees, heaps, graphs, and B-trees.
3. Assess how the choice of data structures and algorithm design methods impacts the performance.

Prerequisites:

Good programming knowledge in C & CPP.

UNIT- I

Arrays, Linked Lists, and Recursion: Using Arrays, Storing Game Entries in an Array, Sorting an Array, Two-Dimensional Arrays, Singly Linked Lists, Implementing a Singly Linked List, Insertion to the Front of a Singly Linked List, Removal from the Front of a Singly Linked List, Implementing a Generic Singly Linked List, Doubly Linked Lists, Insertion into a Doubly Linked List, Removal from a Doubly Linked List, Circularly Linked Lists, Reversing a Linked List, Recursion, Linear Recursion, Binary Recursion, Multiple Recursion, Analysis of Algorithms.

UNIT- II

Stacks, Queues, and Deques: Stacks, The Stack Abstract Data Type, The STL Stack, A C++ Stack Interface, A Simple Array-Based Stack Implementation, Implementing a Stack with a Generic Linked List, Reversing a Vector Using a Stack, Matching Parentheses and HTML Tags, Queues, The Queue Abstract Data Type, The STL Queue, A C++ Queue Interface, A Simple Array-Based Implementation, Implementing a Queue with a Circularly Linked List, Double-Ended Queues, The Deque Abstract Data Type, The STL Deque, Implementing a Deque with a Doubly Linked List.

List and Iterator ADTs: Lists, Node-Based Operations and Iterators, The List Abstract Data Type, STL Lists, STL Containers and Iterators.

UNIT- III

Trees: General Trees, Tree Definitions and Properties, Tree Functions, A C++ Tree Interface, A Linked Structure for General Trees, Tree Traversal Algorithms, Depth and Height, Preorder Traversal, Postorder Traversal, Binary Trees, The Binary Tree ADT,A C++ Binary Tree Interface, Properties of Binary Trees, A Linked Structure for Binary Trees, A Vector-Based Structure for Binary Trees, Traversals of a Binary Tree, Representing General Trees with Binary Trees.

Heaps and Priority Queues: The Priority Queue Abstract Data Type, Keys, Priorities, and Total Order Relations, Comparators, The Priority Queue ADT, A C++ Priority Queue Interface, Sorting with a Priority Queue, The STL priority queue Class, Implementing a Priority Queue with a List, Selection-Sort and Insertion-Sort, Heaps, The Heap Data Structure, Complete Binary Trees and Their Representation, Implementing a Priority Queue with a Heap, Bottom-Up Heap Construction.

UNIT- IV

Search Trees: Binary Search Trees, Searching, Update Operations, C++ Implementation of a Binary Search Tree, AVL Trees, Update Operations, Splay Trees, Splaying, When to Splay, Amortized Analysis of Splaying, Tree, Multi-Way Search Trees, Update Operations for (2,4) Tree, Red-Black Trees, Update Operations.

Graph Algorithms: Graphs, The Graph ADT, Data Structures for Graphs, The Edge List Structure, The Adjacency List Structure, The Adjacency Matrix Structure, Graph Traversals, Depth-First Search, Implementing Depth-First Search, Breadth-First Search, Directed Graphs, Traversing a Digraph, Transitive Closure, Directed Acyclic Graphs, Shortest Paths,

Weighted Graphs, Dijkstra's Algorithm, Minimum Spanning Trees, Kruskal's Algorithm, The Prim-Jarn´ık Algorithm.

UNIT- V

Hash Tables: Hash Tables, Bucket Arrays, Hash Functions, Hash Codes, Compression functions, Collision-Handling Schemes, Load Factors and Rehashing.

Sorting: Merge-Sort , Divide-and-Conquer, Merging Arrays and Lists, The Running Time of Merge-Sort , Merge-Sort and Recurrence Equations, Quick-Sort, Randomized Quick-Sort, Studying Sorting through an Algorithmic Lens, A Lower Bound for Sorting, Linear-Time Sorting: Bucket-Sort and Radix-Sort, Comparing Sorting Algorithms.

Strings: Pattern Matching Algorithms, Brute Force, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Tries, Standard Tries, Compressed Tries, Suffix Tries.

Text Book:

1. Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structure and Algorithms in C++", 2nd Edition, John Wiley, 2011.

Suggested Reading:

1. Ellis Horowitz, Dinesh Mehta, S. Sahani, "Fundamentals of Data Structures in C++", Universities Press, 2007.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 3rd edition Addison-Wesley, 2007.
3. Bruno R. Preiss, "Data Structures and Algorithms with Object-Oriented Design Patterns in C++", John Wiley & Sons, 2001.
4. D. Samantha, "Classic Data Structures", Prentice Hall India, 2nd Edition, 2013.
5. Langsam, Augenstein&Tenenbaum,"Data Structures Using C & C++", 2nd edition, Prentice Hall

With effect from Academic Year 2014-15

IT 213

DIGITAL ELECTRONICS & LOGIC DESIGN

Instruction	4 periods per week
Duration of Semester- End Examination	3 Hours
Semester- End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To familiarize the students with the principles of digital Hardware.
2. To explain the operation and design of combinational and arithmetic logic circuits.
3. To facilitate with the concepts of HDL tools.

Course Outcome:

After taking the course, the students will be able to

1. Design complex logic circuits, do simplification, analysis and synthesis.
2. Understand the principles of different combinational and arithmetic logic designs.
3. Know the working principles of Latches, Flip-flops, and counters.

Prerequisites:

Physics and Mathematics.

UNIT – I

Design Concepts – Digital Hardware, Design process, Design of digital hardware Introduction to logic circuits – Variables and functions, Logic gates and networks. Boolean algebra, Synthesis using AND, OR, and NOT Gates, Design examples. Optimized implementation of logic functions – Karnaugh Map, Strategies for minimization, minimizing Product-of-Sum Forms, Incompletely Specified functions, multiple output circuits. NAND and NOR logic networks, Introduction to CAD tools and Very High Speed Integrated Circuit Hardware Description Language (VHDL).

UNIT – II

Programmable logic devices: general structure of a Programmable Logic Array (PLA), gate level diagram, schematic diagram, Programmable Array Logic (PAL) Structure of CPLDs and FPGAs, 2-input and 3-input lookup tables (LUT). Design of Arithmetic-circuits, VHDL for Arithmetic-circuits Combinational circuit building blocks – Multiplexers, Decoders, Encoders, Code converters, Arithmetic comparison circuits. VHDL for Combinational circuits.

UNIT – III

Basic Latch Gated SR Latch, Gated D Latch, Master-Slave and Edge- Triggered D Flip-Flops, D Flip-Flops with Clear and Preset. T Flip-flop, JK Flip-flop, Excitation tables. Registers-Shift Register, Parallel-Access Shift Register, Counters-Asynchronous and synchronous counters, BCD counter, Ring counter, Johnson counter, Registers and Counters in VHDL Code.

UNIT – IV

Synchronous Sequential Circuits – Basic design steps.State-Assignment problem Moore and Mealy state model.Design of Finite state machines using VHDL.State minimization, FSM as an Arbiter Circuit, Analysis of Synchronous sequential Circuits. Algorithmic State Machine (ASM) charts, formal model.

UNIT – V

Asynchronous Sequential Circuits – Behaviour, Analysis, Synthesis, State reduction, State Assignment, examples. Hazards: static and dynamic hazards. Significance of Hazards. Clock skew, set up and hold time of a flip-flop, Shift and add multiplier, data path circuit for the multiplier, ASM chart and data path circuit for the divider control circuit, sort operation.

Text book:

1. Stephen Brown, ZvonkoVranesic, "Fundamentals of Digital Logic with VHDL design", 2nd Edition, McGraw Hill, 2009.

Suggested Reading:

1. Jain R.P., "Modern Digital Electronics," 3rd edition, TMH, 2003.
2. John F. Wakerly, "Digital design Principles & Practices", 3rd edition, Prentice Hall, 2001
3. M. Morris Mano, Charles R. Kime, "Logic and Computer Design Fundamentals", 2nd edition, Pearson Education Asia, 2001.
4. ZVI Kohavi, Switching and Finite Automata Theory, 2nd edition, Tata McGraw Hill, 1995.
5. William I Fletcher, "An Engineering Approach to Digital Design", Eastern Economy Edition, PHI
6. H.T. Nagle, "Introduction to Computer Logic", Prentice Hall, 1975.

With effect from Academic Year 2014-15

IT 214

DATA COMMUNICATIONS

Instruction	4 periods per week
Duration of Semester- End Examination	3 Hours
Semester- End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

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

1. Familiarize with the basics of data transmission, transmission media, data Communications System and its components.
2. Describe various encoding and modulation schemes, various data link protocols for flow control, error detection and correction.
3. Understand different types of multiplexing and spread spectrum techniques, Familiarize with different types of Ethernet and to understand the architecture and services of WLANs and Bluetooth.

Course Outcomes:

After completing this course the student should acquire the knowledge and ability to:

1. Demonstrate systematic understanding of Data Communication Techniques and solve problems related to data communications.
2. Apply appropriate Analytical Techniques to critically evaluate communication processes.
3. Familiarize with the basic protocols of data link layer and prepared to take the computer networks course.

Prerequisites:

Engineering physics

UNIT-I

Data Communications, Data Networks and The Internet: Data Communications and Networking for Today's Enterprise, Communications Model, Data Communications, Networks, The Internet, An Example Configuration

The Need for a Protocol Architecture, The TCP/IP Protocol Architecture, The OSI Model, Standardization within a Protocol.

Data Transmission: Concepts and Terminology, Analog and Digital Transmission, Transmission Impairments, Transmission media.

UNIT-II

Data Encoding: Digital Data Digital Signals, Digital Data-Analog Signals, Analog Data-Digital Signals, Analog Data-Analog Signals.

Data Communication Interface: Asynchronous and Synchronous Transmission, Line Configuration, Interfacing.

Data Link Control: Flow Control, Error Detection, Error Control, HDLC, Other Data link Control Protocols, Performance Issues**.**

UNIT - III

Multiplexing: Frequency Division Multiplexing, Wavelength Division Multiplexing, Synchronous TimeDivision Multiplexing, Statistical TimeDivision Multiplexing. Asymmetric Digital Subscriber Line, xDSL.

Spread Spectrum: The Concept, Direct Sequence Spread Spectrum, Frequency Hopping Spread Spectrum, Code Division Multiple Access.

UNIT -IV

Circuit Switching and Packet Switching: Switched Communications Networks, Circuit-Switching Networks,Circuit-Switching Concepts, Soft switch Architecture,Packet-Switching Principles,X.25,Frame Relay.

ATM : Architecture, Logical Connection, ATM Cells, Transmission of ATM cells.

UNIT -V

Traditional Ethernet: Topologies and Transmission Media, LAN protocol architecture, MAC sub layer, CSMA/CD, Physical Layer, Bridged, Switched and Full Duplex Ethernets

Fast Ethernet: MAC sub Layer, Physical layer, Gigabit Ethernet: MAC sub Layer, Physical Layer

Wireless LANs: Overview, Wireless LAN Technology, IEEE 802.11 Architecture and Services, IEEE 802.11 Medium Access Control, IEEE 802.11 Physical Layer.

Bluetooth: Architecture, Layers.

Text Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", 4th edition, Tata McGraw Hill, 2006.
2. William Stallings, "Data and Computer communication", 8th edition, Pearson Education, Asia-2004.

Suggested Reading:

1. Fred Halsall, "Data Communications, Computer Networks and Open Systems", 4th edition, Pearson Education, 2000.
2. Andrew S. Tanenbaum, "Computer Networks", 5th edition, Pearson Education.
3. Gilbert Held, "Understanding Data Communications", 7th Edition, Pearson Education.
4. Nader F.Mir, "Computer and Communication Networks, 7th edition, Prentice Hall,

With effect from Academic Year 2014-15

EC 215

BASIC ELECTRONICS
(Common for CSE, IT, MECH, PROD)

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

Course Objectives:

1. To understand the knowledge of basic semiconductor devices and create foundation for forthcoming circuit design courses
2. To understand various applications like amplifiers, oscillators and op-amps also motivate and train students in logic design.
3. To understand the working principle of the transducers and aware the students about the advances in Instrumentation.

Course Outcomes:

1. Ability to understand the usefulness of semiconductor devices in circuit making like rectifiers, filters, regulators etc.
2. Ability to develop new directions in logic design to analyze, design and implement combinational circuits.
3. Ability to analyze the principles and practices for instrument design to development the real world Problems.

UNIT – I

Semiconductor Theory: Energy levels, Intrinsic and Extrinsic Semiconductor, Mobility, Diffusion and Drift current, Hall effect, Law of mass action, Characteristics of P-N Junction diode, current equation, Parameters and Applications.

Rectifiers: Half wave and Full wave Rectifiers Bridge and center tapped with and without filters, Ripple factor, regulation and efficiency.

UNIT – II

Transistors: Bipolar and field effect transistors with their h-parameter equivalent circuits, Basic Amplifiers classification and their circuits (Qualitative treatment only).

Regulators and Inverters: Zener Diode**,** Breakdown mechanisms, Characteristics, Effect of Temperature, Application as voltage regulator.

UNIT-III

Feedback Amplifiers: Properties of Negative Feedback Amplifier, Types of Negative Feedback, Effect of negative feedback on Input impedance and Output impedance, Applications (Qualitative treatment only).

Oscillators: principle of oscillations, LC Type-Hartley, Colpitt and RC Type- Phase shift, Wien Bridge and Crystal Oscillator (Qualitative treatment only).

UNIT – IV

Operational Amplifiers: Basic Principle, Ideal and practical Characteristics and Applications-Summer, Integrator, Differentiator, Instrumentation Amplifier.

Digital System: Review of basic gates, Universal gates, Demorgan's theorem, minimization with Karnaugh Map up to three variables and realization of half, Full Adder and half, Full Sub tractors.

UNIT – V

Data Acquisition systems: Study of transducers-LVDT, Strain gauge.
Photo Electric Devices and Industrial Devices: Photo diode, Photo Transistor, LED, LCD, SCR, UJT Construction and Characteristics and their applications only.
Display Systems: Constructional details of C.R.O and Applications.

Text Books:

1. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuits Theory", Pearson Education, 9^{TH} edition, LPE, Reprinted, 2006.
2. Morris Mano, "Digital Design", Pearson Education, Asia 2002.

Suggested Reading:

1. Jacob Millman and C., Halkias, "Electronic Devices", McGraw Hill, Eight Edition, Reprinted, 1985.
2. Ramakanth A. Gayakwad, "Op-Amps and Linear Integrated Circuits", Prentice Hall of India, 3rd edition,1985
3. W. D. Cooper, A. Helfric, "Electronic Instrumentation and Measurement Techniques", PHI, 4th edition.
4. S. Shalivahan, N. Suresh Kumar, A Vallavea Raj, "Electronic Devices and Circuits", Tata McGraw Hill, 2003

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MB 214

MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction:	4L periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Internal Examination	20 Marks
Case Study/ Assignment	5 Marks
Credits	3

Objective: The objective of the course is to provide the analytical tools and managerial insights that are essential for the solution of those business problems that have significant consequences for the firm and society.

UNIT-I: Introduction to Managerial Economics
Introduction to Economics and its evolution - Managerial Economics - its scope, importance, Its usefulness to engineers - Basic concepts of Managerial economics.

UNIT-II:Demands Analysis
Demands Analysis - Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Demand Forecasting - Markets Competitive structures, price-output determination under perfect competition and Monopoly. (Theory questions and small numerical problems can be asked).

UNIT-III: Production and Cost Analysis
Theory of Production - Firm and Industry - Production function - input-out relations - laws of returns - internal and external economies of scale. Cost Analysis: Cost concepts - fixed and variable costs - explicit and implicit costs - out of pocket costs and imputed costs - Opportunity cost - Cost output relationship - Break-even analysis. (Theory and problems).

UNIT-IV:Capital Management
Capital Management, its significance, determinants and estimation of fixed and working capital requirements, sources of capital - Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.
(Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT-V: Accountancy
Book-keeping, principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments.
(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement).

Essential Readings:

1. Mehta P.L., “Managerial Economics – Analysis, Problems and Cases”, Sulthan Chand & Son’s Educational publishers, 2011.
2. Maheswari S.N. “Introduction to Accountancy”, Vikas Publishing House, 2005.
3. Panday I.M. “Financial Management”, Vikas Publishing House, 2009.

Suggested Readings:

1. Varshney and KL Maheswari, Managerial Economics, Sultan Chand, 2001.
2. M.Kasi Reddy and S.Saraswathi, Managerial Economics and Financial Accounting, Prentice Hall of India Pvt Ltd, 2007.
3. JC Pappas and EF Brigham, Managerial Economics.

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IT 215

DATA STRUCTURES LAB

Instruction	4 periods per week
Duration of Semester- End Examination	3 Hours
Semester- End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. The fundamental design, analysis, and implementation of basic data structures and algorithms.
2. Understand data structures such as Trees, Threaded Binary Trees, Heaps, etc.
3. Be familiar with graph operations and algorithms.
4. Get familiar with advanced tree structures like AVL, Splay, m-way, B-Trees.

Course Outcomes:

Student will be able to

1. Choose the data structures that effectively model the data in a problem.
2. Design, implement, test, and debug programs using a variety of data structures including hash tables, binary and general tree structures, heaps, graphs, and B-trees.
3. Choose the appropriate data structure and algorithm design method for a specified application.

Prerequisites:

Good programming knowledge in C & CPP.

List of Programs

1. Implement String ADT.
2. Implement Infix to Postfix Conversion and evaluation of postfix expression using Stack.
3. Implementation of Queues, Circular Queues and Deques.
4. Implementation of Single Linked List and its operations.
5. Implementation of Double Linked List and its operations.
6. Implementation of Binary Search and Hashing.
7. Implementation of Sorting Techniques: Insertion, Bubble, Selection, Shell, Merge, Quick, Heap.
8. Implementation of Tree Traversals on Binary Trees.
9. Implementation of operations on AVL Trees.
10. Implementation of Traversal on Graphs.
11. Implementation of Splay Trees.

Suggested Reading:

1. Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structure and Algorithms in C++", 2nd Edition, John Wiley, 2011.
2. Ellis Horowitz, Dinesh Mehta, S. Sahani, "Fundamentals of Data Structures in C++", Universities Press, 2007.
3. K. R. Venugopal, "Mastering C++", Tata McGraw-Hill Publishing Company, 1997
4. D. Samantha, "Classic Data Structures", Prentice Hall India, August 2004.
5. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 3rd edition, Addison-Wesley, 2007

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EC 218

BASIC ELECTRONICS LAB

(Common for CSE, IT, MECH, PROD)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

The main objectives of this course are:

1. To study the electronics components.
2. To study characteristics of semi-conductor devices.
3. To study simple electronic circuits.

Course Outcomes:

Upon completion of this course, the student will be able to

1. Understand the knowledge regarding electronic components and equipment.
2. Design various rectifiers and filters .Analysis of characteristic behavior of BJT , FET
3. Design of an amplifier.
4. Verify the operation of Op-amp for various applications.

List of Experiments:

1. Study of Electronic components.

2. Characteristics of Semiconductor diodes (Germanium, Silicon and Zener).

3. CRO and its Applications.

4. Half, Full wave rectifiers with and without filters.

5. Voltage Regulator using zener diode.

6. Characteristics of BJT in CE Configuration.

7. Characteristics of FET in CS Configuration.

8. Amplifier with and without feedback.

9. RC Phase shift oscillator

10. Operational Amplifier and its applications.

11. Verification of Logic gates

12. Realization of Half and Full adder

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text - Lab Manual", 7th Edition, TMH, 1994.

2. Paul B. Zbar," Industrial Electronics, A Text - Lab Manual", 3rd Edition.

With effect from Academic Year 2014-15

IT 216

MINI PROJECT - I

Instruction	3 periods per week
Sessional	25 Marks
Credits	1

Course Objectives:

1. To learn by doing, by taking responsibility of the end product.
2. To develop capability to analyse and solve real world problems with an emphasis on applying/integrating knowledge acquired.

Course Outcomes:

Students should be able to do the following:

1. Construct innovative solutions.
2. To work in team as well as individuals.
3. To manage time and resources.

The Students are required to implement one of the projects from project exercise given in the suggested readings of the theory subjects. During the implementation of the project, Personnel Software Process (PSP) has to be followed.

Report of the project work has to be submitted for evaluation.

With effect from Academic Year 2014-15

MT 222

PROBABILITY AND RANDOM PROCESSES

Instruction	4 periods per week
Duration of Semester-End Examination	3Hours
Semester-End Examination	75Marks
Sessional	25Marks
Credits	3

Course Objectives:

1. To induce the ability to describe a random experiment in terms of procedure, observation, and a Probability model.
2. To inculcate ability to characterize functions of random variables
3. To impart the students the methods to characterize stochastic processes with an emphasis on stationary random processes.

Course outcomes:

1. The student is expected to characterize jointly multiple discrete and continuous random variables
2. The student must be able to describe conditional and independent events and conditional random variables.
3. Learn the techniques to describe independent events and independent random variables and their sums.

UNIT-I

The meaning of Probability-Introduction, definitions-Probability and Induction-Causality versus Randomness.

The Axioms of probability: Set theory-Probability Space- Conditional Probability.

Repeated trials: combined experiments-Bernoulli's trials –Bernoulli's theorem and games of chance.

UNIT-II

The concept of Random variable: Introduction-Distribution and density functions-Specific random variables-Conditional distributions-Asymptotic Approximations for Binomial approximations.

Functions of one random variables: The random variable g(x)- The distribution of g(x)-Mean and variance-moments – Characteristic Function.

UNIT-III

Two random variables: Bivariate distributions-one function of two random variables

-Two function of two random variables-joint moments-joint characteristic functions-conditional distributions- conditional Expected Probability function.

UNIT-IV

Random Process: Definitions- Basic concepts and examples-Stationary and ergodicity-second order properties- Spectral representation Winer-Kinche
Theorem.

UNIT-V

Linear Operations: Gaussian Processes-Poisson process- Low pass and band pass noice representations.

Text Books:

1. T.Veerarajan "Probability, Statistics and Random Process", Tata Mc Graw Hill company Pvt. Ltd. Third Edition, 2010
2. P.Ramesh Babu "Probability Theory and Random Processes", Tata McGraw Hill Education Private Limited First Edition-2014
3. S. C.Gupta and V.K.Kapoor "Mathematical Statistics", Sultan Chand & Sons Tenth Edition, 2000.

With effect from Academic Year 2014-15

IT 221

JAVA PROGRAMMING

Instruction	4 Periods per week
Duration of Semester- End Examination	3 Hours
Semester-End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods, using class libraries.
2. To create Java application programs using sound OOP practices such as interfaces, APIs and error exception handling.
3. Using API to solve real world problems.

Course Outcomes:

At the end of this course student will:

1. Achieve proficiency in object-oriented concepts and also learns to incorporate the same into the Java programming language.
2. Develop programming skills and implement problem-solving techniques using OOP concepts.
3. Develop the ability to solve real-world problems through software development in high-level programming language and Large APIs of Java.

Prerequisites:

1. Should have programming knowledge in high level language such as C.
2. Should have basic concepts of OOPs.

UNIT-I

Introduction To Java: Objects, Classes, Java Programs, Introduction to jdk and jre, Java Primitive Types, Basic Operators, Conditional and Logical statements, Some Typical Differences Between C and Java.

Defining Classes: Adding Instance Fields and Methods, Constructors, Access Modifiers (Visibility Modes), Object Creation Examples, Method Overloading and Constructor Overloading, Use of static and final keywords, Objects as parameters, Difference between local variable and instance field, Introduction to Object class, How to read user input (from keyboard).

UNIT-II

Arrays, Strings in Java: How to create and define arrays, Introduction to java.util.Array class, Difference between String &StringBuffer classes, StringTokenizer class and Wrapper classes and conversion between Objects and primitives

Inheritance, Interfaces and Packages in Java: Defining super / sub classes, Abstract classes, Method overriding, Interfaces, Using Library Interfaces [Comparable and Comparator], Creating and Defining Packages;

Inner classes in Java: Types of inner classes, Creating static / non-static inner classes, Local and anonymous inner classes.

UNIT-III

Exception Handling in Java: What are exceptions, writing your own exception classes, [try, catch, throw, throws clauses] , Difference between checked Vs.unchecked Exceptions, Error Vs. Exception.

Multithreading in Java: what are threads, how to create threads, Thread class in java, use of synchronized keyword, how to avoid deadlock.

Generics and Frameworks: Generics, Collections Framework, Collection interfaces and classes ArrayList, LinkedList, Vector.

UNIT-IV

GUI Design & Event Handling: Component, Container, Color , GUI Controls, Layout Managers, Introduction to Swings, Events, Listeners, Icon interface, Writing GUI Based applications, Applets , Running Applets.

UNIT-V

File Handling: Stream classes, Reader and Writer classes, File and Directory class

Database Handling in Java: Java Database Connectivity (JDBC)

Text Book:

1. Herbert Schildt: "Java™: The Complete Reference Java", Eighth Edition, Tata McGraw Hill Publications, 2011, ISBN: 9781259002465

Suggested Reading:

1. Cay S. Horstmann, Gary Cornell: "Core Java, Volume I--Fundamentals", 8th edition, Prentice Hall, 2008, ISBN: 9780132354790
2. K. Arnold and J. Gosling, "The JAVA programming language", 3rd edition, Pearson Education, 2000.
3. Timothy Budd, "Understanding Object-oriented programming with Java", Addison-Wesley, 2002.
4. C. Thomas Wu, "An introduction to Object-oriented programming with Java", 4th edition, Tata McGraw-Hill Publishing company Ltd., 2006.
5. Deitel&Deitel, "Java: How to Program", 9th Edition, PHI, 2014

With effect from Academic Year 2014-15

IT 222

DESIGN AND ANALYSIS OF ALGORITHMS

Instruction	4 periods per week
Tutorial	1 period per week
Duration of Semester-End Examination	3 Hours
Semester-End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To develop the problem solving capability using different algorithmic design techniques.
2. To learn how to analyse the asymptotic performance of algorithms and prove their correctness.
3. To introduce the notions of NP-completeness and NP-hardness.

Course Outcomes:

Students should be able to do the following:

1. Synthesize/adapt an algorithm to solve the problem in hand and argue its correctness.
2. Analyse best-, average- and worst-case complexities of algorithms using asymptotic notations.
3. Identify the complexity classes such as P, NP, NP-Complete and NP-Hard to which an algorithm belongs and design a feasible solution.

Prerequisites:

Programming language, Data Structures, Discrete mathematics, Basic probability theory.

UNIT-I

Introduction: Algorithm Specification, Performance analysis, Space Complexity, Time Complexity, Asymptotic Notation (O, Omega, Theta), Practical Complexities, Performance Measurement, Randomized Algorithms: An informal discussion, Review of elementary data structures : Stacks, Queues, Trees, Heap and Heap Sort, Set representation, UNION, FIND.

UNIT-II

Divide- and Conquer: The general method, Finding maximum minimum. Merge sort, Quick sort, Selection Sort, Strassen's Matrix Multiplication **Greedy Method:** The General Method,Knapsack problem, Job sequencing with deadlines, Minimum Cost Spanning Trees, Optimal Storage on tapes, Optimal merge patterns, Single Source Shortest Paths.

UNIT-III

Dynamic Programming: The General Method, Multistage graph, Single source shortest path, All Pair Shortest Path, Optimal Binary Search trees, 0/1 Knapsack, Reliability Design, Traveling Salesperson Problem, **Techniques for Graph Traversal**: Breath First Traversal, Depth First Traversal, Connected Components and Spanning Trees, Bi-connected Components and Depth First Search.

UNIT-IV

Backtracking : The General Method,8-Queens Problem, Graph Colouring, Hamilton cycle, Knapsack Problem, **Branch and Bounds:** The Method, LC Search, 15 puzzle, FIFO Branch and Bound, LC Branch and Bound, 0/1 Knapsack Problem, Traveling salesperson problem.

UNIT-V

NP-Hard and NP-Completeness: Basic concepts, Non-Deterministic Algorithms, The Classes NP Hard and NP Complete. Cook's theorem, NP-hard Graph Problems: Node Cover Decision Problem, Chromatic Number Decision Problem, Directed Hamiltonian Cycle, Traveling salesperson decision problem, NP Hard Scheduling Problems: Job Shop Scheduling.

Text Book:

1. Ellis Horowitz, SartajSahani and SanguthevarRajasekaran, Fundamentals of Computer Algorithm, 2nd edition, Semester-End Press, 2011.

Suggested Reading:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 2nd Edition, Prentice Hall of India Private Limited, 2006.
2. AnanyLevitin, "Introduction to the Design & Analysis of Algorithms", Pearson Education, 2003.
3. Aho, Hopcroft, Ullman, "The Design and Analysis of Computer Algorithm", Pearson Education, 2000.
4. ParagH.Dave, Himanshu B. Dave, "Design and Analysis of Algorithms", Pearson Education, Second Edition, 2014.

With effect from Academic Year 2014-15

IT 223

THEORY OF AUTOMATA

Instruction	4 periods per week
Tutorial	1 period per week
Duration of Semester-End Examination	3 Hours
Semester-End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To study, evaluate and explain the differences between different computational models, such as Turing machines, push-down automata, finite automata, etc.
2. To design solutions for problems using the different computational models (Pushdown Automata, Finite Automata, TMs).
3. To understand and work with grammars and representations of formal languages.

Course Outcomes:

Upon successful completion of this course, students should be able to have

1. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
2. An ability to apply knowledge of computing and mathematics appropriate to the discipline in the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.
3. An ability to design, implements, and evaluate a computer-based system, process, component, or program to meet desired needs.

Prerequisites: Discrete Structures and Data Structures

UNIT-I

Automata: Introduction to Finite Automata, The Central Concepts of Automata Theory: Alphabets, Strings, Languages.

Finite Automata: An Informal Picture Of Finite Automata: The Ground Rules, The Protocol, Enabling the Automata to Ignore Actions, The Entire System as an Automaton. Deterministic Finite Automata: Definition of a DFA, How a DFA Processes Strings? Simpler

Notations for DFA's, Extending the Transition Function to Strings, The Language of a DFA, Nondeterministic Finite Automata: Definition of NFA, The Extended Transition Function, The Language of an NFA, Equivalence of NFA and DFA, An Application: Text Search, Finite Automata with Epsilon-Transitions: Use of €-transitions, The formal notation for an €-NFA , €-closure, Extended Transitions and Languages for €-NFA's, Eliminating €-transitions

UNIT -II

Regular Expression and languages: Regular Expressions: The Operators of Regular Expressions, Building Regular Expressions. Finite Automata and Regular Expression: From DFAs to Regular Expressions, Converting DFA's to Regular Expressions by Eliminating States, Converting Regular Expressions to Automata. Applications of Regular Expressions, Algebraic Laws for Regular Expressions.

Properties of Regular Languages: Proving Languages not to be Regular: The pumping lemma for Regular Languages, Applications of Pumping Lemma, Closure Properties of Regular Languages: Decision Properties of Regular Languages: Testing Emptiness of Regular Languages, Testing Membership in a Regular Language. Equivalence and Minimization of Automata: Testing Equivalence of States, Testing Equivalence of Regular Languages ,Minimization of DFA's.

UNIT-III

Context Free Grammars and Languages: Context-Free Grammars: Definition of Context Free Grammars, Derivations using a Grammar, Leftmost and Rightmost Derivation, The language of a Grammar, Parse Trees: Constructing Parse Trees, The Yield of a Parse Tree, Applications of CFGs, Ambiguity in Grammars and Languages: Ambiguous Grammars, Removing Ambiguity From Grammars, Leftmost Derivations as way to Express Ambiguity, Inherent Ambiguity.

Properties of Context Free Languages: Normal Forms for Context-Free Grammars: Eliminating Useless Symbols, Computing the Generating and Reachable Symbols, Eliminating Productions, Eliminating Unit Productions, Chomsky Normal Form, Pumping Lemma for

CFL's: Statement of the Pumping Lemma, Applications of Pumping Lemma for CFL's, Closure Properties of CFL's, Decision Properties of CFL's: Testing Emptiness of CFL's, Testing Membership in a CFL's.

UNIT -IV

Pushdown Automata: Definition of pushdown automaton: The Formal Definition of PDA,

Graphical Notation for PDA's, Instantaneous Description of a PDA. The Languageof a PDA: Acceptance by Final State, Acceptance by Empty Stack, From Empty Stack to Final State, From Final State to Empty Stack, Equivalence of PDA's and CFG's: From Grammars to PDA's, From PDA's to Grammars, Deterministic Pushdown Automata: Definition, Regular Languages and Deterministic PDA's, DPDA's to CFL's, DPDA's to Ambiguous Grammars.

Introduction to Turing Machines: Problems that Computer Cannot Solve: The Turing Machine: Notation for the TM, Instantaneous Descriptions for TM's, Transitions Diagrams, The Language of a TM, Turing Machines and Halting, Programming Techniques for Turing Machines: Storage in the State, Multiple Tracks, Subroutines, Extensions to the Basic Turing Machine: Multitape Turing Machine, Equivalence of One-Tape and Multi-Tape TM's, Non deterministic Turing Machines, Restricted Turing Machines: TM's with Semi infinite Tapes, Multistack Machines, Counter Machines. Turing Machine and Computers: Simulating a Computer by a TM.

UNIT -V

Undecidability: A Language That Is Not Recursively Enumerable: Enumerating the Binary Strings, Codes for Turing Machines, The Diagonalization Language, An Undecidableproblemthat is RE: Recursive Languages, Compliments of Recursive and RE languages, The Universal Languages, Undecidablity of the Universal Language,Undecidable problems about Turing Machines: Reductions, TM's That Accept The Empty Language, Rice's Theorem and Properties of RE languages, Post's Correspondence Problem: Definition of PCP, The Modified PCP, Other UndecidableProblems.

Intractable Problems: The classes P and NP: Problems Solvable in Polynomial Time,Nondeterministic Polynomial Time, NP-Complete Problem.

Text book:

1. John E. Hopcroft, Rajeev Motwani, Jeffery D Ullman, "Introduction to AutomataTheoryLanguages and Computation", Third edition, Pearson Education, 2007.

Suggested Reading:

1. John C Martin. "Introduction to Language and Theory of Computation", 3rd edition, TMH, 2003.
2. Daniel Cohen, "Introduction to Computer Theory", 2nd edition, Wiley Publications, 2007.
3. Mishra K., Chandrasekaran N., "Theory of Computer Science (Automata, Languages and
4. Computation)", 3rd edition,Prentice Hall of India 2008.
5. ShyamalendraKandar, "Introduction to Automata Theory, Formal Languages and Computation", Pearson, 2013.

With effect from Academic Year 2014-15

IT224

SOFTWARE ENGINEERING

Instruction	4 periods per week
Duration of Semester-End Examination	3 Hours
Semester-End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

This course introduces the students to

1. Understand the software life cycle models.
2. Understand the importance of the software development process.
3. Understand the importance of software quality and review techniques.

Course Outcomes:

1. An ability to apply knowledge of mathematics, science, and engineering.
2. An ability to design and conduct experiments, as well as to analyze and interpret data, conduct tests using various testing methods to verify and validate the results.
3. An ability to identify, formulate and implement software projects.

Pre-requisites: Knowledge of design, coding, and debugging programs.

UNIT-I

Software and Software Engineering: The Nature of Software, Software Engineering. The Software Process, Software Engineering Practice.Process Models: A Generic Process Model, Prescriptive Process Models, Specialized Process Models, The Unified Process, Process Technology, Product and Process, Process Assessment and Improvement, The CMMI, The people CMM,Introduction to Agile development.

Understanding Requirements: Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

Requirements Modeling: Requirements Analysis, Scenario-Based Modeling, Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity-Relationship diagrams, Software Requirement and Specifications, Behavioral and non-behavioral requirements, Software Prototyping.

UNIT-II

Design Concepts: Design within the Context of Software Engineering, The Design Process, Design Concepts. Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design.

Architectural Design: Software Architecture, Architecture Styles.

Component level Design: Designing Class-Based Components, Conducting Component-Level Design, Designing Traditional Components, Component-Based Development.

UNIT-III

Quality Concepts: Software Quality, Achieving Software Quality.

Review Techniques: Cost Impact of Software Defects.

Software Quality Assurance: Background Issues, Elements of Software Quality Assurance, SQA Tasks, Goals and Metrics, Formal Approaches to SQA, Statistical Software Quality Assurance, Software Reliability, The ISO 9000 Quality Standards, The SQA Plan.

UNIT-IV

Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Validation Testing, System Testing, The Art of Debugging. Testing Tools –Rational functional tester, Win Runner, Load Runner, Testing Standards,Selenium software testing tool.

Testing Conventional Applications:

Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black–Box Testing, Software Configuration Management.

Product Metrics: A Framework for Product Metrics, Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information Flow Metrics, Metrics for Testing, Metrics for Maintenance.

UNIT-V

Estimation: Observations on Estimation, The Project Planning Process, Software Scope and Feasibility, Resources, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Specialized Estimation Techniques.

Risk Management: Reactive versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Monitoring, and Management, The RMMM Plan.

Text Books:

1. Roger S.Pressman, "Software Engineering: A Practitioners Approach" ,7th edition, McGrawHill, 2009.

Suggested Reading:

1. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, "Fundamentals of Software Engineering", PHI, 2nd edition.
2. Ali Behforoz and Frederic J.Hadson, "Software Engineering Fundamentals", Oxford Semester-End Press, 1996.
3. PankajJalote "An Integrated Approach to Software Engineering ", 3rd edition, Narosa Publishing house, 2008.
4. James F.Peters, WitoldPedrycz, "Software Engineering-An engineering Approach", John Wiley Inc., 2000.

With effect from Academic Year 2014-15

IT 225

COMPUTER ORGANIZATION & MICROPROCESSORS

Instruction	4 periods per week
Duration of Semester-End Examination	3 Hours
Semester-End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To familiarize students with the design and organization of a digital computer, operation of various functional units, instruction set design and factors that influence the performance of a computer.
2. To facilitate students with the understanding of architecture and instruction set of 8085 in particular and programming 8085.
3. To facilitate students with the understanding of the functionality and interfacing of various peripheral devices.

Course Outcomes:

After completing the course, student should be able to

1. Understand and analyze the performance of computer systems and know how to improve their efficiency.
2. Understand the instruction set of 8085 and write assembly language programs.
3. Design new special purpose systems for various applications using appropriate peripheral interfacing.

Prerequisites:

Digital Electronics and Logic Design

UNIT-I

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi-computers, Historical perspective.

Arithmetic: Addition and Subtraction of Signed numbers: Addition/Subtraction Logic Unit, Design of fast adders: Carry – Look-ahead Addition, Multiplication of positive numbers, Signed-Operand Multiplication: Booth Algorithm, Fast Multiplication: Bit-Pair Recording of Multipliers, Carry-Save addition of Summands, Integer Division, Floating Point Numbers and Operations: IEEE Standard for Floating-Point Numbers, Arithmetic Operations on Floating-Point Numbers, Guard Bits and Truncation, Implementing Floating-Point Operations.

UNIT-II

The Memory System: Basic concepts, Semi-conductor RAM Memories: Internal Organization of Memory Chips, Static Memories, Asynchronous DRAMs, Synchronous DRAMs , Structure of Larger Memories, Memory System Considerations, Rambus Memory, Read-Only Memories: ROM, PROM, EPROM, EEPROM, Flash Memory, Speed, Size and Cost, Cache Memories**:** Mapping Functions, Replacement Algorithms, Performance considerations: Interleaving, Hit rate and Miss Penalty, Caches on the Processor Chip, Other Enhancements. Virtual Memories: Address Translation, Memory Management requirements, Secondary Storage: Magnetic Hard Disks, Optical Disks and Magnetic Tape Systems.

UNIT-III

8085 Microprocessor Architecture: Introduction to Microprocessors, The 8085 MPU: The 8085 Microprocessor, Microprocessor Communication and Bus Timings, De-multiplexing the Bus AD_7-AD_0, Generating Control Signals, A Detailed Look at the 8085 MPU and its Architecture, Decoding and Executing an Instruction.

Programming the 8085: Introduction to 8085 instructions: Data Transfer (Copy) Operations, Arithmetic Operation, Logic Operations, Branch Operations, Writing Assembly Language Programs, Debugging a Program. Programming techniques with Additional instructions: Programming Techniques-Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Operations Related to memory, Logic Operations: Rotate and Compare, Dynamic Debugging.

UNIT-IV

Stacks and subroutines: Stack, Subroutine, Restart, Conditional CALL and RETURN instructions, Advanced Subroutine Concepts.

Interrupts: The 8085 Interrupt, 8085 Vectored Interrupts:TRAP, RST 7.5, 6.5, AND 5.5, Additional I/O Concepts and Processes: Programmable Interrupt Controller (8259A), Direct Memory Access (DMA).

Interfacing Data Converters: Digital to Analog (D/A) Converters, Analog to Digital (A/D) Converters.

UNIT-V

Programmable Peripheral Interface (Intel 8255A), Programmable Communication Interface (Intel 8251), Programmable Interval Timer (Intel 8253 and 8254), Programmable Keyboard /Display Controller (Intel 8279), Serial and Parallel bus Standards: RS 232 C and IEEE 488.

Text books:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, “Computer Organization”, 5th Edition, McGraw Hill, 2002.
2. Ramesh S Gaonkar, “Microprocessor Architecture, Programming and Applications with the8085”, 5th edition, Prentice Hall, 2002.

Suggested Readings:

1. M. M. Mano, “Computer System Architecture”, 3rd edition, Prentice Hall, 1994.
2. William Stallings, “Computer Organisation and Architecture, Design for Performance”, Pearson, 9th Edition, 2013
3. Pal Chouduri, “Computer Organization and Design”, Prentice Hall of India, 1994.
4. Douglass V. Hall,“Microprocessors and Interfacing: Programming and Hardware”, 2nd Edition,

With effect from Academic Year 2014-15

IT226

JAVA PROGRAMMING AND ALGORITHMS LAB

Instruction	4 periods per week
Duration of Semester-End Examination	3 Hours
Semester-End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To build software development skills using java programming for real world applications.
2. To implement frontend and backend of an application
3. To implement classical problems using java programming.

Course Outcomes:

Students should be able to demonstrate the following.

1. Develop java based software applications using different IOs
2. Design user friendly GUI with befitting backend
3. Implement Algorithms using java programming

List of programs

1. Program(s) to illustrate the concepts polymorphism, abstract class,interface, String Handling and inner classes.
2. A program(s) for demonstrating different exceptions and creation of user defined exception.
3. A program to illustrate multithreading & thread synchronization.
4. Program(s) using Collection classes and Interfaces
5. Program(s) to illustrate the usage of filter and Buffered I/O streams.
6. An application involving GUI with different controls, event handling and applets.
7. A Program to connect to MySql database using JDBC.
8. A program to implement 0/1 Knapsack problem using Dynamic Programming.
9. A program single source shortest path using Dijkstra's algorithm.
10. A program to implement N Queen's problem using Back Tracking
11. A program to find the chromatic number of a given graph.
12. A program to obtain the Topological ordering of vertices in a given digraph.
13. A GUI based Applet Animation to implement the Travelling Salesperson problem.
14. A program to find the shortest path of the multistage graph using dynamic programming.

Suggested Reading:

1. Ellis Horowitz, SartajSahani and SanguthevarRajasekaran, “Fundamentals of Computer Algorithm”, 2nd edition, Semester-End Press, 2011.
2. Herbert Schildt: “Java™: The Complete Reference Java”, 8th edition, Tata McGraw Hill Publications, 2011.

With effect from Academic Year 2014-15

IT 227

MICROPROCESSORS LAB

Instruction	4 periods per week
Duration of Semester-End Examination	3 Hours
Semester-End Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To become familiar with the architecture and Instruction set of Intel 8085 microprocessor.
2. To provide practical hands on experience with Assembly Language Programming.
3. To familiarize the students with interfacing of various peripheral devices with 8085 microprocessor.

Course Learning Outcomes:

After completing the course students should be able to

1. Describe the architecture and comprehend the instruction set of 8085.
2. Understand and apply the principles of Assembly Language Programming in developing microprocessor based applications.
3. Work with standard microprocessor interfaces like serial ports, digital-to-analog Converters and analog-to-digital converters etc.

Prerequisites:

Digital Electronics and Logic Design, Computer Organization

List of Experiments

1. 8085 Programming covering all its instructions on microprocessor trainer kit.
2. Interfacing and programming of 8255. (E.g. traffic light controller).
3. Interfacing and programming of 8254.
4. Interfacing and programming of 8279.
5. A/D and D/A converter interface.
6. Stepper motor interface.
7. Display interface.

Suggested Readings:

1. Ramesh S Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085”, 5th edition, Prentice Hall, 2002.

With effect from Academic Year 2014-15

IT 228

MINI PROJECT - II

Instruction	3 periods per week
Sessional	25 Marks
Credits	1

Course Objectives:

1. To learn by doing, by taking responsibility of the end product.
2. To develop capability to analyse and solve real world problems with an emphasis on applying/integrating knowledge acquired.

Course Outcomes:

Students should be able to do the following:

1. Construct innovative solutions.
2. To work in team as well as individuals.
3. To manage time and resources.

The Students are required to implement one of the projects from project exercise given in the suggested readings of the theory subjects. Focus may be on File structures,

Micro Processor Based Projects, Development of any Controller Circuits using CPLD's or FPGA's. During the implementation of the project, Personnel Software Process (PSP) has to be followed. Report of the project work has to be submitted for evaluation.

With effect from Academic Year 2015-16

SCHEME OF INSTRUCTION & EXAMINATION
B.E. III YEAR
INFORMATION TECHNOLOGY

Semester - I

S.No	Syllabus Ref.No	SUBJECT	Scheme of Instruction		Scheme of Examination			Credits
			Periods per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		Semester-End Examination	Sessional	
		THEORY						
1.	IT 311	Principles of Operating Systems	4	-	3	75	25	3
2.	IT 312	Database Systems	4	-	3	75	25	3
3.	IT 313	Compiler Design	4	-	3	75	25	3
4.	IT 314	Information Security	4	-	3	75	25	3
5.	IT 315	Object Oriented System Development using UML	4	-	3	75	25	3
6.	CE 444	Human Values and Professional Ethics	2*	-	2	50	-	-
		PRACTICAL						
7.	IT 316	Operating Systems Lab	-	3	3	50	25	2
8.	IT 317	Database Lab	-	3	3	50	25	2
9.	IT 318	Mini Project - III		3	3	-	25	1
10.	EG 221	Soft Skills and Employability Enhancement		2	3	50	25	1
		TOTAL	**22**	**11**	**-**	**575**	**225**	**21**

*21 periods per Semester

With effect from the Academic Year 2015-16

IT 311

PRINCPLES OF OPERATING SYSTEMS

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To develop an understanding of the services provided by an operating system.
2. To understand what a process is and how processes are synchronized and scheduled.
3. To understand different approaches for resourcemanagement and to provide security.

Course Outcomes:

Students who complete this course should be able to

1. Use system calls for managing processes, memory and the file system.
2. Select an efficient algorithm for optimizing the performance in different aspects of operating systems.

Prerequisites:

Computer Organization and Microprocessor, Programming language, Data Structures.

UNIT–I

Introduction: Definition of Operating System, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security.

Operating System Structures: Operating-System Services,System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating-System Structure, System Boot.

Process: Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication,

Threads: Overview, Multicore Programming, Multithreading Models, Threading Issues.

UNIT–II

Process Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems ofSynchronization, Monitors.

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Algorithm Evaluation.

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT–III

Main Memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory, Mass-Storage Structure, Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Formatting, RAID Structure, Stable-Storage Implementation.

UNIT–IV

File-System Interface: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, Protection.

File-System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance.

I/O Systems: Overview, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations.

UNIT–V

Protection: Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of the Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems.

Security: The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication.

Text book:

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts", Ninth Edition, John wiley and sons publication,2013.

Suggested Reading:

1. A.Tanenbaum,"Modern Operation Systems", Third Edition, Pearson Education, 2008.
2. William Stallings, "Operating Systems", Fifth Edition, Pearson Education,2005.
3. Ida M.Flynn, "Understanding Operating Systems", Sixth Edition, Cengage,2011.
4. D.M.Dhamdhere,"Operating systems a concept based approach", SecondEdition, McGraw-Hill, 2007.
5. Pramod Chandra P.Bhatt,"AnIntoduction to Opearting Systems concepts and practice", Third Edition, PHI, 2014.

With effect from the Academic Year 2015-16

IT 312

DATABASE SYSTEMS

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand the different issues in the design and implementation of a databasesystem.
2. To understand the physical and logical database designs and various database models.
3. To study the concepts of database security,concurrency and recoverability.

Course Outcomes:

Students who complete this course should be able to

1. Design and implement a database for any specified domain according to well-known design principles that balance data retrieval performance with data consistency guarantees.
2. Formulate data retrieval queries in SQL and Relational algebra.
3. Apply normalization conceptin the design of a database.

Prerequisites:

Data Structures, Core Java.

UNIT-I

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information RetrievalSpecialty Databases, Database Users and Administrators.

Database Design and the E-R Model: Overview of the Design Process, the Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features, Alternative Notations for Modeling Data, Other Aspects of Database Design.

UNIT – II

Introduction to the RelationalModel: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages,Relational Operations.

Introduction to SQL: Overview of the SQL QueryLanguage, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub queries, Modification of the Database.

Intermediate SQL: Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization.

UNIT – III

Advanced SQL: Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries, Advanced Aggregation Features.

Relational Database Design: Features of Good Relational, Designs, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition.

UNIT - IV

Indexing and Hashing: Basic Concepts, Ordered Indices, B+Tree Index Files, Multiple-Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices, Index Definition in SQL

Transactions: Transaction Concept, a Simple Transaction Model, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements

UNIT – V

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multiversion Schemes, Snapshot Isolation, Insert Operations, Delete Operations and Predicate Reads, Weak Levels of Consistency in Practice.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile, Storage, Early Lock Release and Logical Undo, Operations, ARIES, Remote Backup Systems.

Text book:

1. Abraham Silberschatz, Henry F Korth, S. Sudarshan, “Database System Concepts”, Sixth Edition, McGraw-Hill International Edition, 2010.

Suggested Reading:

1. Ramakrishnan, Gehrke, “Database Management Systems”, Third Edition, McGraw-Hill International Edition, 2003.
2. ElmasriNavathe, Somayajulu, “Fundamentals of Database System”, Fourth Edition, Pearson Education, 2006.
3. PatricO’Neil, Elizabeth O’Neil, “Database-principles, programming and performance”,Morgan Kaufmann Publishers, 2001.

With effect from the academic year 2015-16

IT 313

COMPILER DESIGN

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand various phases in Compiler Design.
2. To design Parsers and generate code for target machine.
3. Understand the role of a symbol table and error recovery strategies.

Course Outcomes:

Students who complete the course should be able to

1. Understand the translation process of a compiler
2. Design top-down and bottom-up parsers.
3. Capable to design a compiler.

Prerequisites:

Structured Programming, Data Structures and Theory of Automata.

UNIT-I

Introduction: Programs related to compilers, Translation process, Major data structures, Other issues in compiler structure, Boot strapping and porting.

Lexical analysis: The role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, The Lexical-Analyzer Generator Lex.

UNIT-II

Syntax Analysis: Introduction, Top-Down parsing, Bottom-Up parsing, Introduction to LR Parsing, More powerful LR parsers, Using Ambiguous Grammars, Parser Generators YACC.

UNIT-III

Syntax Directed Translation: Syntax Directed Definitions, Evaluation Orders for SDDs, Applications of Syntax Directed Translation.

Intermediate code generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Translation of Expressions, Type Checking, Control Flow.

Symbol Table Organization: Structure of Symbol table, Symbol Table organization for Block Structured and non-Block Structured languages, Data Structures of symbol Table.

UNIT-IV

Runtime Environments: Storage Organization, Stack Allocation of Space, Access to Non local Data on the Stack, Heap Management, Introduction to Garbage Collection.

Code Generation : Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Peephole Optimization, Register Allocation and Assignment.

UNIT-V

Machine Independent Optimizations: The Principal Sources of Optimizations, Introduction to data flow analysis, Foundation of data flow analysis.

Linkers and Loaders: Basic Loader functions, Design of an Absolute Loader, A simple bootstrap loader, Machine dependent and independent features.

Text Book:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman ,"Compilers: Principles, Techniques &Tools", Pearson Education, Second Edition, 2007.

Suggested Reading:

1. Leland L Bech, "System Software: An Introduction to Systems Programming", Pearson Education , Asia.
2. Kenneth C Louden, "Compiler Construction: Principles and Practice", Cengage Learning.

With effect from the academic year 2015-16

IT 314

INFORMATION SECURITY

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To introduce students with basic concepts in information system and its relevance in modern society.
2. To understand several security requirements and operations - analysis, design, and implementation of the Security System Development Life Cycle (SecSDLC)
3. To understand and implement authentication, integrity and confidentiality along with related protocols.

Course Outcomes:

Students who complete the course should be

1. Aware of information security issues and understand its technologies.
2. Able to discover, analyse and deal with threads using advanced security issues and technologies.

Prerequisites:

Computer networks, Software Engineering.

UNIT- I

Introduction: History, critical characteristics of information, NSTISSC security model, Components of an information system, securing the components, balancing security and access, The SDLC, The security SDLC.

Need for Security: Business needs, Threats, Attacks-secure software development.

UNIT-II

Legal, Ethical and Professional Issues: Law and ethics in information security, relevant U.S laws-international laws and legal bodies, Ethics and information security.

Risk Management: Overview, Risk Identification, risk assessment, Risk Control strategies, selecting a risk control strategy, Quantitative versus qualitative risk control practices, Risk management discussion points, recommended risk control practices.

UNIT-III

Planning for Security: Security policy, Standards and practices, Security blue print, Security education, Continuity strategies.

Security Technology-Firewalls and VPNs: Physical design, firewalls,protecting remote connections.

UNIT-IV

Security Technology-Intrusion detection: Access control and other security tools - Intrusion detection and prevention systems, Scanning and analysis tools, Biometric Access Controls.

Cryptography: Foundations of cryptology, cipher methods, cryptographic Algorithms, Cryptographic tools, Protocols for secure communications, Attacks on cryptosystems.

UNIT-V

Implementing Information Security: Information security project management, Technical topics of implementation, Non-technical aspects of implementation, Security certification and accreditation.

Security and Personnel: Positioning and staffing security function, Credentials of InformationSecurity Professionals, Internal control strategies.

Information security Maintenance: Security management models, TheSecurity maintenancemodel, Digital forensics.

Text book:

1. Michael E. Whitman and Hebert J Mattord, "Principles of Information Security", Fourth Edition, Cengage Learning 2011.

Suggesting Reading:

1. Thomas R Peltier, JustingPeltier, John Blackley, "Information Security Fundamentals", Auerbacj Publications 2010.
2. Detmar W Straub, Seymor Goodman, Richard L Baskerville, "Information Security Policy proceses and practices", PHI, 2008.
3. Marks Merkow and Jim Breithaupt, "Information Security Principle and Practices", Pearson Education, 2007.

With effect from the academic year 2015-16

IT 315

OBJECT ORIENTED SYSTEM DEVELOPMENT USING UML

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Toacquaint the student with the precise vocabulary and powerful notation used in Unified modeling language.
2. To learnmethodology for analysis and design by using object oriented concepts.
3. To strengthen software development by lucrative UML diagrams.

Course Outcomes:

Students who complete this course should be able to

1. Understand the importance of systems analysis and design in solving complex problems.
2. Construct effective UML models for software development.

Prerequisites:

Basic Programming, OOPS Concepts, Software Engineering.

UNIT-I

UML Introduction: Why we Model, Introducing the UML, Elements of UML.Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, ClassDiagrams.

Advanced Structural Modeling: Advanced Classes, Advanced Relationships, Interfaces, Typesand Roles, Packages, Instances, Object Diagrams, Components, Case studies on class diagrams.

UNIT-II

Basic BehavioralModeling: Interactions, Use Cases, Use Case Diagrams, Interaction diagrams,Activity diagrams, Case studies on Use Case diagrams, Interaction diagrams.

Advanced BehavioralModeling: Events and Signals, State Machines, Processes and Threads, Time and space, State Chart Diagrams, Case studies on State chart diagrams.

UNIT-III

Architectural Modeling: Artifacts, Deployment Collaborations, Patterns and Frame-works,Artifact Diagrams, Deployment Diagrams, Systems and Models, Case studies on Deployment diagrams.

UNIT-IV

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

UNIT-V

Core Workflows: Requirements Capture, Capturing Requirements as Use Cases, Analysis,Design, Implementation, Test.

Text book:

1. Ivor Jacobson, Grady Booch, James Rumbaugh, "The Unified Software DevelopmentProcess", Pearson Education, India, 2008.

Suggested Reading:

1. Grady Booch, James Rumbaugh, Ivor Jacobson, "The Unified Modeling Language-UserGuide(Covering UML 2.0)", Second Edition, Pearson Education, India, 2007.
2. Martin Fowler, "UML Distilled", Addison Wesley, Third Edition, 2003.

With effect from the academic year 2015-16

CE 444 HUMAN VALUES AND PROFESSIONAL ETHICS

Instructions	: 21 Periods per semester (7*3)
Duration of University Examination	: 2 Hours
University Examination	: 50 Marks
Sessional	: Nil
Credits	: Nil

Course Objectives:

1. To develop the critical ability among students to distinguish between what is of value and what is superficial in life
2. To enable the students understand the values, the need for value adoption and prepare them meet the challenges
3. To enable the students develop the potential to adopt values, develop a good character and personality and lead a happy life
4. To motivate the students practice the values in life and contribute for the society around them and for the development of the institutions /organisation around they are in.
5. To make the students understand the professional ethics and their applications to engineering profession

Course Outcomes

1. Students develop the capability of shaping themselves into outstanding personalities, through a value based life.
2. Students turn themselves into champions of their lives.
3. Students take things positively, convert everything into happiness and contribute for the happiness of others.
4. Students become potential sources for contributing to the development of the society around them and institutions / organisations they work in.
5. Students shape themselves into valuable professionals, follow professional ethics and are able to solve their ethical dilemmas.

UNIT-1 Concepts and Classification of Values –Need and challenges for value Adoption

Definition of Values – Concept of Values – Classification of Values – Hierarchy of Values – Types of Values –Espoused and Applied Values – Value judgement based on Culture – Value judgement based on Tradition – Interdependence of Values

Need for value education – Findings of Commissions and Committees - Corruption and illegal practices – Science and Technology without values- Exploitation of nature – Increasing use of violence and intoxicants – Lack of education in values – Implications of education in values – Vision for a better India

Challenges for Value adoption – Cultural, Social, Religious, Intellectual and Personal challenges

UNIT – 2: Personal Development and Values in Life

Personal Development: Enlightened self-interest – Accountability and responsibility – Desires and weaknesses – Character development – Good relationships, self-restraint, Spirituality and Purity – The quest for Character – Tests of Character – The key to good character

Values in Life: Building an ethical policy – Integrating values in everyday life – Archaic Social Values – Parenting practices – Critical Thinking - Analyzing and Prioritizing values – Practicing Yoga and Meditation

UNIT – 3: Practicing Values for the development of Society

Resentment Management and Self-analysis – Positive Thinking and Emotional Maturity – The importance of Women , Children and Taking care of them – Helping the poor and needy – Fighting against addictions and atrocities – Environmental awareness – Working for the Sustainable development of the society

Values in Education system: Present Scenario- Engineering education –Current trends- Need for quality improvement- Adoption of value education – Principles of Integrity- Institutional Development.

UNIT – 4: Basic Concepts of Professional Ethics

Ethics, Morals and Human life , Types of Ethics, Personal Ethics, Professional ethics, Ethical dilemmas, Indian and Global thoughts on ethics, Profession, Professional and Professionalism, Ethical role of a professional Basic ethical principles, Some basic ethical theories, use of ethical theories.

Science, Religion Ethics, Genders and ethics, Media and ethics, Computer Ethics, Case Studies on Professional Ethics, Exemplary life sketches of prominent Indian personalities

UNIT-5: Ethics in engineering profession

Engineering profession-Technology and Society-Engineering as Social Experimentation-Engineering ethics-Ethical obligations of Engineering Professionals-Role of Engineers-Engineers as Managers-Professional responsibilities of Engineers- Engineers Responsibility for Safety- A few Case Studies on Risk management

Conflicts of Interest- Occupational Crimes- Plagiarism-Self plagiarism-Ethics Audit-Consideration for ethics audit-Ethics Standards and Bench Marking

Text Books:

1. Subramanian R., " Professional Ethics " , Oxford University Press , 2013
2. Nagarajan R.S., " A Text Book on Human Values and Professional Ethics " New Age Publications , 2007

3. Dinesh Babu S., " Professional Ethics and Human Values", Laxmi Publications, 2007

Reference Books:

4. SantoshAjmera and Nanda Kishore Reddy " Ethics, Integrity and Aptitude",McGrawhill Education Private Limited , 2014
5. GovindaRajan M., Natarajan S., Senthil Kumar V.S." Professional Ethics and Human Values " Prentice Hall India Private Limited ,2012
6. Course Material for Post Graduate Diploma In "Value Education & Spirituality" Prepared by Annamalai University in Collaboration with Brahma Kumaris , 2010

With effect from the Academic Year 2015-16

IT 316

OPERATING SYSTEMS LAB

Instruction per week	3 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:
1. To familiarize with various system calls of LINUX.
2. To implement processes synchronization and scheduling algorithms.
3. To develop a simulator of process set.

Course Outcomes:
Students who complete the course should be able to
1. Use system calls for managing inter-process communication.
2. Capable of simulating different processes sets.

Prerequisites:
Knowledge of C Programming, Basic commands of UNIX, Data Structures.

List of Programs

1. a. Create 2-processes using fork() system call of LINUX.
   b. Create processes hierarchy using fork() system call of LINUX.
2. a. Demonstrate execvp() system call for executing another inbuilt function.
   b. Demonstrate execvp() system call for executing user defined function.
3. Use system calls to get the attributes of a file/Directory.
4. Use system calls to get and set the environment variables.
5. a. Implement Echo server using pipes.
   b. Implement full duplex communication using pipes.
6. a. Implement Echo server using shared memory.
   b. Implement Client-Server model using shared memory.
7. a. Implement Echo server using Message queues.
   b. Implementprivate communication between a server and multiple clients via a single message queue.
8. a. Simulate FCFS CPU Scheduling Algorithm.
   b. Simulate SJF CPU Scheduling Algorithm.
9. Implement Banker's algorithm for Deadlock Avoidance.
10. Implement Producer-Consumer Problem using Message passing.
11. Implement Dining philosophers problem using semaphores.
12. Implement Producer-Consumer Problem using semaphores.
13. Implement Reader-writers problem using Semaphores.

Suggested Reading:
1. W. Richard Stevens, "Unix Network Programming", Volume 1, Addison-Wesley Professional, 2004.

With effect from the academic year 2015-16

IT 317

DATABASE LAB

Instructionper week	3 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	50 Marks
Sessional	25 Marks
Credits	2

Course objectives:

1. To present the concepts and techniques relating to query processing.
2. To design and develop database for an application.
3. To understand various methods of securing the database.

Course outcomes:

Students who complete this course should be able to

1. Design and implement a database schema by enforcing integrity constraints for a given problem-domain.
2. Populate and query a database using SQL DML/DDL commands.
3. Do PL/SQL programming.

Prerequisites:

Familiarity with variables and data types is required.

List of Programs

1. Creation of database (exercising the commands for creation).
2. Exercising Simple to complex queries.
3. Demonstration of PL/SQL Blocks, Procedures and Functions.
4. Usage of Triggers and Cursors.
5. Demonstrate Exception Handling by PL/SQL procedures for data validation.
6. Creation of Forms for student Information, library information etc.
7. Generation using SQL reports.
8. Creating Password and Security features for applications.
9. Usage of File locking table locking, facilities in applications.
10. Creation of small full pledged database application spreading over to 3 sessions.

Note:-The creation of sample database for the purpose of the experiments is to be pre-decided by the instructor.

Suggested Reading:

1. Rick F Vander Lans, "Introduction to SQL", Fourth edition, Pearson Education,2007.
2. Benjamin Rosenzweig, Elena Silvestrova, "Oracle PL/SQL by Example", Third Edition, Pearson Education, 2004.
3. Albert Lulushi, "Oracle Forms Developer's Handbook", Pearson Education, 2006.

With effect from the academic year 2015-16

IT 318

MINI PROJECT – III

Instruction per week	3 Periods
Sessional	25
MarksCredits	1

The Students are required to carry out Mini Project in any of the areas such as DatabaseSystems, Operating Systems,Compiler Design and Object Oriented System Development.

Students are required to submit a report on the Mini Project at the end of the Semester.

With effect from the academic year 2015-16

EG 221

SOFT SKILLS AND EMPLOYABILITY ENHANCEMENT

Instructionper week	2 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	50 Marks
Sessional	25 Marks
Credits	1

Course Objectives: To help the students

1. Participate in group discussions with confidence and to make effective presentations. Also to learn the art of communication.
2. With- resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management & goal setting, self-confidence and assertiveness.
4. Understand what constitutes proper grooming and etiquette in a professional environment. Also to understand academic ethics and value systems.

Course Outcomes: The students will be able to

1. Be effective communicators and participate in group discussions with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to mange time effectively and deal with stress.
4. Make the transition smoothly from campus to corporate. Also use media with etiquette and know what academic ethics are.

List of Experiments

Exercise 1

Communicative Competence – The Art of Communication, basic grammar, Indianisms, Effective listening skills, using English in different situations

Exercise 2

Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence

Elements of effective presentation – Structure of presentation – Presentation tools – Body language

Creating an effective PPT

Exercise 3

Interview Skills – Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets

Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews

Exercise 4

Personality Development – Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values.

Exercise 5

Corporate Culture – Grooming and etiquette, communication media etiquette
Academic ethics and integrity

Suggested Reading:

1. Madhavi Apte , "A Course in English communication", Prentice-Hall of India, 2007
2. Leena Sen , "Communication Skills", Prentice-Hall of India, 2005
3. Dr. Shalini Verma, "Body Language- Your Success Mantra", S Chand, 2006
4. Edgar Thorpe and Showick Thorpe , "Objective English", 2nd edition, Pearson Education, 2007
5. Ramesh, Gopalswamy, and Mahadevan Ramesh, "The ACE of Soft Skills", New Delhi: Pearson, 2010
6. Gulati and Sarvesh, " Corporate Soft Skills", New Delhi: Rupa and Co. , 2006
7. Van Emden, Joan, and Lucinda Becker, "Presentation Skills for Students", New York: Palgrave Macmillan, 2004
8. Covey and Stephen R, "The Habits of Highly Effective People", New York: Free Press, 1989

With effect from Academic Year 2015-16

SCHEME OF INSTRUCTION & EXAMINATION
B.E. III YEAR
INFORMATION TECHNOLOGY

Semester - II

S.No	Syllabus Ref.No	SUBJECT	Scheme of Instruction		Scheme of Examination			Credits
			Periods per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		Semester-End Examination	Sessional	
		THEORY						
1	IT 321	Computer Networks and Socket Programming	4	-	3	75	25	3
2	IT 322	Data Warehousing and Data Mining	4	-	3	75	25	3
3	IT 323	Web Programming	4	-	3	75	25	3
4	IT 324	Computational Intelligence	4	-	3	75	25	3
5	IT 325	Digital Image Processing and Analysis	4	-	3	75	25	3
6		Elective-I	4	-	3	75	25	3
		PRACTICAL						
7	IT 326	Network Programming Lab	-	3	3	50	25	2
8	IT 327	Data Mining Lab	-	3	3	50	25	2
9	IT 328	Mini Project – IV	-	3	3	-	25	1
10	-	Industrial Visit	-	-	-	-	-	-
		TOTAL	**24**	**9**	**-**	**550**	**225**	**23**

Elective-I

IT 351 Computer Graphics
IT 352 Software Testing
IT 353 Software Project Management
IT 354 Natural Language Processing
IT 355 Advanced Computer Architecture

IT 356 Human Computer Interaction

With effect from the academic year 2015-16

IT 321

COMPUTER NETWORKS AND SOCKET PROGRAMMING

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand the fundamental concepts of computer networks and Socket programming.
2. To know the role of various layers and protocols for computer networks.
3. To introduce internet services and security policies.

Course Outcomes:

Students who complete this course should be able to

1. Identify the different types of network topologies and protocols, networking devices and their functions within the network.
2. Enumerate the layers of the OSI model and TCP/IP and describe the function(s) of each layer.
3. Develop solutions for networking and security problems, balancing business concerns, technical issues and security.

Prerequisites:

Structured Programming, Data Communications.

UNI T-I

Introduction: Uses of Computer Networks, Network Hardware, Network Software: Reference Models (ISO -OSI, TCP/IP).

Network Programming: Socket Interface: Sockets, Socket Address, Elementary Sockets, Advanced Sockets, Socket Options, Out of Band Data, Daemon process and Internet Super Server.

Remote Procedure Calls: Introduction, Transparency Issues and Sun RPC.

UNI T-II

Network Layer: Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Quality of Service.

Internetworking: Concatenated virtual circuits, Connectionless Internetworking, Tunneling,Internetworkrouting, Fragmentation.

UNIT-III

Network layer in the Internet: Internet Protocol, IPv4, IPv6, Interoperability of IPv4 and IPv6, IP addresses, Internet Control protocols, OSPF, BGP, Internet Multicasting, Mobile IP.

Transport Layer: The Transport Service, Elements of Transport Protocols, The Internet **Transport Protocols:** UDP, Internet Transport Protocols - TCP.

UNIT-IV

Application Layer: Domain Name System:DNS Name Space, Resource Records, Name Servers.

Electronic Mail: Architecture and Services, UserAgent, Message Formats, Message transfer and Final Delivery.

World Wide Web: Architectural Overview, Static Web Documents, Dynamic Web Documents, HTTP, Wireless Web.

Multimedia: Digital Audio, Streaming Audio, Voice over IP, Video on Demand.

UNIT-V

Network Security: Cryptography, Symmetric Key Algorithms, Public Key Algorithms, Digital Signatures, Management of Public Keys, Communication Security, Authentication Protocols, E-mail Security, Web Security.

Text Book:

1. Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, Pearson Education.
2. W. Richard Stevens, "Unix Network Programming" Prentice Hall/Pearson Education,2009.

Suggested Reading:

1. James F. Kurose, Keith W, Ross, "Computer Networking, ATop-Down Approach Featuring the Internet", Third Edition, Pearson Education, 2005.
2. William Stallings, "Computer Networking with Internet Protocols and Technology", Pearson Education, 2004.

With effect from the academic year 2015-16

IT 322

DATA WAREHOUSING AND DATA MINING

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 MarksCredits
	3

Course Objectives:

1. To introduce the basic concepts of Data Warehouse and Data Mining techniques.
2. Examine the types of the data to be mined and apply preprocessing methods on raw data.
3. Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.

Course Outcomes:

Students who complete this course should be able to

1. Process raw data to make it suitable for various data mining algorithms.
2. Discover and measure interesting patterns from different kinds of databases.
3. Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data.

Prerequisites:

Basic Programming, Mathematics-Statistics, Database Concepts

UNIT-I

Introduction: Introduction to Data Mining, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining.

Getting to know your data: Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity.

Data Preprocessing: An Overview, DataCleaning, DataIntegration, DataReduction, Data Transformation and Data Discretization.

UNIT-II

DataWarehousing and Online Analytical Processing

DataWarehouse: Basic Concepts, DataWarehouseModeling: Data Cube and OLAP, DataWarehouse Design and Usage: A Business Analysis Framework for Data Warehouse Design, Data Warehouse Design Process, Data Warehouse Usage for Information Processing, DataWarehouse Implementation.

Mining Frequent Patterns,Associations and correlations: Basic Concepts, Frequent Item Set Mining Methods, Interesting patterns, Pattern Evaluation Methods, Pattern Mining in Multilevel and multidimensional space.

UNIT-III

Classification: Basic Concepts**,** Decision Tree Induction,Bayes Classification Methods,Rule-Based Classification,Model Evaluation and Selection,Techniques to Improve Classification Accuracy: Introducing Ensemble Methods, Bagging, Boosting and AdaBoost.

Classification: Advanced Methods

Bayesian Belief Networks, Classification by Back propagation, Support Vector Machines, Lazy Learners (or Learning from Your Neighbors), Other Classification Methods.

UNIT-IV

Cluster Analysis: Basic Concepts and Methods, Overview of Basic Clustering Methods,Partitioning Methods, Hierarchical Methods: Agglomerative versus Divisive Hierarchical Clustering, Distance Measures in Algorithmic Methods, BIRCH: Multiphase Hierarchical Clustering Using Clustering Feature Trees.

Density-Based Methods: DBSCAN: Density-Based Clustering Based on Connected Regions with High Density, OPTICS: Ordering Points to Identify the Clustering Structure, Grid-Based Methods.

Evaluation of Clustering: Assessing Clustering Tendency, Determining the Number of Clusters, Measuring Clustering Quality.

UNIT-V

Outlier Detection: Outliers and Outlier Analysis, Outlier Detection Methods, Statistical Approaches, Proximity-Based Approaches

Data Mining Trends and Research Frontiers:

Mining Complex Data Types: Mining Sequence Data: Time-Series, Symbolic Sequences and Biological Sequences, Mining Other Kinds of Data, Data Mining Applications, Data Mining and Society, Data Mining Trends.

Text Book:

1. Han J &Kamber M, “Data Mining: Concepts and Techniques”, Third Edition, Elsevier, 2011.

Suggested Reading:

1. Pang-Ning Tan, Michael Steinback, Vipin Kumar, “Introduction to Data Mining”, Pearson Education, 2008.
2. M.Humphires, M.Hawkins, M.Dy,“Data Warehousing: Architecture andImplementation”, Pearson Education, 2009.
3. Anahory, Murray, “Data Warehousing in the Real World”, Pearson Education, 2008.
4. Kargupta, Joshi,etc., “Data Mining: Next Generation Challenges and Future Directions”, Prentice Hall of India Pvt Ltd, 2007.

With effect from the academic year 2015-16

IT 323

WEB PROGRAMMING

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To design and develop web pages using html5, CSS positioning, servlets and JDBC.
2. Understanding and writing a well-formed XML schemas and documents.
3. Using JSP as view component in MVC based web applications.
4. Understanding .NET architecture and writing applications with ADO.NET

Course Outcomes:

Students who complete this course should be able to

1. Design and develop various web based applications using JavaScript and servlets
2. Use JDBC in JSP pages, Create web forms with JQuery.
3. Design web site using HTML, CSS and ASP.NET with Ajax based requests.

UNIT-I

Introduction: Web Fundamentals, **HTML 5.0:** basic tags, Form elements and attributes.
Introduction to Cascading Style Sheets: CSS selectors, CSS BOX Model, CSS Positioning, and CSS floating.
JQuery: Introduction to JavaScript, Selecting elements in the documents, Event handling, working with styles, The Event object, Using and creating plugins, JSON Fundamentals.
Web-Based and REST Style Services:

UNIT-II

Introduction to XML: The Syntax of XML, XML Document Structure, Document Type Definitions, Name Space, XML Schemas, Displaying raw XML Documents, Displaying XML Documents with CSS, XSLT Style Sheets and XML Processors.

UNIT-III

Java Servlets: Servlet Life Cycle,Basic Servlet Structure, request methods, passing initialization parameters from web.xml, Handling the client request form data, Generating HTTP Response, Request dispatching and State Management techniques.
Java Server Pages: Expressions, Scripting elements, Page Directives, Actions, JSP Objects, Handling Exceptions, MVC Flow of Control, Accessing MsAccess, MySQL and Oracle databases using servlets and JSP.

UNIT-IV

Web Services: Definition, Web services Architecture, Simple Object Access Protocol

(SOAP) - goals, structure and contents of a SOAP Message, processing a SOAP message, Web Services Description language (WSDL) - Structure of WSDL interface, Implications of WSDL Model, Universal description discovery and integration (UDDI) - Goals, Information in a UDDI registry, UDDI data structures, UDDI Registry API.

UNIT-V

ASP.NET: Web Form fundamentals, Web Controls, State management, Building better web form - Validation, rich controls, user controls and graphics, Data Management with ADO.NET, ASP.NET with Ajax.

Text Book:

1. Robert W.Sebesta, "Programming with World Wide Web", Eighth Edition, Pearson Education, 2008.
2. John Pollak, "JQuery - A Beginners Guide", McGraw-Hill Education, 2014.
3. Phil Hanna, "The Complete Reference JSP", First Edition, Tata McGraw-Hill, 2003.
4. Gustavo Alonso ,"Web Services: Concepts, Architectures and Applications" Springer Science & Business Media, 2004
5. Matthew MacDonald, "Beginning ASP.NET 4.5 in C#", Illustrated, Apress, 2012.

Suggested Reading:

1. James Webber, SavasParastatidis, Ivan Robinson,"Rest in Practice:HyperMedid and System Architecture", First Edition,O'REILLY,2010.

With effect from the academic year 2015-16

IT 324

COMPUTATIONAL INTELLIGENCE

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand knowledge representation and logical reasoning techniques used in Artificial Intelligence.
2. To learn problem solving techniques, natural language processing and build expert systems.
3. To design machine learning and neural network systems.

Course Outcomes:

Students who complete this course should be able to

1. Design an Expert System to solve real world problems.
2. Develop self-learning system that can compensate for partial knowledge base.

Prerequisites:

Discrete Mathematics, Probability and Random Theory.

UNIT-I

Introduction: History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications.

Problem Solving - State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques, Iterative-Deepening A*, Constraint Satisfaction.

Game Playing: Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning.

UNIT-II

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT-III

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and Tools.

Uncertainty Measure - Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory.

UNIT-IV

Machine-Learning Paradigms: Introduction, Machine Learning Systems, Supervised and Unsupervised Learning, Inductive Learning, Learning Decision Trees, Deductive Learning. Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed-Forward Networks, Multi-Layer Feed-Forward Networks, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.

UNIT-V

Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web.

Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge.

Text books:

1. SarojKaushik, "Artificial Intelligence", Cengage Learning, 2011.
2. Tom M. Mitchell, "Machine Learning", McGraw Hill, 1997.
3. Kulkarni, Parag, Joshi, Prachi ,"Artificial Intelligence : Building Intelligent Systems",PHI,2015

Suggested Reading:

1. Russell, Norvig, "Artificial intelligence - A Modern Approach", Pearson Education, Second Edition. 2004.
2. Rich, Knight, Nair: "Artificial intelligence", Tata McGraw Hill, Third Edition 2009.
3. Nilsson, N., "Artificial Intelligence: A New Synthesis", San Francisco, Morgan Kaufmann, 1998.
4. Peter Jackson, "Introduction to Expert Systems", Third Edition, Pearson Addison Wesley,1998

With effect from the academic year 2015-16

IT 325

DIGITAL IMAGE PROCESSING AND ANALYSIS

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To learn the fundamental concepts and applications of digital image processing.
2. To learn the image processing concepts: Intensity transformations, spatial filtering, smoothing and sharpening in both spatial and frequency domains, Image restoration and reconstruction, Color image processing, Image compression.
3. To learn the image analysis concepts: morphological image processing, image segmentation, image representation and description, and object recognition.

Course Outcomes:

Students who complete this course should be able to

1. Implement Pre and Post process for the given image using image enhancement techniques.
2. Design and Implement digital image processing related problems as part of mini projects.
3. Implement Color image processing and Image compression methods.

Prerequisites:

Knowledge of linear algebra, basic probability and statistics.

UNIT-I

Basics: Introduction, Fundamental steps, Components, Elements of visual perception, image sampling and quantization, some basic relationships between pixels.

Intensity Transformations: Some Basic Intensity Transformation Functions, Histogram Processing.

UNIT- II

Spatial Filtering: Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.

Filtering in the Frequency Domain: Preliminary Concepts, Image Smoothing using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters.

UNIT- III

Image Restoration and Reconstruction: A Model of the Image degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only - Spatial Filtering, Minimum Mean Square Error (Wiener) Filtering.

Morphological Image Processing: Preliminaries, Erosion and Dilation, Opening and Closing.

UNIT- IV

Image Segmentation: Fundamentals, Point, Line, and Edge Detection, Segmentation by Thresholding, Region-Based Segmentation, Segmentation Using Watershed Algorithm.

Representation and Description: Representation, Some Simple Descriptors, Shape Numbers, Fourier Descriptors.

Object Recognition: Patterns and Pattern Classes, Matching: Minimum distance classifier, correlation.

UNIT-V

Color Image Processing: Color Fundamentals, Color Models, Pseudo color Image Processing.

Image Compression: Fundamentals, Compression Techniques, Lossless Compression, Lossy Compression, Measuring Information, Huffman Encoding, Arithmetic Coding, LZW, Run Length, Predictive Coding.

Text Book:

1. Rafael C Gonzalez and Richard E Woods, "Digital Image Processing", Pearson Education, Third Edition.

Suggested Reading:

1. Vipula Singh, "Digital Image Processing with MatLab and lab View", Elsevier.
2. Thomas B. Moeslund, "Introduction to Video and Image Processing: Building Real Systems and Applications", Springer, 2012.
3. Milan Sonka, Vaclav Halvac and Roger Boyle, "Image Processing, Analysis, and Machine Vision", Second Edition, Thomson Learning Publishers.
4. Kenneth R.Castleman, "Digital Image Processing", Pearson Education, 2006.

With effect from the academic year 2015-16

IT 351

COMPUTER GRAPHICS

(ELECTIVE – I)

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Acquire knowledge about device level algorithms for displaying two dimensional output primitives for raster graphics system.
2. Acquire knowledge about the basic concepts of representing 3D objects in 2D.
3. To introduce computer graphics techniques transformations, clipping, curves and surfaces.

Course Outcomes:

Students who complete this course should be able to

1. Understand the core concepts of computer graphics.
2. Understand graphics techniques for rasterization, clipping, curve generation etc.
3. Represent pictures using various algorithms.

Prerequisites:

Knowledge of Linear Algebra (vectors and matrices), Good programming skills.

UNIT-I

Computer Graphics: Introduction, Application areas, Overview of graphics systems: Video-display devices, Raster-scan systems, Random scan systems, Graphics monitors and Work stations and input devices, Graphics software.

Output primitives: Points and lines, line drawing algorithms: DDA and Bresenham's line generation, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms, Fill-Area Functions, Cell Array, Character generation.

UNIT-II

Attributes of Output Primitives: Line Attributes, Curve Attributes, color and gray scale levels, Area Fill Attributes, Character Attributes, Bundled Attributes, Inquiry Functions.

Structures and Hierarchical Modeling: Structure concepts, Editing Structures, Hierarchical modeling with structures. Graphical User Interfaces and Interactive Input Methods: The User Dialogue, Logical Classification of Input Devices, Input Functions, Interactive Picture Construction Techniques.

UNIT-III

2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Liang-Barsky line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT-IV

3-D Object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces, CSG, Octrees, BSP Trees.

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, projections, view volume and general projection transforms.

UNIT-V

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

Text Book:

1. Donald Hearn and M.Pauline Baker, “Computer Graphics C version”, Second Edition, Pearson Education.

Suggested Reading:

1. Foley, VanDam, Feiner and Hughes, “Computer Graphics Principles & Practice in C”, Second edition, Pearson Education.
2. David F Rogers, “Procedural elements for Computer Graphics”, Tata McGraw Hill, Second Edition.
3. Neuman and Sproul, “Principles of Interactive Computer Graphics”, Tata McGraw Hill.
4. Shalini, Govil-pai, “Principles of computer Graphics”, Springer.

With effect from the academic year 2015-16

IT 352

SOFTWARE TESTING
(ELECTIVE – I)

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To learn various software testing techniques through case studies.
2. To understand the essential characteristics of various automation tools used for testing.

Course Outcomes:

Students who complete this course should be able to

1. Apply various test processes and use various testing tools.
2. Implement methods of test generation from requirements.

Prerequisites

Object Oriented Analysis and Design with UML, Software Engineering.

UNIT-I

Introduction: SoftwareTesting, Goals of Software Testing, Software Testing Definitions, Effective Software Testing Vs Exhaustive Software Testing, Software Testing Life Cycle, Software Testing Methodology, Verification and Validation – Verification of Requirements, High Level design, Low level design.

UNIT-II

Dynamic Testing: Black Box Testing Techniques-Functional Testing, Equivalence partitioning, BVA.White Box Testing Techniques-Structural Testing, Static Testing, Validation Activities, Regression Testing. .

UNIT-III

Test Management, Testing Metrics-Base Metrics, Calculated metrics, Manual vs Automated testing, Efficient Test Suite Management.

UNIT-IV

Testing Object Oriented Software – OOT Basics, Object Oriented testing, Testing Web based systems,- Web based system, Web Technology Evolution, Challenges in testing for web bases software, Quality Aspects, Web Engineering (Webe), Testing of Web based systems.

UNIT-V

Overview of Testing Tools, Testing an Application using WinRunner, Test Script Language, Selenium software testing tool, Use of LoadRunner and Rational functional tester, Junit, Source Code Testing Utilities in Unix / Unix Environment.

Text Book:

1. NareshChauhan, "Software Testing Principles and Practices", Oxford University Press, 2010.
2. Dr.K.V.K.K.Prasad, "Software Testing Tools", Dreamtech press, 2008.

Suggested Reading:

1. William E. Perry, "Effective Methods for Software Testing",Third Edition, Wiley & Sons, 2006.
2. SrinivasanDesikan, Gopalaswamy Ramesh, "Software Testing: Principles and Practices", Pearson Education, 2006.

With effect from the academic year 2015-16

IT 353

SOFTWARE PROJECT MANAGEMENT
(ELECTIVE-I)

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To plan and manage projects at each stage of SDLC.
2. To understand the basic concepts and issues of Software Project Management.
3. To discuss the notion of Process Improvement and Process Management.

Course Outcomes:

Students who complete this course should be able to

1. Choose most effective software development model to suit organizational needs.
2. Plan and implement the software projects.
3. Improve process and manage project profiles.

Prerequisites:

Software engineering

UNIT - I

Conventional Software Management, Evolution of Software Economics, Improving SoftwareEconomics, Old Way & New.

UNIT - II

Life - Cycle Phases, Artifacts of the Process, Model Based Software Architectures, Workflows of the Process, Checkpoints of the process.

UNIT - III

Iterative Process Planning, Project Organization & Responsibilities, Process Automation, Project Control and Process Instrumentation, Tailoring the Process.

UNIT - IV

Modern Project Profiles, Next Generation Software Economics, Modern Process Transitions, Managing Contacts, Managing People & Organizing Terms.

UNIT - V

Process Improvement & Managing to the CMM, ISO 12207- an Overview, Programme Management.

Text Book:

1. Walker Royce, "Software Project Management - A Unified frame work", Pearson Education, Addision Wesley.

Suggested Reading:

1. Bob Hughes, MilkeCotterell- "Software Project Management", Tata McGraw Hill, Third Edition.
2. Watt S. Humphery, "Managing Software Process", Addison Wesley, 1998.

With effect from the academic year 2015-16

IT 354

NATURAL LANGUAGE PROCESSING
(ELECTIVE-I)

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand the applications of NLP and different levels of language analysis.
2. To understand syntax and semantics of the language and knowledge representations.
3. To understand the basic concepts of NLP including PoS tagging, Word senses and Ambiguity and to encode ambiguity in logical form.
4. Understand machine learning techniques used in NLP including statistical methods and probabilistic context-free grammars.

Course Outcomes:

Students who complete this course should be able to

1. Understand and apply relevant linguistic concepts and Machine Learning techniques.
2. Choose appropriate solutions for solving typical NLP sub problems (tokenizing, tagging, parsing).
3. Formulate NLP tasks as learning and inference tasks, and address the computational challenges involved.

UNIT- I

Introduction to Natural Language Processing: The study of Language, Applications of NLP, EvaluatingLanguage Understanding Systems, Different levels of Language Analysis,Representations and Understanding, Organization of Natural language, Understanding Systems.

UNIT-II

Linguistic Background: An outline of English syntax,Spoken Language input and output Technologies, Written language Input - Mathematical Methods - statistical Modelling and classification Finite StateMethods.Grammar for Natural Language Processing - Parsing - Introduction to semantics and knowledge representation, Some applicationslike Machine translation, database interface.

UNIT-III

Grammars and Parsing: Grammars and sentence Structure, Top-Down andBottom-Up Parsers, Transition Network Grammars, Top-Down ChartParsing.

Feature Systems and Augmented Grammars: Basic Feature systemfor English, Morphological Analysis and the Lexicon, Parsing with Features,Augmented Transition Networks.

UNIT-IV

Semantic Interpretation: Semantics and Logical Form,word senses and ambiguity, The Basic logical formlanguage, Encoding ambiguity in logical form, Thematic roles, Linking syntaxand semantics, Recent trends in NLP.

UNIT-V

Ambiguity Resolution: Statistical Methods, Probabilistic LanguageProcessing, Estimating Probabilities, Part-of-Speech tagging, ObtainingLexical Probabilities, Probabilistic Context-Free Grammars, Best FirstParsing.

Text Book:

1. James Allen, "Natural Language Understanding", Pearson Education, Second Edition

Suggested Reading:

1. Christopher D Manning and HinrichSchutze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.
2. AksharBharti, VineetChaitanya and Rajeev Sangal, "NLP: A Paninian Perspective", Prentice Hall, New Delhi.
3. D. Jurafsky, J. H. Martin, "Speech and Language Processing", Pearson Education.

With effect from the academic year 2015-16

IT 355

ADVANCED COMPUTER ARCHITECTURE
(ELECTIVE-I)

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand the concepts of Modern processor design.
2. To understand the concepts of Pipelining and Instruction level parallelism.
3. To understand the concepts of Vector Processors and Array Processors.

Course Outcomes:

Students who complete this course should be able to

1. Analyze, evaluate CPU and memory performance.
2. Understand trade-offs in modern CPU design including issues affecting superscalar architectures.
3. Analyze hardware design of multiprocessors including cache coherence and synchronization.

Prerequisites:

Computer organization

UNIT- I

Measuring Performance and Cost: Performance Measurement, Enhancement to Uniprocessor, Models, Benchmarks, Basic Model of Advanced Computer Architectures.

UNIT- II

Pipelining and Superscalar Techniques: Basic Pipelining, Data and Control Hazards, Dynamic Instruction Scheduling, Branch Prediction Techniques, Performance Evaluation, Case Study-Sun Microsystems – Microprocessor.

UNIT- III

Vector Processors: Vector Processor Models, Vector Architecture and Design, Performance Evaluation, Programming Vector Processors.

UNIT- IV

Array Processors: Parallel Array Processor Model, Memory Organization,
Interconnection Networks: Performance Measures, Static and Dynamic Topologies.

UNIT-V

Multiprocessors and Multi Computers: Multiprocessor Models, Shared –Memory and Distributed Memory Architectures, Memory Organization, Cache Coherence and Synchronization Mechanisms, Parallel Computer, Performance Models.

Text Book:

1. John. L. Hennessey and David A Patterson, "Computer Architecture - A Quantitative Approach", Fourth Edition, Elsevier, 2007.

Suggested Reading:

1. Sajjan G. Shiva, Taylor Series, "Advanced Computer Architecture", CRC Press, 2006.
2. Kai Hwang, "Advanced Computer Architecture", McGraw Hill, 1999.

With effect from Academic Year 2015-16

IT 356

HUMAN COMPUTER INTERACTION
(ELECTIVE-I)

Instruction per week	4 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand the need for optimizing the user's interactions with a system, environment or product, so that they match the users' activities that are being supported and extended.
2. To learn the characteristics of graphical and web user interface, the design and evaluation processes.
3. To develop knowledge of the structure and the representational dynamics of the cognitive system interacting with the computer.

Course Outcomes:

Students who complete this course should be able to

1. Demonstrate an understanding of guidelines, principles, and theories influencing human computer interaction.
2. Recognize how a computer system may be modified to cater to the diversity and cognition levels of people.
3. Carry out the steps of design, usability, experimental testing, and evaluation of human computer interaction systems.

Prerequisites:

Moderate experience using computers and GUI-based applications.

UNIT - I

The Importance of the User Interface: Defining the User Interface, the Importance of Good Design, **Characteristics of Graphical and Web User Interfaces:** The Graphical User Interface, **The Web User Interface:** Characteristics of a Web Interface,Principles of User Interface Design: General Principles.

The User Interface Design Process: Obstacles and Pitfalls in the Development Path, Usability, the Design Team, **Know Your User or Client:** Understanding How People Interact with Computers, Important Human Characteristics in Design, Human Considerations in Design, Human Interaction Speeds, Methods for Gaining an Understanding of Users, **Understand the Principles of Good Screen Design:** Human Considerations in Screen Design, **Develop System Menus and Navigation Schemes:** Structures of Menus, Functions of Menus, Content of Menus, Formatting of Menus, Phrasing the Menu, Selecting Menu Choices, Kinds of Graphical Menus

UNIT – II

Select the Proper Kinds of Windows: Window Characteristics, Components of a Window, Window Presentation Styles, Types of Windows, Window Management, Organizing Window Functions, Window Operations, **Select the Proper Device-Based Controls:** Characteristics of Device-Based Controls, **Choose the Proper Screen-Based Controls:** Operable Controls, Text Entry/Read-Only Controls, Combination Entry/Selection Controls, Other Operable Controls, Presentation Controls, Selecting the Proper Controls, **Write Clear Text and Messages.**

UNIT – III

Provide Effective Feedback and Guidance and Assistance, Provide Effective Internationalization and Accessibility, Create Meaningful Graphics, Icons and Images, Choose the Proper Colors, Organize and Layout Windows and Pages.

UNIT – IV

Interaction Design – Introduction, Goals of Interaction Design, Heuristics and Usability principles, **Conceptualizing interaction:** Problem Space, conceptual models, interface metaphors, paradigms. **Understanding Users**: cognition, Conceptual frame works for cognition, **Collaboration and Communication:** Social mechanisms, Conceptual frameworks.

UNIT – V

Understanding how interfaces affect users: Affective aspects, Expressive interfaces, User frustration, Agents, **Process of Interaction Design:** What is interaction design about? Life cycle models, **Design, prototyping and Construction:** Prototyping and construction, Conceptual Design, Physical Design, **Introducing Evaluation:** Introduction, What, Why and when to evaluate, **Evaluation Framework, Testing and modelling users.**

Text Book:

1. Wilbert O. Galitz, "The essential guide to User Interface Design", Wiley Dreamtech, 2002.

Suggested Reading:

1. Sharp, Rogers, Preece, "Interaction Design", Second Edition, John Wiley, 2008.
2. Steven Hein, "The Resonant Interface : HCI Foundations for Interaction Design", Addison-Wesley,2007
3. J.Preece, Y.Rogers, and H.Sharp, "Interaction Design: Beyond Human-Computer Interaction",Wiley& sons ,Second edition, 2007.

With effect from the academic year 2015-16

IT 326

NETWORK PROGRAMMING LAB

Instruction per week	3 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. To understand the use of client/server architecture in application development.
2. To understand and use elementary socket system calls, advanced socket system calls and Java Socket API.
3. To understand how to use TCP and UDP based sockets.
4. To implement network routing algorithms, application layer protocols and encryption algorithms.

Course Outcomes:

Students who complete this course should be able to

1. Use network programming concepts to develop and implement distributed applications.
2. Develop and implement next generation protocols required for emerging applications.
3. Model and evaluate performance of networking systems.

Prerequisites:

Knowledge of C Programming, Basic commands of UNIX.

List of Programs

1. Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, traceroute, whoisetc. Usage of elementary socket system calls (socket(), bind(), listen(), accept(),connect(),send(),recv(),sendto(),recvfrom()).
2. Implementation of Connection oriented concurrent service (TCP).
3. Implementation of Connectionless Iterative time service (UDP).
4. Implementation of Select system call.
5. Implementation of gesockopt(),setsockopt() system calls.
6. Implementation of getpeername() system call.
7. Implementation of remote command execution using socket system calls.
8. Implementation of Distance Vector Routing Algorithm.
9. Implementation of SMTP.
10. Implementation of FTP.
11. Implementation of HTTP.
12. Implementation of RSA algorithm.

Note: Implement programs 2 to 7 in C and 8 to 12 in JAVA.

Suggested Reading:

1. W. Richard Stevens, "Unix Network Programming", Prentice Hall, Pearson Education,2009.
2. Douglas E.Comer,"Hands-on Networking with Internet Technologies", Pearson Education.

With effect from the academic year 2015-16

IT 327

DATA MINING LAB

Instruction per week	3 Periods
Duration of End - Semester Examination	3 Hours
End - Semester Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. Acquaintance to WEKA tool.
2. Prepare the data for mining and apply various mining techniques to analyse the data.
3. Design and develop datamining application on sample/realistic data sets.

Course Outcomes:

Students who complete this course should be

1. Competent to preprocess the data for mining.
2. Proficient in generating association rules.
3. Able to build various classification modelsand Realise clusters from the available data.

Prerequisites:

Database systems.

List of Programs

1. BasicsofWEKA tool
   a. Investigate the Application interfaces. b. Explore the default datasets.
2. Pre-process agiven dataset based on the following:
   a. Attribute Selection b.Handling Missing Values
   c. Discretization d. Eliminating Outliers
3. Create a dataset in ARFF (Attribute-Relation File Format) for any given dataset and perform Market-Basket Analysis.
4. Generate Association Rules using the Apriori algorithm.
5. Generate Association Rules using the FP-Growth algorithm.
6. Build a classifier using K-NN algorithm.
7. Build a Decision Tree by using J48 algorithm.
8. Cluster the IRIS dataset by using the k-Means Clustering algorithm and visualize the cluster mean values and standard deviation of dataset attributes.
9. Build various Regression models.
10. Explore various other data mining tools.

(Note: Wherever necessary interpret the results and measure the performance)

SuggestedReading

1. Ian H.Witten, Eibe Fank, Mark A Hall, "Data Mining Practical Machine Learning Tools and Techniques", Third edition, 2011.
2. Han and Kamber,"Data Mining Concepts and Techniques", Third Edition, Elsevier.

With effect from the academic year 2015-16

IT 328

MINI PROJECT – IV

Instruction per week	3 Periods
Sessional	25 Marks
Credits	1

The Students are required to carry out Mini Project in any of the areas such as Computer Networks, Computational Intelligence, Digital Image Processing, Data Mining and Web Development.

Students are required to submit a report on the Mini Project at the end of the Semester.

PROPOSED SYLLABUS FOR B.E. IV YEAR

OF

FOUR YEAR DEGREE COURSE

IN

INFORMATION TECHNOLOGY

JUNE 2016

DEPARTMENT OF INFORMATION TECHNOLOGY

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

HYDERABAD – 500 075

TABLE OF CONTENTS

SCHEME OF INSTRUCTION AND EXAMINATION
B.E. IV YEAR
INFORMATION TECHNOLOGY

Semester–I

S. No	Syllabus Ref. No	SUBJECT	Scheme of Instruction		Scheme of Examination			Credits
			Periods per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		End Sem. Exam	Sessional	
		THEORY						
1	IT 411	Big Data Analytics	4/1	-	3	75	25	3
2	IT 412	Mobile Computing	4	-	3	75	25	3
3	IT 413	Distributed Systems	4	-	3	75	25	3
4	IT 414	VLSI Technology	4	-	3	75	25	3
5		ELECTIVE -II	4	-	3	75	25	3
		PRACTICALS						
1	IT 415	Big Data Analytics Lab	-	3	3	50	25	2
2	IT 416	VLSI Technology Lab	-	3	3	50	25	2
3	IT 417	Project Seminar	-	3	-		25	1
		TOTAL	**20/1**	**9**		**475**	**200**	**20**

ELECTIVE - II

IT 461 Information Retrieval Systems
IT 462 Semantic Web
IT 463 Grid Computing
IT 464 Research Methodologies
IT 465 Parallel Computing
CE 422 Disaster Management
MB 215 Organizational Behaviour

IT 411

BIG DATA ANALYTICS

Instruction	4 L / 1T periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites:

Data Structures, Design and Analysis of Algorithms, Database Systems, Data Warehousing and Data Mining.

Course Objectives:

1. To introduce the concepts and challenges of big data, role of HDFS in handling big data and MapReduce Architecture.
2. To explore mapper and reducer to solve real world problems.
3. To introduce the features of NoSQL and study the working mechanisms of MongoDB
4. To impart knowledge to work with semi structured and unstructured data using Pig
5. To familiarise with features of Hive to process and query big data

Course Outcomes:

Upon successful completion of this course, student will be able to

1. Develop framework for handling Big Data using Hadoop
2. Acquire, Store and analyse big data in business environments using HDFS
3. Develop programs in MapReduce to solve real world problems
4. Model data using MongoDB
5. Handle semi structured and unstructured big data using Pig
6. Process and query big data in HDFS environment using Hive

Unit - I

What is Big Data?, Why is Big Data Important: When to consider a Big data solution, Big Data use cases: IT for IT Log Analytics, The Fraud Detection Pattern, Social Media Pattern.

The Hadoop Distributed Files system: The Design of HDFS, HDFS Concepts, Blocks, Name nodes and Data nodes, Block Caching, HDFS Federation, HDFS High Availability, The Command-Line Interface, Basic File system Operations, Hadoop File systems, Interfaces, The Java Interface, Reading Data from a Hadoop URL, Reading Data Using the File System API, Writing Data, Directories, Querying the File system, Deleting Data, Data Flow, Anatomy of a File Read, Anatomy of a File Write, Coherency Model, Parallel Copying with distcp, Keeping an HDFS Cluster Balanced

Unit - II

MapReduce: A Weather Dataset, Data Format, Analyzing the Data with Hadoop, Map and Reduce, Java MapReduce, Scaling Out, Data Flow, Combiner Functions, Running a Distributed MapReduce Job

Developing a MapReduce Application: Writing a Unit Test with MRUnit, Mapper, Reducer, Running Locally on Test Data, Running a Job in a Local Job Runner, Testing the Driver, Running on a Cluster, Packaging a Job, Launching a Job, The MapReduce Web

Unit – III

How MapReduce Works: Anatomy of a MapReduce Job Run, Job Submission, Job Initialization, Task Assignment, Task Execution, Progress and Status Updates, Job Completion, Failures, Task Failure, Application Master Failure, Node Manager Failure, Resource Manager Failure, Shuffle and Sort, The Map Side, The Reduce Side, **MapReduce Types and Formats:** MapReduce Types, The Default MapReduce Job, Input Formats, Input Splits and Records, Text Input, Output Formats, Text Output

Unit – IV

No SQL Databases: Review of traditional Databases, Need for NoSQL Databases, Columnar Databases, Failover and reliability principles, CAP Theorem, Differences between SQL and NoSQL databases, **Working mechanisms of Mongo DB:** Overview, Advantages, Environment, Data Modelling, Create Database, Drop Database, Create collection, Drop collection, Data types, Insert, Query, Update and Delete operations, Limiting and Sorting records, Indexing, Aggregation

Unit - V

Pig: Installing and Running Pig, an Example, Generating Examples, Comparison with Databases, Pig Latin, User-Defined Functions, Data Processing Operators, Pig in Practice.

Hive: Installing Hive, The Hive Shell, An Example, Running Hive, Comparison with Traditional Databases, HiveQL, Tables, Querying Data, User-Defined Functions, Writing a User Defined Functions, Writing a User Defined Aggregate Function.

Text Books:

1. Tom White, "Hadoop: The Definitive Guide", 4th Edition, O'Reilly Media Inc, 2015.
2. Paul C. Zikopoulos, Chris Eaton, Dirk DeRoos, Thomas Deutsch, George Lapis, "Understanding Big Data - Analytics for Enterprise class Hadoop and Streaming Data", McGrawHill, 2012.
3. Kristina Chodorow, "MongoDB: The Definitive Guide-Powerful and Scalable Data Storage", 2nd Edition, O'Reilly Media, 2013

Suggested Reading:

1. Chuck Lam, Mark Davis, AjitGaddam, "Hadoop in Action", Manning Publications Company, 2016.
2. Alex Holmes," Hadoop in Practice", Manning Publications Company, 2012.
3. Alan Gates, "Programming Pig", O'Reilly Media Inc, 2011.
4. Edward Capriolo, Dean Wampler, and Jason Rutherglen, "Programming Hive", O'Reilly Media Inc, October 2012.
5. Vignesh Prajapati, "Big data Analytics with R and Hadoop", Packt Publishing, November 2013.

Web Resources:

1. http://www.planetcassandra.org/what-is-nosql/
2. http://www.iitr.ac.in/media/facspace/patelfec/16Bit/index.html
3. https://class.coursera.org/datasci-001/lecture
4. http://bigdatauniversity.com/

IT 412

MOBILE COMPUTING

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Data Communication, Computer Networks

Course Objectives:

1. To introduce cellular concepts, medium access mechanisms and features of a range of mobile devices and systems
2. To familiarize with the functions of network and transport layers for mobile networks
3. To provide an understanding of different techniques to handle databases, data dissemination and data Synchronization in Mobile Computing environments.

Course Outcomes:

Upon successful completion of the course, student will be able to

1. Explain the cellular concepts, techniques for improving cellular system capacity and medium access control.
2. Describe the features of a wide variety of mobile devices and systems.
3. Appreciate the evolution in mobile system standards
4. Understand Mobile IP, packet delivery and Dynamic Host Configuration Protocol
5. Analyze different variations of TCP for mobile communication systems.
6. Describe database hoarding techniques, data dissemination and data Synchronization on mobile computing systems

UNIT-I

Introduction: Challenges in mobile computing, Coping with uncertainties, resource poorness, bandwidth, etc. Cellular architecture, Co-channel interference, Frequency reuse, Capacity increase by cell splitting.

Medium Access Control: Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals; SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access; CDMA: Spread Aloha multiple access.

UNIT-II

Mobile Devices And Systems-Features of Mobile Smart Phones,Digital Music Players, Hand-held Pocket Computers, Operating Systems of Hand-held Devices and their features, Smart Systems- Smart cards, Smart labels, RFID, Smart Tokens, Sensors and Actuators, Set-top Boxes,Limitations of Mobile Devices,Automotive Systems.

GSM: Mobile services, System architecture, Localization, Call Handling, Handover, Security, New data services.

Features of HSPA 3G Network, HSPA+, Long Term Evolution (LTE), WiMax and 4G LTE Advanced and WiMax 802.16m Networks.

UNIT-III

Mobile Network Layer: Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse tunneling, Ipv6; Dynamic host configuration protocol.

UNIT-IV

Mobile Transport Layer : Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/timeout freezing, Selective retransmission, Transaction oriented TCP .

UNIT-V

Databases and Mobile Computing: Data Hoarding Techniques, Data Caching-Cache Invalidation Mechanisms, Data Cache Maintenance and Web Cache Maintenance in Mobile Environments, Power-aware Mobile Computing, Context-aware Computing.

Data Dissemination: Communication Asymmetry, Classification of Data Delivery mechanisms: Push-based mechanisms, Pull-based mechanisms, Hybrid mechanisms.

Data Synchronization: Synchronization in Mobile Computing Systems, Usage Models for Synchronization, Domain-dependent Specific rules for Data Synchronization, Personal Information Manager (PIM), Synchronization and Conflict resolution strategies, Synchronizer.

Text Books:

1. Jochen, M Schiller, "Mobile Communications", 2nd Edition Pearson Education, India, 2012.
2. Raj Kamal, "Mobile Computing", Second Edition, Oxford University Press, 2013.

Suggested Reading:

1. Reza B, "Mobile Computing Principles", Cambridge University press 2005.
2. Frank Adelstein, S.K.S. Gupta, Golden G. Richard III and Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional Publication.
2. KurnkumGarg, "Mobile Computing", Pearson Education, 2010.
3. K. Pahlavan and P. Krishnamurthy, "Principles of Wireless Networks", Prentice Hall.
4. D.P. Agrawal and Q.A. Zeng, "Introduction to Wireless and Mobile Systems", Thomson Brooks/Cole.

IT 413

DISTRIBUTED SYSTEMS

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites
Operating Systems, Computer Networks

Course Objectives:

1. To present the basic concepts and principles of distributed systems.
2. To introduce the architectures and models of distributed systems
3. To familiarize with communication, Synchronization, Consistency and Replication, Fault Tolerance in distributed systems.
4. To provide understanding of various security issues in distributed environments

Course Outcomes:
Upon successful completion of the course, student will be able to

1. Describe the various models and architectures of distributed systems.
2. Illustrate use of threads in distributed systems
3. Demonstrate the distributed communication mechanisms like RPC and RMI.
4. Describe various naming and synchronization mechanism in distributed systems
5. Apply Consistency, Replication and Fault Tolerance in distributed systems.
6. Compare and contrast various distributed object-based systems

UNIT – I

Introduction: Definition of A Distributed System; Goals- Making Resources Accessible, Distribution Transparency, Openness, Scalability, Pitfalls; Types of Distributed Systems- Distributed Computing Systems, Distributed Information Systems, Distributed Pervasive Systems.

Architectures: Architectural Styles, System Architectures- Centralized Architectures, Decentralized Architectures, Hybrid Architectures; Architectures versus Middleware- Interceptors, General Approaches to Adaptive Software, Discussion.

UNIT – II

Processes: Threads- Introduction to Threads, Threads in Distributed Systems; Virtualization, The Role Of Virtualization In Distributed Systems, Architectures of Virtual Machines; Clients- Networked User Interfaces, Client-Side Software for Distribution Transparency; Servers- General Design Issues, Server Clusters, Managing Server Clusters; Code Migration- Approaches to Code Migration, Migration and Local Resources, Migration in Heterogeneous Systems.

Communication: Fundamentals- Layered Protocols, Types of Communication; Remote Procedure Call- Basic RPC Operation, Parameter Passing; Asynchronous RPC, Example: DCE RPC; Message-Oriented Communication- Message Oriented Transient Communication, Message Oriented Persistent Communication, Example: IBM'S Web-Sphere Message-Queuing System; Stream-Oriented Communication- Support for Continuous Media, Streams and Quality of Service, Stream Synchronization; Multicast Communication, Application-Level Multicasting, Gossip-Based Data Dissemination.

UNIT-III

Naming: Names, Identifiers, and Addresses, Flat Naming, Simple Solutions, Home-Based Approaches, Distributed Hash Tables, Hierarchical Approaches; Structured Naming, Name Spaces, Name Resolution, the Implementation of a Name Space, Example: The Domain Name System; Attribute-based Naming, Directory Services, Hierarchical Implementations: LDAP, Decentralized Implementations;

Synchronization: Clock Synchronization- Physical Clocks, Global Positioning System, Clock Synchronization Algorithms; Logical Clocks- Lamport's Logical Clocks, Vector Clocks; Mutual Exclusion-Overview, A Centralized Algorithm, A Decentralized Algorithm, A Distributed Algorithm, A Token Ring Algorithm, A Comparison of the Four Algorithms; Global Positioning of Nodes, Election Algorithms- Traditional Election Algorithms, Elections in Wireless Environments, Elections in Large Scale Systems.

UNIT-IV

Consistency And Replication: Introduction- Reasons for Replication, Replication as Scaling Technique; Data-Centric Consistency Models- Continuous Consistency, Consistent Ordering of Operations; Client-Centric Consistency Models- Eventual Consistency, Monotonic Reads, Monotonic Writes, Read your Writes, Writes Follow Reads; Replica Management- Replica-Server Placement, Content Replication and Placement, Content Distribution; Consistency Protocols- Continuous Consistency, Primary-Based Protocols, Replicated-Write Protocols, A Cache-Coherence Protocols, Implementing Client-Centric Consistency.

Fault Tolerance: Introduction To Fault Tolerance-Basic Concepts, Failure Models, Failure Masking by Redundancy; Process Resilience- Design Issues, Failure Masking and Replication, Agreement in Faulty Systems, Failure Detection; Reliable Client-Server Communication- Point-To-Point Communication, RPC Semantics in The Presence Of Failures; Reliable Group Communication- Basic Reliable-Multicasting Schemes, Scalability in Reliable Multicasting, Atomic Multicast; Distributed Commit-Two-Phase Commit, Three-Phase Commit; Recovery- Introduction, Checkpointing, Message Logging, Recovery-Oriented Computing.

UNIT-V

Distributed Object-Based Systems: Architecture- Distributed Objects, Example: Enterprise Java Beans, Example- Globe Distributed Shared Objects; Processes- Object Servers, Example: The Ice Runtime System; Communication- Binding a Client to an Object, Static versus Dynamic Remote Method Invocations, Parameter Passing, Example: Java RMI, Object-Based Messaging; Naming- CORBA Object References, Globe Object References;

Synchronization, Consistency and Replication- Entry Consistency, Replicated Invocations; Fault Tolerance- Example: Fault-Tolerant CORBA, Example: Fault-Tolerant Java; Security-Example: GLOBE , Security for Remote Objects.

Text Books:

1. Andrew S. Tanenbaum and Van Steen "Distributed Systems", PHI, Second Edition, 2014
2. Colouris G., Dollimore Jean and Kindberg Tim, "Distributed Systems Concepts and Design", Pearson education, 3rd Edition, 2002.

Suggested Reading:

1. Sunitha Mahajan, Seema Shah, "Distributed Computing", Oxford University Press, Second Edition, 2013
2. Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, "Distributed and Cloud Computing", Morgan Kaufmann publishers, 2012.
3. S.Ghosh, Chapman & Hall/CRC, "Distributed Systems", Taylor & Francis Group, 2010.
4. Ajay D. Kshemakalyani & MukeshSinghal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge, 2010.

IT 414

VLSI TECHNOLOGY

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Basic Electronics, Digital Electronics, Computer Organization.

Course Objectives:

1. To introduce the students to the fundamentals of CMOS circuits, to understand basic electrical properties of MOS circuits and the design process at gate level and subsystem level
2. To develop an understanding of VLSI Design Flow and Transistor-Level CMOS Logic Design
3. To familiarize with VLSI Fabrication and Experience CMOS Physical Design

Course Outcomes:

After completing the course, student will be able to

1. Use circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnections.
2. Create models of moderately sized CMOS circuits that realize specified digital functions.
3. Know the Fabrication process of a chip .
4. Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing, power, and parasitic effects.
5. Understand the characteristics of CMOS circuit construction and compare state-of-the-art CMOS process and emerging electronic circuit technologies and processes.
6. Complete a significant VLSI design project having a set of objective criteria and design constraints.

UNIT-I

An overview of VLSI, Moore's law, Electrical Conduction in Silicon, Electrical Characteristics of MOSFETs Threshold voltage, n-FET Current-Voltage equations, square law and linear model of a FET, MOS capacitances, gate-source and gate drain capacitances, junction capacitances in a MOSFET, RC model of a FET, Modeling small MOSFET, scaling. MOSFET as switches, pass characteristics, logic gates using CMOS, Bubble pushing, XOR and XNOR gates, AOI and OAI logic gates, transmission gates. TG based 2-to-1 MUX, XOR, XNOR, OR circuits.

UNIT-II

Physical structure of CMOS ICs, IC layers, layers used to create a MOSFET, Top and side view of MOSFETs, Silicon patterning or layouts for series and parallel connected FETs. Layouts of NOT gate, transmission gate, non-inverting buffer, NAND2, NOR2, Complex logic gate, 4 input AOI gate. Stick diagram representations. Layouts of Basic Structure: n-wells, active area definition, design of n^+, p^+ regions, masks for the n-FET, active contact cross section and mask set, metal1 line with active contact, poly contact: cross section and layout, vias and higher level metals. Latchup prevention.

UNIT-III

Fabrication of CMOS ICs, CMOS process flow, Design rules: minimum space width, minimum spacing, surround, extension, cell concepts and cell based design, logic gates as basic cells, creation of new cell using basic gates. DC characteristics of the CMOS inverter symmetrical inverter, layouts, Inverter switching characteristics, RC switch model equivalent for the CMOS inverter, fan-out, input capacitance and load effects, rise time and fall time calculation, propagation delay, driving large capacitive loads, delay minimization in an inverter cascade.

UNIT-IV

Pseudo n-MOS, tri-state inverter circuits, clocked CMOS, charge leakage, Dynamic CMOS logic circuits, pre-charge and evaluation charge sharing, Domino logic, Dual rail logic networks, differential Cascade Voltage Switch Logic (CVSL) AND/NAND, OR/NOR gates, Complementary Pass Transistor Logic (CPL). The SRAM, 6T SRAM cell design parameters, writing to an SRAM, resistor model, multi-port SRAM, SRAM arrays, Dynamic RAMs: 1T RAM cell, charge leakage and refresh in a DRAM cell, NOR based ROM, ROM array using pseudo n-MOS circuitry, floating gate MOSFET, effect of charge storage on the floating gate, A E^2PROM word using floating gate n-FETs, logic gate diagram of the PLA, NOR based design, CMOS PLA, Gate arrays.

UNIT-V

VLSI Design flow, structural gate level modeling, gate primitives, gate delays, switch level modeling, behavioural and RTL operators, timing controls, blocking and non blocking assignments, conditional statements, Data flow modeling and RTL, Comparator and priority encoder barrel shifter, D latch Master slave D type flip-flop, Arithmetic circuits; half adder, full adder, AOI based, TG based, ripple carry adders, carry look ahead adders, High speed adders, multipliers. Interconnect modeling; Interconnect resistance and capacitance sheet resistance Rs, time delay, single and multiple rung ladder circuits, simple RC interconnect model, modeling interconnect lines with a series pass FET, cross talk, floor planning and routing, clocking, Testing of VLSI circuits.

Text Book:

1. John P. Uyemura, "Introduction to VLSI circuits and Systems", John Wiley & Sons, 2002.
2. Douglas A. Pucknell, Kamran Eshraghian, "Basic VLSI Design" 3rd Edition, PHI, 2000.

Suggested Reading:

1. John P. Uyemura, "Chip design for submicron VLSI: CMOS layout and simulation" IE, Cengage learning, 2006.
2. Jan M. Rabey and others "Digital Integrated Circuits A design perspective", Pearson Education
3. Kamran Eshraghian, Douglas A. Pucknell, and Sholeh Eshraghian, "Essentials of VLSI circuits and systems", PHI, 2011.

IT415

BIG DATA ANALYTICS LAB

Instruction	3 periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Prerequisites: Java and Web Programming, Data Warehousing and Data Mining, Computational Intelligence.

Course Objectives:

1. To provide the knowledge to setup a Hadoop Cluster
2. To impart knowledge to develop programs using MapReduce Technique
3. To learn file handling in HDFS
4. To introduce Pig, PigLatin and HiveQL to process big data
5. To learn machine learning operations using Mahout Hadoop
6. To introduce NoSQL databases

Course Outcomes:

Upon successful completion of this course, student will be able to

1. Understand Hadoop working environment
2. Work with big data applications in multi node clusters
3. Write scripts using Pig to solve real world problems
4. Write queries using Hive to analyse the datasets
5. Model and build a recommendation system using Mahout Hadoop
6. Apply big data and echo system techniques for real world problems

Experiments:

1. Understanding and using basic HDFS commands
2. Word count application using MapperReducer on single node cluster
3. Analysis of Weather Dataset on Multi node Cluster
4. Working with files in Hadoop file system: Reading, Writing and Copying
5. Writing User Defined Functions/Eval functions for filtering unwanted data in Pig
6. Retrieving user login credentials from /etc/passwd using Pig Latin
7. Working with HiveQL.
8. Writing User Defined Functions in Hive
9. Perform classification & clustering in Mahout Hadoop
10. Building a Mahout Recommendation System on a Hadoop Cluster

Text Books:

1. Tom White, "Hadoop: The Definitive Guide", 4th Edition, O'Reilly Media Inc, April 2015.
2. Alan Gates, "Programming Pig", O'Reilly Media Inc, 2011.

Suggested Reading:

1. Edward Capriolo, Dean Wampler, and Jason Rutherglen, "Programming Hive", O'Reilly Media Inc, October 2012.
2. VigneshPrajapati, "Big data Analytics with R and Hadoop", Packt Publishing, November 2013.

Web Resources:

1. http://www.iitr.ac.in/media/facspace/patelfec/16Bit/index.html
2. https://class.coursera.org/datasci-001/lecture
3. http://bigdatauniversity.com/

IT416

VLSI TECHNOLOGY LAB

Instruction	3 periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Prerequisites: Digital Electronics and Logic Design, Programming and Problem Solving

Course Objectives:

1. To introduce the students to understand basics in Hardware design using CAD tools
2. Understand and Experience Verilog Design Flow
3. Learn Transistor-Level CMOS Logic Design using both Verilog and VHDL
4. Understand VLSI Fabrication and experience CMOS Physical Design using backend tools

Course Outcomes:

Upon successful completion of this course, student will be able to

1. Use CAD tools to program digital electronics circuits
2. Create models of CMOS circuits that realize specified digital functions.
3. Do simulation and synthesis process for design of CMOS technology
4. Understand process and emerging tools in electronic circuit technologies
5. Complete a small significant VLSI design project having a set of objective criteria and design constraints.
6. Experience the difference in both Hardware design tools

Experiments:

1. Switch level modeling using Verilog
   a) Logic gates b) AOI and OAI gates c) Transmission gate
   d) Complex logic gates using CMOS

2. Structural Gate-level modeling[With and without delays] – Digital circuits using gate primitives – using Verilog.
   a) AOI and OAI gate b) Half adder and full adders c) MUX using buffers
   d) S-R latch etc.
3. Mixed gate –level and Switch-level modeling using Verilog-usage of primitives, modules and instancing and understanding the hierarchical design.
   a) Constructing a 4-input AND gate using CMOS 2-input NAND and NOR gates.
   b) Constructing a decoder using CMOS 2-input AND gates and NOT gates etc.

4. RTL modeling of general VLSI system components.(Verilog)
   a) MUX es b) Decoders
   c) Priority encoders d) Flip-flops &Latch e) Registers.

5. Synthesis of Digital Circuits
   a) Ripple carry adder and carry look-ahead adder
   b) Array multiplier

6. Verilog code for finite state machine

7. Structural Gate-level modeling [With and without delays] – Digital circuits using gate primitives – using VHDL.
   a) AOI and OAI gate b) Half adder and full adders c) MUXes

8. RTL modeling of general VLSI system components using VHDL.
   a) Decoders c) Priority encoders d) Flip-flops &Latches e) Registers

9. Design of 4-bit ALU with 8 instructions using VHDL.

10. Design of 4-bit Comparator using VHDL.

Suggested Reading:

1. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis", 2nd Edition, IEEE 1364-2001 Compliant, Pearson Education, 2005.

2. Stephen Brown, ZvonkoVranesic, "Fundamentals of Digital Logicwith VHDL design", 2nd Edition, McGraw Hill, 2009.

IT417

PROJECT SEMINAR

Instruction	3 periods per week
Sessional	25 Marks
Credits	1

The objective of the project seminar is to actively involve the student in the initial work required to undertake the final year project. Dealing with a real time problem should be the focus of the under graduate project.

It may comprise of

- Problem definition and specifications.
- A broad understanding of the available techniques to solve a problem of interest.
- Presentation (Oral & written) of the project.

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

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

Each project group/batch is required to

1. Submit a one page synopsis of the seminar to be delivered for display on notice board.
2. Give a 30-40 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write up on the talk delivered.

Three (3) teachers will be associated with the evaluation of the project seminar for the award of the Sessional marks which should be on the basis of performance on all the three items stated above.

IT 461

INFORMATION RETRIEVAL SYSTEMS
(Elective-II)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Database Systems, Data Warehousing and Data Mining

Course Objectives:

1. Learn how to build index of the unstructured data for information retrieval problem
2. To understand basic IR Models
3. To understand various techniques to compress indexing, matching, organizing, and evaluating methods to IR problems
4. To know various classification and clustering algorithms

Course Outcomes:

Students should have gained a good understanding of the foundation concepts of information retrieval techniques and should be able to:

1. Build and manage the unstructured data into a well-organized structure
2. Compress the structured data and apply IR principles to locate relevant information from large collections of data
3. Analyze performance of retrieval systems
4. Apply classification techniques on unstructured data
5. Apply clustering techniques on unstructured data
6. To Analyse current research problems in information retrieval

UNIT- I

Boolean retrieval: An example information retrieval problem, A first take at building an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval.

The term vocabulary and postings lists: Document delineation and character sequence decoding, determining the vocabulary of terms, faster postings list intersection via skip pointers, Positional postings and phrase queries.

Dictionaries and tolerant retrieval: Search structures for dictionaries, Wildcard queries, spelling correction, Phonetic correction.

Index construction: Hardware basic, Blocked sort-based indexing, Single-pass in-memory indexing, distributed indexing, dynamic indexing.

UNIT- II

Index compression: Statistical properties of terms in information retrieval, Dictionary compression, Postings file compression.

Scoring, term weighting and the vector space model:Parametric and zone indexes, Term frequency and weighting, Vector space model for scoring, Variant tf-idf functions.

Computing scores in a complete search system: Efficient scoring and ranking, Components of an information retrieval system, Vector space scoring and query operator interaction.

UNIT- III

Evaluation in information retrieval: Information retrieval system evaluation, Standard test collections, Evaluation of unranked retrieval sets, Evaluation of ranked retrieval results, Assessing relevance, A broader perspective: System quality and user utility.

Relevance feedback and query expansion: Relevance feedback and pseudo relevance feedback, Global methods for query reformulation.

Probabilistic information retrieval: Review of basic probability theory, The Probability Ranking Principle, The Binary Independence Model.

UNIT- IV

Text classification: The text classification problem, Naive Bayes text classification, The Bernoulli model, Properties of Naive Bayes, Feature selection, Evaluation of text classification.

Vector space classification: Document representations and measures of relatedness in vector spaces, Rocchio classification, k nearest neighbour, Linear versus nonlinear classifiers, Classification with more than two classes, the bias-variance trade-off.

Support vector machines and machine learning on documents: Support vector machines: The linearly separable case, Extensions to the SVM model, Issues in the classification of text documents, Machine learning methods in ad hoc information retrieval.

UNIT- V

Flat clustering: Clustering in information retrieval, Problem statement, Evaluation of clustering, K-means, Model-based clustering.

Hierarchical clustering: Hierarchical agglomerative clustering, Single-link and complete-link clustering, Group-average agglomerative clustering, Centroid clustering, Optimality of HAC, Divisive clustering, Cluster labelling.

Matrix decompositions and latent semantic indexing: Linear algebra review, Term-document matrices and singular value decompositions, Low-rank approximations, Latent semantic indexing.

Text Book:

1. Christopher D. Manning and Prabhakar Raghavan and Hinrich Schütze, "Introduction to Information Retrieval", Cambridge University Press, 2009.
2. David A. Grossman, OphirFrieder, "Information Retrieval – Algorithms and Heuristics", Springer, 2nd Edition, Universities Press, 2004.

Suggested Reading:

1. Kowalski, Gerald and Mark T Maybury, "Information Storage and Retrieval Systems: Theory and Implementation", Springer.
2. Baeza-Yates Ricardo and Berthier Ribeiro-Neto "Modern Information Retrieval", 2nd edition, Addison-Wesley, 2011.

Web links:

1. https://class.coursera.org/nlp/lecture
2. http://www.dcs.gla.ac.uk/Keith/Preface.html

IT 462

SEMANTIC WEB
(Elective-II)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Discrete Structures, Web Programming

Course Objectives:
This course is intended to introduce
1. Features, rationale, and advantages of Semantic Web technology.
2. XML (Extensible Markup Language) language structure, RDF model and RDF Schema.
3. Requirements and features of web ontology language (OWL) and Rule Markup languages
4. Different Semantic web services and various ontology development methods
5. Software agent architecture and role of semantic web in various applications

Course Outcomes:
At the end of the course student will be able to:
1. Distinguish between semantic web and syntactic web
2. Describe knowledge using DL, XML, RDF and RDF Schema
3. Represent domain knowledge using OWL and Rule Markup Languages
4. Develop an ontology for a given knowledge domain
5. Understand the role of software agents
6. Realise the role of Semantic Web technologies in various application areas

UNIT- I
The Future of the Internet: Introduction, Syntactic Web, Semantic Web, Working of Semantic Web, What is not a Semantic Web, Side Effects.
Ontology: Definitions, Taxonomies, Thesauri and Ontologies, Classifying Ontologies, Web Ontology Description language, Ontologies-Categories-Intelligence.

UNIT- II
Knowledge Description in Description Logic: Introduction, Example, Family of Attributive Languages, Inference problems.
RDF and RDF Schema: Introduction, XML Essentials, RDF, RDF Schema.

UNIT- III
OWL: Introduction, Requirements for Web Ontology Description Languages, Header Information, Versioning and Annotation Properties, Properties, Classes, Individuals, Data types.
Rule Languages: Introduction, Usage Scenarios, Datalog, RuleML, SWRL, TRIPLE.

UNIT- IV

Semantic Web Services: Introduction, Web Service Essentials, OWL-S Service Ontology, OWL-S Example.

Methods for Ontology Development: Introduction, Uschold and King Ontology Development Method, Toronto Virtual Enterprise Method, Methontology, KACTUS Project Ontology Development Method, Lexicon-Based Ontology Development Method, Simplified Methods.

UNIT- V

Ontology Sources: Introduction, Metadata, Upper Ontologies.

Software Agents: Introduction, Agent Forms, Agent Architecture, Agents in the Semantic Web Context.

Applications: Introduction, Horizontal Information Products, Open academia, Bibster, Data Integration, Skill Finding, Think Tank Portal, e-learning, Web Services.

Text Books:

1. Karin K Brietman, Marco Antonio Casanova, Walter Truszkowski, "Semantic Web – Concepts Technologies and Applications", Springer 2007.
2. Grigoris Antoniou, Frank van Harmelen, "A Semantic Web Primer", PHI 2008.

Suggested Reading:

1. Liyang Yu, "Semantic Web and Semantic Web Services", CRC 2007.
2. Dean Allemang, James Hendler, "Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL", Elsevier, 2011.
3. Pascal Hitzler, Markus Krotzsch, Sebastian Rudolph, "Foundations of Semantic Web Technologies", CRC Press 2009.

Web Resources:

1. http://www.cambridgesemantics.com/resources/case-study
2. The World Wide Web Consortium www.w3.org
3. http://protege.stanford.edu/
4. http://protege.stanford.edu/publications/ontology_development/ontology101-noy-mcguinness.html

IT 463

GRID COMPUTING
(Elective-II)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

CoursePrerequisites:

Knowledge in Operating Systems, Basics of client server programming

Course Objectives:

1. To understand the genesis of grid computing
2. To know the application of grid computing
3. To understanding the technology and tools to facilitated the grid computing

Course Outcomes:

1. To understand the need for and evolution of Grids in the context of processor
2. To be familiar with the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery.
3. To be able to form a grid infrastructure.
4. To be able to design and implement Grid computing applications using Globus or similar toolkits.
5. To be able to analyze solve the complex problems using Grid Computing.
6. To be able to justify the applicability, or non-applicability, of Grid technologies for a specific application.

UNIT - I

Introduction to Grid Computing: Grid Computing Concept, History of Distributed Computing, Computational Grid Applications, Grid Computing Infrastructure Development, GridComputing Software Interface Job Submission: Introduction, Globus Job Submission, Transferring Files.

UNIT - II

Schedulers: Scheduler Features, Scheduler Examples, Grid Computing Meta-Schedulers, Distributed Resource Management Application (DRMAA).

Security Concepts: Introduction, Symmetric Key Cryptography, Asymmetric Key Cryptography, (Public Key Cryptography), Public Key Infrastructure, Systems/Protocols Using Security Mechanisms.

Grid Security: Introduction, Grid Security Infrastructure (GSI), Delegation, Higher-Level Authorization Tools.

UNIT - III

System Infrastructure I: Web Services: Service-Oriented Architecture, Web Services and Web Service Implementation.

System Infrastructure II: Grid Computing Services: Grid Computing and Standardization Bodies, Interacting Grid Computing Components, Open Grid Services Architecture (OGSA), WSRF.

User-Friendly Interfaces: Introduction Grid Computing Workflow Editors, Grid Portals.

UNIT - IV

Grid-Enabling Applications: Introduction, Parameter Sweep, Using an Existing Program on Multiple Grid Computers, Writing an Application Specifically for a Grid, Using Multiple Grid Computers to Solve a Single Problem.

UNIT - V

Case Studies:

Globus: Overview of Globus Toolkit 4, Installation of Globus, GT4 Configuration, Main Components and programming Model, Using Globus.

gLite: Introduction, Internal Workings of gLite, Logging and Bookkeeping (LB), Security Mechanism Using gLite, Resource management using Gridway and Grid bus, Scheduling using Condor, SGE, PBS, LSF Grid scheduling with QoS.

Text Books:

1. Barry Wilkinson, "Grid Computing Techniques and Applications", CRC Press, 2010.
2. Luis Ferreira, Viktors Berstis, Jonathan Armstrong, Mike Kendzierski, Andreas Neukoetter, Masanobu Takagi, Richard Bing-Wo, Adeeb Amir, Ryo Murakawa, Olegario Hernandez, James Magowan, Norbert Bieberstein "Introduction to Grid Computing with Globus", IBM Redbooks.

Suggested Reading:

1. Frederic Magoules, Jie Pan, Kiat-An Tan, Abhinit Kumar, "Introduction to Grid Computing" CRC Press, 2009.
2. Vladimir Silva, "Grid Computing for Developers ", Dreamtech Press, 2006.
3. Ian Foster, Carl Kesselman. "The Grid 2-Blueprint for a new computing Infrastructure".
4. Elsevier Series, 2004.
5. Fran Berman, Geoffrey Fox. Anthony J.G Hey, "Grid Computing: Making the Global Infrastructure a Reality", Wiley, 2003.
6. Joshey Joseph, Craig Fellenstein, "Grid computing", IBM Press, 2004.

Web Links:

1. Globus project: http://www.globus.org/alliance/
2. Global Grid Forum: http://www.ggf.org

IT 464

RESEARCH METHODOLOGY
(Elective-II)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Mini Projects

Course Objectives:

1. To assist in the planning and carrying out research projects.
2. To understand the principles, procedures and techniques of implementing a research project.
3. To understand the tools used for data analysis

Course Outcomes:

Upon successful completion of the course, students will be able to

1. Define and describe the research process and research methods
2. Apply basic research methods including research design, data analysis, and interpretation.
3. Identify and analyse the problems
4. Apply analytical tools to solve the problem
5. Use Quantitative Techniques methods to provide soltuions
6. Develop technical reports using LaTex

UNIT -I

Research Methodology :Description: Introduction - meaning of research - objectives of research -motivation in research - types of research - research approaches - significance of research -research methods versus methodology - research and scientific method -importance of knowing how research is done - research processes - criteria of good research - defining research problem - selecting the problem - necessity of defining the problem - techniques involved in defining a problem –research design - meaning of research design - need for research design - features of good design - different research designs - basic principles of experimental design.

Originality in Research: Resources for research - research skills –time management - role of supervisor and scholar - interaction with subject experts.

Thesis Writing: The preliminary pages and the introduction - the literature review - methodology - the data analysis - the conclusions - the references (IEEE format).

UNIT- II

Review of Literature: Significance of review of literature –source for literature: books - journals – proceedings - thesis and dissertations -unpublished items.

On-line Searching: Database – SciFinder – Scopus - Science Direct –Searching research articles - Citation Index - Impact Factor - H-index etc,

UNIT- III

Introduction of analytical tools – Introduction to data analysis –least squares fitting of linear data and non-linear data - exponential type data -logarithmic type data - power function data and polynomials of different orders -plotting and fitting of linear, Non-linear, Gaussian, Polynomial, and Sigmoidal type data - fitting of exponential growth, exponential decay type data –plotting polar graphs - plotting histograms - Y error bars - XY error bars - data masking.

UNIT- IV

Quantitative Techniques: General steps required for quantitative analysis -reliability of the data - classification of errors – accuracy – precision –statistical treatment of random errors - the standard deviation of complete results –error proportion in arithmetic calculations - uncertainty and its use in representing significant digits of results - confidence limits - estimation of detection limit.

UNIT- V

LaTeX and Beamer: Description: Writing scientific report - structure and components of research report - revision and refining' - writing project proposal - paper writing for international journals, submitting to editors - conference presentation –preparation of effective slides, pictures, graphs - citation styles.

Text Books:

1. C. R. Kothari, "Research Methodology Methods and Techniques", New Age International Publishers, New Delhi, 2nd edition, 2009.
2. F. Mittelbach and M. Goossens, "The LATEX Companion", Addison Wesley, 2nd edition, 2004.

Suggested Reading:

1. R. Panneerselvam, "Research Methodology", PHI, 2005.
2. P. Oliver, "Writing Your Thesis", Vistaar Publications, 2004.
3. J. W. Creswell, "Research Design: Qualitative, Quantitative, and Mixed Methods & Approaches", Sage Publications, 3rd edition, 2008.
4. Kumar, "Research Methodology: A Step by Step Guide for Beginners", SAGE Publications, 2005.

IT 465

PARALLEL COMPUTING
(Elective-II)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Data Structures and Design and Analysis of Algorithms.

Course Objectives:

1. To develop an understanding of parallel computing environment and its needs.
2. To understand the difference between the principles of sequential and parallel programming.
3. To solve problems using parallel computing.

Course Outcomes:

Student who completes this course will be able to:

1. Define terminology commonly used in parallel computing systems.
2. Describe different parallel architectures, inter-connect networks, programming models.
3. Explain algorithms for common operations such as broadcast, sorting etc.
4. Show the steps performed by a parallel algorithm on a given input as per the topology of processors.
5. Analyze the performance of a parallel algorithm, determine its computational bottlenecks and optimize the performance.
6. Design a parallel algorithm for a given problem**.**

UNIT - I

Introduction to Parallel Computing: Motivating Parallelism: The Computational Power Argument, The Memory/Disk Speed Argument, The Data Communication Argument, Scope of Parallel Computing; Applications in Engineering and Design, Scientific Applications, Applications in Computer Systems.

Parallel Programming Platforms Implicit Parallelism: Trends in Microprocessor, Pipelining and Superscalar Execution, Very Long Instruction Word Processors, Limitations of Memory System Performance, Improving Effective Memory Latency Using Caches, Impact of Memory Bandwidth, Alternate Approaches for Hiding Memory Latency, Communication Costs in Parallel Machines, Message Passing Costs in Parallel Computers, Communication Costs in Shared-Address-Space Machines.

UNIT -II

Principles of Parallel Algorithm: Decomposition, Tasks, and Dependency, Granularity, Concurrency, and Task-Interaction, Processes and Mapping, Processes versus Processor, Decomposition Techniques, Characteristics of Tasks and Interactions, Characteristics of Tasks, Characteristics of Inter-Task Interactions, Mapping Techniques for Load Balancing, Schemes for Static Mapping, Schemes for Dynamic Mapping, Methods for Containing Interaction Overheads, Maximizing Data Locality, Minimizing Contention and Hot Spots, Overlapping Computations with Interactions, Replicating Data or Computations, Using Optimized Collective Interaction Operations, Overlapping Interactions with Other Interactions.

UNIT -III

Basic Communication Operations: One-to-All Broadcast and All-to-One, Ring or Linear Array, Mesh, Hypercube, Balanced Binary Tree, All-to-All Broadcast and Reduction, Linear Array and Ring , Mesh, Hypercube, Cost, All-Reduce and Prefix-Sum Operations, Scatter and Gather, All-to-All Personalized Communication, Ring, Mesh, Hypercube, Circular Shift, Mesh, Hypercube.

Analytical Modelling of Parallel Programs: Sources of Overhead in Parallel, Performance Metrics for Parallel Systems, Execution Time, Total Parallel Overhead, Speedup, Efficiency, Cost, The Effect of Granularity on Performance, Scalability of Parallel Systems, Scaling Characteristics of Parallel Programs.

UNIT -IV

Programming Using the Message-Passing Paradigm: Principles of Message-Passing Programming, The Building Blocks: Send and Receive Operations, Blocking Message Passing Operations, Non-Blocking Message Passing Operations.

Sorting: Issues in Sorting on Parallel Computers, Where the Input and Output Sequences are Stored, How Comparisons are Performed, Sorting Networks, Bubble Sort and its Variants, Shellsort, Quicksort, Parallelizing Quicksort, Pivot Selection.

UNIT -V

Graph Algorithms: Definitions and Representation, Minimum Spanning Tree: Prim's Algorithm, Single-Source Shortest Paths: Dijkstra's Algorithm, All-Pairs Shortest Paths, Dijkstra's Algorithm, Floyd's Algorithm.

Search Algorithms for Discrete Optimization Problems: Definitions and Examples, Sequential Search Algorithms, Depth-First Search Algorithms, Best-First Search Algorithms.

Dynamic Programming: Overview of Dynamic Programming, Serial Monadic DP Formulations, the Shortest-Path Problem, the 0/1 Knapsack Problem.

Text Books:

1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, "Introduction to Parallel Computing", Second Edition, Publisher: Addison Wesley, January, 2003 ISBN: 0-201-64865-2, Pages: 856.
2. Behrooz Parhami, "Introduction to Parallel Processing Algorithms and Architectures", Kluwer Academic Publishers, New York, Boston, Dordrecht, London, Moscow, 2002.

Suggested Reading:

1. Michael J. Quinn, "Parallel Computing", January 1st 1994 by McGraw-Hill Companies.
2. Selim G. Akl, "The Design and Analysis of Parallel Algorithms", January 1st 1989 by Prentice Hall
3. Justin R. Smith, "The Design and Analysis of Parallel Algorithms".

Web Resources:

1. Web link: http://nptel.ac.in/syllabus/106102114/
2. http://www.cse.hcmut.edu.vn/~tuananh/courses/parallel_computing/Parhami%20B.%20Introduction%20to%20Parallel%20Processing%20%20Algorithms%20and%20Architectures%20(Kluwer,%202002).pdf

CE 422 DISASTER MITIGATION AND MANAGEMENT

Instruction	4 Periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	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:

1. Ability to analyse and critically examine existing programs in disaster management regarding vulnerability, risk and capacity at local level
2. Ability to choose the appropriate activities and tools and set up priorities to build a coherent and adapted disaster management plan.
3. Ability to 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. Ability to understand various participatory approaches/strategies and their application in disaster management
6. Ability to 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, "Disaster Management Global Challenges and Local Solutions" Universities Press Hyderabad 2012.
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., Earth and Atmospheric Disasters Management, Natural and Manmade. B.S. Publications, Hyderabad 2009.
2. Fearn-Banks, K, Crises computations approach: A case book approach. Route ledge Publishers, Special Indian Education, New York & London 2011.
3. Battacharya, T., Disaster Science and Management. Tata McGraw Hill Company, New Delhi 2012.

MB 215 ORGANIZATIONAL BEHAVIOUR

Instruction	4L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Internal Examination	20 Marks
Case Study/Assignment	5 Marks
Credits	3

Course Objectives: The objectives of the course are to:

1. Familiarize the students with the basic understanding of individual behavior and explore issues of motivation, communication, leadership, power, politics and organizational change.
2. Provide a comprehensive, up-to-date, practical knowledge base that provides an engaging introduction and concepts of organizational behavior.
3. Oriented the students with real life examples that correlate the theory to actual practice from the industry.
4. Enable the students to practically implement the Organizational Behavior principles and practice in real time situations in their careers and life.

Course Outcomes: After completion of this course students will be able to:

1. analyze the behavior, perception and personality of individuals and groups in organizations in terms of the key factors that influence organizational behavior.
2. assess the potential effects of organizational-level factors on organizational behavior.
3. critically evaluate the potential effects of motivating and leading the individuals in the Organization.
4. analyze organizational behavioral issues in the context of groups, power, politics and conflict issues.

Unit – I

Organizational behavior – Nature and levels of organizational behavior – Individuals in organization – Individual differences – Personality and Ability – The Big 5 Model of personality – Organizationally relevant personality traits. The nature of perception – characteristics of the perceiver, target and situation – perceptual problems.

Unit – II

Organizational Designs and Structures – Traditional and Contemporary organizational designs.Organizational culture and ethical behavior – factors shaping organizational culture– creating an ethical culture.

Unit – III

Motivation–early and contemporary theories of motivation. Leadership – early and contemporary approaches to leadership.

Unit – IV

Groups and group development – turning groups into effective teams.Managing change – process, types and challenges.Communicating effectively in organizations – communication

process–barriers to communication–overcoming barriers to communication–persuasive communication–communication in crisis situations.

Unit – V

Power, Politics, Conflict and Negotiations–Sources of individual, functional and divisional Power.Organizational politics.Conflict – causes and consequences – Pondy's model of organizational conflict–conflict resolution strategies.

Essential Readings:

1. Jennifer George and Gareth Jones "Understanding and Managing Organizational Behavior", Published by Pearson Education Inc.
2. Jon L Pierce and Donald G. Gardner, "Management and Organizational behavior", Cengage Learning India (P) Limited.
3. Richard Pettinger, "Organizational Behavior", 2010 Routledge.

Suggested Books:

1. Stephen P. Robbins, Jennifer George and Gareth Jones, "Management and Organizational Behavior", Pearson Education Inc.
2. K. Aswathappa, "Organizational behavior", Himalaya Publishing House.
3. John Schermerhorn, Jr., James G. Hunt and Richard N. Osborn, "Organizational Behavior", 10th edition, Wiley India Edition.

SCHEME OF INSTRUCTION AND EXAMINATION

B.E. IV YEAR
INFORMATION TECHNOLOGY

Semester – II

S.No	Syllabus Ref.No	SUBJECT	Scheme of Instruction		Scheme of Examination			Credits
			Periods per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		End Sem. Exam	Sessional	
		THEORY						
1	IT 421	Embedded Systems & Internet of Things	4	-	3	75	25	3
2		Elective-III	4	-	3	75	25	3
3		Elective-IV	4	-	3	75	25	3
		PRACTICALS						
1	IT 422	Embedded Systems &IoTLab	-	3	3	50	25	2
2	IT 423	Seminar	-	3	-	-	25	1
3	IT 901	Main Project	-	6	Viva voice	Gr*	50	9
		TOTAL	**12**	**12**	**-**	**275**	**175**	**21**

ELECTIVE - III

IT 471 Data Hiding
IT 472 Social Media Analytics
IT 473 Information Storage and Management
IT 474 Adhoc and Sensor Networks
IT 475 Enterprise Technologies
IT 476 E-Commerce
IT 477 Data Analysis using R programming
ME 414 Operations Research

ELECTIVE - IV

IT 481 Cloud Computing
IT 482 Software Quality Assurance
IT 483 Simulation and Modelling
IT 484 Security Policies & Procedures
IT 485 Distributed Databases
ME 464 Entrepreneurship
ME 472Intellectual Property Rights

IT 421

EMBEDDED SYSTEMS& INTERNET OF THINGS

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Digital Logic and Design, C programming, Microelectronics, Computer Organization

Course Objectives:

1. To teach students theoretical aspects of the design and development of an embedded system, including hardware and embedded software development.
2. To familiarize students with the basic concepts and structure and development of embedded systems.
3. To provide an overview of Internet of Things, building blocks of IoT and the real-world applications
4. To introduce Rasberry Pi device, its interfaces and Django Framework.

Course Outcomes:

1. Possess the passion for acquiring knowledge and skill in development of embedded systems.
2. Design and develop embedded systems (hardware, software and firmware)
3. Demonstrate real-time and advanced processor concepts.
4. Describe the role of things and Internet in IoT and determine the IoT levels for designing an IoT system.
5. Learn about generic design methodology for IoT system design.
6. Describe about the Rasberry Pi board and interfacing sensors and actuators with Rasberry Pi and work with python based web application framework called Django.

UNIT-I

Embedded Computing: Introduction, Complex Systems and Microprocessor, Embedded System Design Process, Formalisms for System Design, Design Examples. The 8051 Architecture: Introduction, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

UNIT-II

Programming using 8051. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication. Introduction to Real- Time Operating Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipe.

UNIT-III

Basic Design Using a Real-Time Operating System: Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment. Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded

Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, Introduction to advanced architectures: ARM and SHARC Processor and memory organization, Bus protocols, 12C bus and CAN bus.

UNIT-IV

Introduction & Concepts: Introduction to Internet of Things- Definitions & Characteristics of IoT, Physical Design of IOT-Things in IoT, IoT Protocols, Logical Design of IOT-IoT Functional Blocks, IoT Communication Models, IoT Communication APIs, IOT Enabling Technologies-Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems, IOT Levels& Deployment Templates.

Domain Specific IOTs: Various types of IoT Applications in Home Automation, Cities, Environment, Energy, Retail, Logistics Agriculture, Industry, Health & Life Style-Wearable Electronics.

UNIT-V

IoT Platforms Design Methodology: Introduction, IoT Design Methodology Steps-Purpose and Requirements Specification, Process Specification, Domain Model Specification, Information Model Specification, Service Specifications, IoT Level Specification, Functional View Specification, Operational View Specification, Device and Component Integration, Application Development, Case Study on IoT System for Weather Monitoring.

IoT Physical Devices and End Points: Basic building blocks of an IoT device, Rasberry Pi-About the board, Rasberry Pi interfaces-Serial, SPI,I2C.

Python Web Application Framework: Django Framework-Roles of Model, Template and View.

Text Books:

1. Wayne Wolf, "Computers and Components", Elsevier.
2. Kenneth J.Ayala, "The 8051 Microcontroller", Third Edition, Thomson.
3. David E. Simon, "An Embedded Software Primer", Pearson Education.
4. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press.

Suggested Reading:

1. Raj Kamal, "Embedded Systems", Tata McGraw Hill.
2. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
3. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

IT 422

EMBEDDED SYSTEMS & IoT LAB

Instruction	3 periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Prerequisites: Micro Processors Lab

Course Objectives:

1. To teach students all aspects of the design and development of an embedded system, including hardware and embedded software development.
2. To provide necessary knowledge to develop working code for real-world IoT applications

Course Outcomes:

After completion of the course, student will be able to

1. Possess the passion for acquiring programming skills in using different tools.
2. Able to design and develop embedded systems (hardware, peripherals and firmware).
3. Experience Programming in Real Time Operating System using VxWorks.
4. Develop python programs that run on Rasberry Pi
5. Interface Sensors and Actuators with Rasberry Pi
6. Develop simple IoT systems using Rasberry Pi device and appropriate sensors and Django Framework.

Experiments:

A. Use of 8-bit and 32-bit Microcontrollers, (such as 8051 Microcontroller, ARM2148 / ARM2378, LPC 2141/42/44/46/48) and C compiler (Keil, Ride etc.) to:

1. Interface Input-Output and other units such as: Relays, LEDs, LCDs, Switches, Keypads, Stepper Motors, Sensors, ADCs, Timers
2. Demonstrate Communications: RS232, IIC and CAN protocols
3. Develop Control Applications such as: Temperature Controller, Elevator Controller, Traffic Controller

B. Understanding Real Time Concepts using any RTOS through Demonstration of:

1. Timing
2. Multi-Tasking
3. Semaphores
4. Message Queues
5. Round-Robin Task Scheduling
6. Pre-emptive Priority based Task Scheduling
7. Priority Inversion
8. Signals
9. Interrupt Service Routines

C. **Internet of Things (IoT) Experiments**

Following are some of the programs that a student should be able to write and test on an Raspberry Pi, but not limited to this only.

1. Python- Installation, Working with Numbers, Strings, Lists, Tuples, Dictionaries, Type Conversions, Control flow examples, Pass statement, Functions, Modules, Packages, File Handling, Date/Time operations, Classes
2. Create a Python program to compute document statistics
3. Switching LED on/off from Rasberry Pi Console
4. Python program for blinking LED
5. Interfacing an LED and Switch with Rasberry Pi
6. Python program for sending an email on switch press
7. Interfacing a Light Sensor with Rasberry Pi
8. Implement any IoT application using Rasberry Pi, Python and Django Framework

Student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

Text Book:

1. Kenneth J.Ayala, "The 8051 Microcontroller", Third Edition, Thomson.
2. ArshdeepBahga, Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press.

IT 423

SEMINAR

Instruction	3 Periods 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 state of the art topics in a broad area of his /her specialization.

Seminar topics may be chosen by the students with advice from the faculty members. The seminar topic must be chosen from a standard publication (IEEE/ACM/Springer/ Elsevier/John Wiley & Sons Publishing Company etc.) with a prior approval from the designated faculty.

Students are to be exposed to following aspects of seminar presentations.

- Literature survey
- Consolidation of available information
- Power point Preparation
- Technical writing

Each student is required to:

1. Submit a one page synopsis of the seminar talk for display on the notice board.

2. Give twenty(20) minutes presentation through OHP/ PPT/ Slide Projector followed by Ten(10) minutes discussion

3. Submit a report on the seminar topic with list of references and hard copy of the slides.

Seminars are to be scheduled from 3rd week to the last week of the semester and any change in schedule should be discouraged.

For the award of sessional marks students are judged by three (3) faculty members and are based on oral and written presentations as well as their involvement in the discussions during the oral presentation.

Note: Topic of the seminar should be from any peer reviewed recent journal publications.

IT 471 **DATA HIDING**
(Elective-III)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Cryptography and Network security and Digital Image processing

Course Objectives:

1. To teach students theoretical aspects of the watermarking and steganography
2. Students have knowledge about the History of watermarking and steganography
3. Students have knowledge about the basic models of watermarking
4. Students have knowledge about the basic concepts of watermarking and steganography
5. Students have knowledge about the embedding process in steganography
6. The course utilizes and applies the scenarios of Steganalysis

Course Outcomes:

After completion of the course, student will be able to

1. Possess the passion for acquiring knowledge and skill in preserving and authenticate information
2. Able to design and develop Watermarked security and cryptography
3. Able to demonstrate algorithms of watermarking and steganography

UNIT- I

Introduction: Information Hiding, Steganography, and Watermarking, History of Watermarking, History of Steganography, Importance of Digital Watermarking, Importance of Steganography. Applications and Properties: Applications of Watermarking, Applications of Steganography , Properties of Watermarking Systems, Evaluating Watermarking Systems, Properties of Steganography and Steganalysis Systems. Evaluating and Testing Steganographic Systems.

UNIT- II

Models of Watermarking: Notation, Communications, Communication-Based Models of Watermarking, Basic model, Watermarking as Communications with Side Information at the Transmitter, Watermarking as Multiplexed Communications, Geometric Models of Watermarking, Modeling Watermark Detection by Correlation, Linear Correlation, Normalized Correlation, Correlation Coefficient, Robust Watermarking: Approaches, Robustness to Volumetric Distortions.

UNIT-III

Watermark Security: Security Requirements, Restricting Watermark Operations, Public and Private Watermarking, Categories of Attack, Assumptions about the Adversary, Watermark

Security and Cryptography, The Analogy between Watermarking and Cryptography, Preventing Unauthorized Detection, Embedding and Removal, Some Significant Known Attacks, Scrambling Attacks, Pathological Distortions, Copy Attacks, Ambiguity Attacks, Sensitivity Analysis Attacks, Gradient Descent Attacks, Content Authentication : Exact Authentication ,Selective Authentication, Localization, Restoration.

UNIT-IV

Steganography: Information-Theoretic Foundations of Steganography, Cachin's Definition of Steganographic Security, Practical Steganographic Methods: Statistics Preserving Steganography, Model-Based Steganography, Masking Embedding as Natural Processing, Minimizing the Embedding Impact, Matrix Embedding, Nonshared Selection Rule.

UNIT-V

Steganalysis: Steganalysis Scenarios, Detection, Forensic Steganalysis, the Influence of the Cover Work on Steganalysis, Significant Steganalysis Algorithms, LSB Embedding and the Histogram Attack, Sample Pairs Analysis. Blind Steganalysis of JPEG Images Using Calibration, Blind Steganalysis in the Spatial Domain.

Text Book:

1. Ingemar Cox, Matthew Miller, Jeffrey Bloom, and Jessica Fridrich, "Digital Watermarking and Steganography", 2nd Edition, (The Morgan Kaufmann Series in Multimedia Information and Systems).

Suggested reading:

1. Frank Y. Shih. "Digital Watermarking and Steganography: Fundamentals and Techniques", CRC Press.
2. Stefan Katzenbeisser, Fabien, and A.P. Petitcolas, "Information Hiding Techniques for Steganography and Digital Watermarking", Artech House.
3. Neil F. Johnson; ZoranDuric; SushilJajodia, "Information Hiding: Steganography and Watermarking - Attacks and Countermeasures", Springer.
4. Gregory Kipper, "Investigator's Guide to Steganography", Auerbach Publications.

IT 472

SOCIAL MEDIA ANALYTICS
(Elective- III)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Data Structures, Design and Analysis of Algorithms, Data Warehousing and Data Mining, Computational Intelligence, Big Data Analytics

Course Objectives:

1. To introduce the basics of Social media mining and challenges in mining social media data
2. To discuss graph essentials, network essentials and network models for social media mining
3. To teach the process of detecting, analyzing communities and Information diffusion in the context of Social media analytics
4. To impart knowledge about mining essentials and importance of influence and homophily
5. To discuss recommendation systems in the context of social media
6. To introduce the working of prediction systems

Course Outcomes:

After Completion of the course, student will be able to

1. Understand and analyse the challenges posed by social media data
2. Represent social media using a suitable network model
3. Perform community analysis and analyse herd behaviour
4. Model, measure and distinguish between influence and homophily
5. Understand and build recommendation systems
6. Understand how a prediction system works

Unit - I

Introduction: What is Social Media Mining, New Challenges for Mining, **Graph Essentials:** Graph Basics, Graph Representation, Types of Graphs, Connectivity in Graphs, Special Graphs, Graph Algorithms, **Network Measures**: Centrality, Transitivity and Reciprocity, Balance and Status, Similarity, **Network Models:** Properties of Real-World Networks, Random Graphs, Small-World Model, Preferential Attachment Model.

Unit - II

Community Analysis: Community Detection, Community Evolution, Community Evaluation, **Information Diffusion in Social Media:** Herd Behaviour, Information Cascades, Diffusion of Innovations, Epidemics

Unit - III

Data Mining Essentials: Data, Data Preprocessing, Data Mining Algorithms, Supervised Learning, Unsupervised Learning, **Influence and Homophily**: Measuring Assortativity, Influence, Homophily, Distinguishing Influence and Homophily.

Unit - IV

Recommendation in Social Media: Challenges, Classical Recommendation Algorithms, Recommendation Using Social Context, Evaluating Recommendations, **Behavior Analytics:** Individual Behavior, Collective Behavior.

Unit - V

Prediction: Predicting the future, Prediction of learning, Predicting elections, Predicting Box offices, Predicting Stock market, Closing predictions.

Text Books:

1. Zafarani R., Abbasi M.A., Liu H, "Social Media Mining: An Introduction", Cambridge University Press, 2014.
2. Lutz Finger, Soumitra Dutta, "Ask, Measure, Learn: Using Social Media Analytics to Understand and Influence Customer Behavior", O'Reilly Media, 2014.

Suggested Reading:

1. Bing Liu, "Sentiment Analysis: mining opinions, sentiments, and emotions", Cambridge University Press, 2015.
2. Matthew A. Russell, "Mining the Social Web: Analyzing Data from Facebook, Twitter, LinkedIn, and Other Social Media Sites", O'Reilly Media 2011.

Web Resources:

1. http://www.kdd.org/kdd2015/tutorial.html
2. http://thinktostart.com/category/social-media/
3. http://simplymeasured.com/free-social-media-tools/#sm.0001p0rf42mqwdxnu1s1j6llvxvix
4. http://blogs.iit.edu/iit_web/social-media-2/social-media-whats-your-strategy/

IT 473

INFORMATION STORAGE AND MANAGEMENT
(Elective- III)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: IT Workshop, Database Systems, Computer Networks, Data communications

Course Objectives:

1. To introduce storage architectures, including storage subsystems, DAS, SAN, NAS, CAS
2. To provide understanding of logical and physical components of a storage infrastructure and different storage virtualization technologies
3. To facilitate the knowledge about components for managing and monitoring the data center and for establishing clusters

Course Outcomes:

After successful completion of the course, students will be able to

1. Identify key challenges in managing information and analyze different storage technologies
2. Monitor the storage infrastructure and management activities
3. Identify CAS architecture and types of archives and forms current storage virtualization technologies
4. Manage virtual servers and storage between remote locations
5. Design, analyze and manage clusters of resources
6. Gain Knowledge to establish Data Centres

UNIT-I

Introduction to Storage Technology: Data creation and The value of data to a business, Information Lifecycle, Challenges in data storage and data management, Solutions available for data storage, Core elements of a Data Centre infrastructure, role of each element in supporting business activities.

UNIT-II

Storage Systems Architecture: Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its components, Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Integrated and Modular storage systems, high-level architecture and working of an intelligent storage system.

UNIT-III

Introduction to Networked Storage: Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN, Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfil the need, Understand the appropriateness of the different networked storage options for different application environments.

UNIT-IV

Information Availability, Monitoring & Managing Data Center: Reasons for planned/unplanned outages and the impact of downtime, Impact of downtime. Differentiate between business continuity (BC) and disaster recovery (DR), RTO and RPO, Identification of single points of failure in a storage infrastructure and solutions to mitigate these failures, Architecture of backup/recovery and the different backup/ recovery topologies, replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities. Key areas to monitor in a data centre, Industry standards for data center monitoring and management, Key metrics to monitor storage infrastructure.

UNIT-V

Securing Storage and Storage Virtualization: Information Security, Critical security attributes for information systems, Storage security domains, Analyze the common threats in each domain. Storage Virtualization: Forms, Configurations and Challenges, Types of Storage Virtualization: Block-level and File-Level.

Text Book:

1. G.Somasundaram, Alok Shrivastava, EMC Education Series, "Information Storage and Management", Wiley, Publishing Inc., 2011.
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003.

Suggested Reading:

1. Marc Farley, "Building Storage Networks", Tata McGraw Hill, Osborne. 2001.
2. Meeta Gupta, "Storage Area Network Fundamentals", Pearson Education Limited, 2002

Web Links:

1. http://www.mikeownage.com/mike/ebooks/Information%20Storage%20and%20Management.pdf

IT 474

ADHOC AND SENSOR NETWORKS
(Elective- III)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Data Communication, Computer Networks, Mobile Computing

Course Objectives:

1. To provide students with an understanding of wireless ad-hoc and sensor networks
2. To enable them to recognise the wide range of applicability of these networks
3. To provide an understanding of the major design issues, including topics such as protocol mechanisms and resource constraints.

Course Outcomes:

After learning the course student should be able to:

1. Understand the needs of Wireless Adhoc and Sensor Network in current scenario of technology.
2. Describe current technology trends for the implementation and deployment of wireless adhoc/sensor networks.
3. Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks.
4. Explain the principles and characteristics of wireless sensor networks

UNIT-I

Introduction: Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, Radio Propagation Mechanisms, Characteristics of the Wireless Channel, IEEE 802.11Standard, Origin of Ad hoc Packet Radio Networks – Technical Challenges, Architecture of PRNETs, Components of Packet Radios, Comparison of Cellular and Ad-hoc Wireless Networks, Applications of Ad-hoc Wireless Networks, Challenges and Issues of Ad hoc Wireless Networks.

UNIT-II

Adhoc Network Protocols : Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols. Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An Architecture Reference Model for Multicast Routing Protocols, Classifications of Multicast Routing Protocols, Issues in Designing a Transport Layer Protocol for Ad hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad hoc Wireless Networks, Classification of Transport Layer Solutions, TCP over Ad hoc Wireless Networks, Security in Ad Hoc Wireless Networks.

UNIT-III

QoS and Energy Management in Adhoc Wireless Networks: Issues and Challenges in Providing QoS in Ad hoc Wireless Networks, Classifications of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QoS Frameworks for Ad hoc Wireless Networks. Need for Energy Management in Ad hoc Wireless Networks, Classification of Energy Management Schemes, Battery Management Schemes, Transmission Power Management Schemes, and System Power Management Scheme.

UNIT-IV

Introduction and Overview of Wireless Sensor Networks: Background of Sensor Network Technology, Applications of Wireless Sensor Networks, Basic Wireless Sensor Technology: Introduction, Sensor Node Technology, Sensor Taxonomy, WN Operating Environment, WN Trends.

UNIT-V

Wireless Sensor Network Protocols: MAC Protocols for WSNs: Fundamentals of MAC Protocols, MAC Protocols for WSNs, Sensor-MAC case study, Routing Protocols for WSNs: Background, Data Dissemination and Gathering, Routing Challenges and design Issue, Flooding, SPIN and LEACH protocols for WSNs. Transport Protocol Design Issues in WSNs.

Text Books:

1. C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks Architectures and Protocols", Prentice Hall, PTR, 2004.
2. KazemSohraby, Daniel Minoli, TaiebZnati, "Wireless Sensor Networks', A John Wiley & Sons Inc. Publication, 2007.

Suggested Reading:

1. Carlos de MoraisCordeiro and Dharma PrakashAgrawal, "Ad Hoc and Sensor Networks : Theory and Applications", Second Edition, World Scientific Publishers, 2011.
2. C. K. Toh, "Ad Hoc Mobile Wireless Networks Protocols and Systems", Prentice Hall, PTR, 2001.
3. Ananthram Swami, Qing Zhao, Yao-Win Hong, Lang Tong, "Wireless Sensor Networks Signal Processing and Communications", John Wiley & Sons.

IT 475

ENTERPRISE TECHNOLOGIES
(Elective- III)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Java Programming, Web Programming

Course Objectives:

1. To understand the enterprise application environment and how middleware services like security,clustering,transaction etc., can be applied in distributed environment
2. To understand the flow of execution of struts framework.
3. To understand the advantageof Hibernate ORMin comparison with existing alternatives.
4. To understand the core concepts of spring framework.
5. To understand the spring MVC web application development process.

Course Outcomes:

Upon successful completion of this course, student will be able to

1. Identify the suitability of EJB in application development and configuring the appropriate middleware services
2. Develop web applications using struts framework
3. Apply ORM in place of entity beans and JPA
4. Apply the spring concepts like Inversion of Control (IOC), Dependency Injection etc.
5. Develop robust web applications using spring MVC.

UNIT-I

EJB 3: Introduction to EJB 3.0, Architecture of EJB 3.0, Session Beans in EJB 3.0Stateless Session Bean, Stateful Session Bean, JPA-Java persistence API,Building applications with session beans and entity beans.

UNIT-II

Struts: The scope of Struts, The development process with struts, The Struts Controller, Action Class, Views in Struts, Sample Applications.

UNIT-III

Hibernate: Introduction to ORM, Introduction to hibernate, Hibernate Architecture, Hibernate Configuration file & Mapping files, Session Operations, Building applications with Hibernate

UNIT-IV

Spring: What is spring; How Spring fits into enterprise world, Introduction to IOC, Types of DI, Setters Vs Constructor, Collection DI, Bean Inheritance, Collection Merging, and Building Applications.

UNIT-V

Spring MVC: Spring 3.0 features, Spring MVC Architecture, Advantages of Spring MVC Framework, Handler Mapping, Validation Framework and Building applications.

Text Books:

1. Jim Farley, William Crawford, O'Reilly and Associates, "Java Enterprise in a Nutshell",2005.
2. Govind Seshadri, "Enterprise java Computing: Application and Architectures", Cambridge University Publications, 1999.

Suggested Reading:

1. Jonathan Wetherbee and Raghu Kodali, "Beginning EJB 3, Java EE, 7th Edition" Apress, 2013.
2. Christian Bauer and Gavin King "Hibernate in Action" Manning Publications, 2004.
3. Richard Scarry "The Rooster Struts Board book", Golden books, 2015.
4. Willie Wheeler, Joshua White "Spring in Practice" Manning Publications, 2013.

Online Resources:

1. http://docs.oracle.com/javaee/6/tutorial/doc/gijsz.html
2. https://www.udemy.com/javaspring/
3. http://viralpatel.net/blogs/tutorial-spring-3-mvc-introduction-spring-mvc-framework/
4. http://www.journaldev.com/3793/hibernate-tutorial
5. http://www.ibm.com/developerworks/websphere/techjournal/0302_fung/fung.html

IT 476

ELECTRONIC COMMERCE
(Elective-III)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Computer Networks, Information Security

Course Educational Objectives:

1. To introduce the concepts and importance of E-commerce.
2. To facilitate understanding of the importance of ethics, legal issues and privacy in E-Commerce.
3. To familiarize with various electronic payment systems, advertising and marketing on the web.

Course Outcomes:

Students who complete this course will be able to

1. Understand the impact of information superhighway and multimedia on global business and life style.
2. Explain the significance of Electronic data interchange and legal, security and privacy issues.
3. Describe the digital documentations, market research and corporate data warehouses, and their usage in the business strategy formulation.
4. Understand the significance of the various modes of electronic payments and the risks involved.
5. Explain the significance of organizing the data in a consumer oriented view.

UNIT-I

Electronic Commerce: Electronic Commerce Frame Work, Electronic Commerce and Media Convergence, Anatomy of E-Commerce appellations, Electronic Commerce Consumer applications, Electronic Commerce Organization Applications.

Consumer Oriented Electronic Commerce: Consumer- Oriented Applications, Mercantile Process Models, Mercantile Models from the Consumer's Perspective, Mercantile Models from the Merchants' Perspective.

UNIT-II

Electronic Payment systems: Types of Electronic Payment Systems, Digital Token - Based Electronic Payment Systems, Smart Cards Electronic Payment Systems, Credit Card- Based Electronic Payment Systems, Risk and Electronic Payment systems, Designing Electronic Payment Systems.

UNIT -III

Inter Organizational Commerce and EDI: Electronic Data Interchange, EDI applications in business, EDI: Legal, Security, and Privacy issues, EDI and Electronic Commerce. EDI Implementation, MIME and Value added networks.-Standardization and EDI, EDI Software Implementation, EDI Envelope for Message Transport, Value-Added Networks, Internet-Based EDI.

Intra organizational Electronic Commerce: Internal Information Systems, Work Flow Automation and Coordination, Customization and internal Commerce, Supply chain Management.

UNIT-IV

Corporate Digital Library: Dimensions of Internal electronic Commerce Systems, Types of Digital Documents, Issues behind Document Infrastructure, Corporate Data Warehouse Advertising and Marketing on the Internet - Information based marketing, advertising on Internet, on-line marketing process, market research.

UNIT -V

Consumer Search and Resource Discovery: Search and Resource Discovery paradigms, Information search and Retrieval, Electronic Commerce catalogues or Directories, information filtering, Consumer-Data Interface, Emerging Tools.

Multimedia and Digital video: key multimedia concepts, Digital Video and Electronic Commerce, Desktop video processing, Desktop video conferencing.

Text Book:

1. Ravi Kalakota & A. B. Whinstong: "Frontiers of Electronic Commerce", Pearson Education, lndia, 2006.

Suggested Reading:

1. Daniel Minoli, Emma Minoli, “Web Commerce Technology Handbook” Tata McGraw Hill 2007.
2. J Christopher W, Theodore HKC, "Global Electronic Commerce: Theory and Case Studies", Universities Press, 2001.

IT 477

DATA ANALYSIS USING R PROGRAMMING
(Elective-III)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Probability and Random Processes, Java Programming, Big Data Analytics

Course objectives:
To introduce R, an easy to use tool for high level data analytics.

Course outcomes:
After successful completion of the course students will be able to

1. Learn and use various built-in data types in R and read and write data from other datasets using R packages.
2. Use Textual and binary formats for storing data and perform numerical and statistical calculations using Vectorized operations, Date and Time.
3. Perform operations for managing Data frames using dplyr package and write programs using control structures and Functions.
4. Appreciate lexical scoping of R that simplifies statistical computations and use loop functions to implement loops in a compact form.
5. Debug programs using interactive debugging tools of R and optimize R programs using Rprofiler
6. Simulate a system by modeling random inputs using random number generators.

UNIT-I

History and Overview of R: Basic Features of R, Design of the R System, Limitations of R, R Resources, **Introduction to R:**Installation, Interface, Entering Input, Evaluation, R Objects, Numbers, Attributes, Creating Vectors, Mixing Objects, Explicit Coercion, Matrices, Lists, Factors, Missing Values, Data Frames, Names, **Getting Data In and Out of R :**Reading and Writing Data, Reading Data Files with read.table(), Reading in Larger Datasets with read.table, Calculating Memory Requirements for R Objects, **Using the readr Package**

UNIT-II

Using Textual and Binary Formats for Storing Data: Usingdput() and dump(), Binary Formats, **Interfaces to the Outside World**: File Connections, Reading Lines of a Text File, Reading From a URL Connection, **Subsetting R Objects**: Subsetting a Vector, Subsetting a Matrix, Subsetting Lists, Subsetting Nested Elements of a List Extracting Multiple Elements of a List, Partial Matching, Removing NA Values, **Vectorized Operations**:Vectorized Matrix Operations, **Dates and Times**: Dates in R, Times in R, Operations on Dates and Times.

UNIT-III

Managing Data Frames: Data Frames, The dplyr Package, dplyr Grammar, Installing the dplyr package, select(), filter(), arrange(), rename(), mutate(), group_by(), Pipeline operator, **Control Structures**: if-else, for Loops, Nested for loops, while Loops, repeat Loops, next, break, **Functions**: Functions in R, Argument Matching, Lazy Evaluation, The ... Argument, Arguments Coming After the ... Argument.

UNIT-IV

Scoping Rules of R:A Diversion on Binding Values to Symbol, Scoping Rules, Lexical Scoping: Lexical vs. Dynamic Scoping, Application: Optimization, Plotting the Likelihood, **Coding Standards for R, Loop Functions**:, Looping on the Command Line, lapply(), sapply(), split(), Splitting a Data Frame, tapply, apply(), Col/Row Sums and Means, Other Ways to Apply, mapply(), Vectorizing a Function, **Debugging:** Figuring Out What's Wrong, Debugging Tools in R, Using traceback(), Using debug(), Using recover().

UNIT-V

Profiling R Code: Usingsystem.time(), Timing Longer Expressions, The R Profiler Using summaryRprof(), **Simulation:** Generating Random Numbers, Setting the random number seed, Simulating a Linear Model, Random Sampling, **Data Analysis Case Study:**Simulation, Loading and Processing the Raw Data , Results.

Text Book:

1. Ravi Kalakota & A. B. Whinstong, "Frontiers of Electronic Commerce", Pearson Education, lndia, 2006.

Suggested Reading:

1. Daniel Minoli, Emma Minoli, "Web Commerce Technology Handbook", Tata McGraw Hill 2007.
2. J Christopher W, Theodore HKC, "Global Electronic Commerce: Theory and Case Studies", Universities Press, 2001.

ME 414

Operations Research

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

Course Objectives:

1. To understand the significance of Operations Research concept and techniques
2. To know the formulation of LPP models
3. To understand the Algorithms of Graphical and Simplex Methods
4. To understand the Transportation and Assignment techniques
5. To know the procedure of Project Management along with CPM and PERT techniques
6. To understand the concepts of sequencing and queuing theory

Course Outcomes: At the end of the course, the students were able to

1. Recognize the importance and value of Operations Research and mathematical formulation in solving practical problems in industry;
2. Formulate a managerial decision problem into a mathematical model;
3. Apply Operations Research models to real time industry problems;
4. Build and solve Transportation Models and Assignment Models.
5. Apply project management techniques like CPM and PERT to plan and execute project successfully
6. Apply sequencing and queuing theory concepts in industry applications

UNIT-I

Introduction: Definition and Scope of Operations Research.

Linear Programming: Introduction, Formulation of linear programming problems, graphical method of solving LP problem, simplex method, Degeneracy in Simplex, Duality in Simplex.

UNIT-II

Transportation Models: Finding an initial feasible solution - North West Corner Method, Least Cost Method, Vogel's Approximation Method, Finding the optimal solution, Special cases in Transportation problems - Unbalanced Transportation problem, Degeneracy in Transportation, Profit Maximization in Transportation.

UNIT-III

Assignment Techniques: Introduction, Hungarian technique of Assignment techniques, unbalanced problems, problems with restrictions, Maximization in Assignment problems, travelling salesman problems

UNIT-IV

Project Management: Definition, Procedure and Objectives of Project Management, Differences between PERT and CPM, Rules for drawing Network diagram, Scheduling the activities, Fulkerson's rule, Earliest and Latest times, Determination of ES and EF times in forward path, LS & LF times in backward path, Determination of critical path, duration of the project, Free float, Independent float and Total float, Crashing of network.

UNIT-V

Sequencing Models: Introduction, General assumptions, processing 'n' jobs through two machines, processing 'n' jobs through three machines.

Queuing Theory: Introduction, Kendal's Notation, single channel - poisson arrivals - exponential service times

Text Books:

1. Hamdy, A. Taha, "Operations Research-An Introduction", Sixth Edition, Prentice Hall of India Pvt. Ltd., 1997.
2. S.D. Sharma, "Operations Research", Kedarnath, Ramnath& Co., Meerut,2009
3. V.K. Kapoor, "Operations Research", S. Chand Publishers, New Delhi, 2004

Suggested Reading:

1. Harvey M. Wagner, "Principles of Operations Research", Second Edition, Prentice Hall of India Ltd., 1980.
2. R. Paneer Selvam, "Operations Research", Second Edition, PHI Learning Pvt. Ltd., New Delhi, 2008.
3. Nita H. Shah, Ravi M. Gor, HardikSoni, "Operations Research", PHI Learning Private Limited, 2013

IT 481

CLOUD COMPUTING
(Elective-IV)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course prerequisites: Operating Systems, Distributed Systems

Course Objectives:

1. To introduce mechanisms that enable cloud computing
2. To familiarize with the architecture and standards of cloud computing
3. To facilitate understanding of different virtualization technologies
4. To provide an introduction to various cloud platforms

Course Outcomes:

After successful completion of the course, student will be able to

1. Describe the features of clouds and basic principles of cloud computing
2. Discuss system virtualization and outline its role in enabling the cloud computing system model.
3. Analyze and apply various clouds architectures
4. Identify the security requirements of cloud computing
5. Develop applications on different cloud platforms

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-Centre Automation.

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 Holomorphic 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.

Text Books:

1. John W. Rittenhouse, James F. Ransome, "Cloud Computing: Implementation, Management, and Security ", CRC Press, 2009.
2. RajkumarBuyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", WileyPublishing, 2011.

Suggested Reading:

1. Kai Hwang, Geoffrey C.Fox, Jack J.Dongarra, "Distributed and Cloud Computing from Parallel Processing to the Internet of Things", Elsevier, 2012.
2. Raluca Ada Popa, Catherine M.S.Redfield, NickolaiZeldovich and HariBalakrishnana, "CryptDB: Protecting Confidentiality with encrypted Query Processing" 23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
3. David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", AuerbachPublications(CRC Press), 2006.

IT 482

SOFTWARE QUALITY ASSURANCE
(Elective-IV)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Software Engineering, Software Testing

Course Objectives:

1. To introduce the concepts and methods required for effective and efficient SQA.
2. To develop a broad understanding of SQA processes from planning until execution
3. Introduce various approaches, techniques, technologies, and methodologies used in software quality assurance.
4. Prepare students to conduct independent research on software testing and quality assurance and to apply that knowledge in their future research and practice.

Course Outcomes:

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

1. Understand quality management processes
2. Distinguish between the various activities of quality assurance, quality planning and quality control.
3. Understand the importance of standards in the quality management process and their impact on the final product.
4. Understand and apply key quality assurance techniques tailored for specific software development environments.
5. Propose and defend innovative solutions to software quality assurance and measurement problems in the context of various software development environments.
6. Research, consolidate and present large amounts of information related to appropriate quality assurance techniques and be able to make recommendations for management strategies.

UNIT I:

Fundamentals Of Software Quality Assurance : The Role of SQA , SQA Plan, Establishing quality goals, the purpose of quality goals, the quality goal methodology , SQA responsibilities, Factors affecting the SQA effort, SQA functions, SQA considerations, SQA people , Quality Management, Software Configuration Management, Configuration control, Change management, Revisions, Deltas, Conditional code.

UNIT II

Managing Software Quality: Managing Software Organizations , Managing Software Quality, Defect Prevention, Defect evaluation, Defect reporting, Cause analysis, Action plan development, Performance tracking, Software Quality Assurance Management, Quality tasks, A minimal QA effort, Factors affecting the SQA effort, the critical Personnel question, Fundamental requirements.

UNIT III

Software Quality Assurance Metrics: Software Quality – Total Quality Management (TQM) – Quality Metrics –QA techniques, Technical Reviews, technical review objectives, Auditing, Software Inspection, software inspection objectives, Walkthroughs , Walkthrough objectives, planning for process improvement, Software Quality Metrics Analysis-Software quality metric, CMM Compatibility, ISO 9000 compatibility.

UNIT IV

Software Quality Program: Software Quality Program Concepts –Scope of the software quality program, Establishment of a Software Quality Program – Professional ethics, a Minimal QA effort, Software Quality Assurance Planning – An Overview –Contents and structure of the standard, establishing quality goals, the purpose of quality goals, the quality goal methodology, Purpose& Scope.

UNIT V

Software Quality Assurance Standardization : Software Standards–ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 – Comparison of ISO 9000 Model with SEI's CMM –The models orientations, ISO 9000 weaknesses, CMM weaknesses, the capability model enjoys some important strengths, SPICE-software Process improvement and capability determination

Text Books:

1. Mordechai Ben-Menachem / Garry S Marliss, "Software Quality", Vikas Publishing House, Pvt. Ltd., New Delhi.
2. Watts S Humphrey, "Managing the Software Process", Pearson Education Inc.

Suggested Reading:

1. G. Gordon Schulmeyer, "Handbook of Software Quality Assurance", Fourth Edition, Artech House Inc, London.
2. KshirasagarNaik , "Software Testing and Quality Assurance: Theory and Practice", 1st Edition, Wiley Publishers.

IT 483

SIMULATION AND MODELING
(Elective-IV)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Probability and Statistics

Course Objectives:

1. To present an introduction to discrete event simulation systems.
2. To familiarize with simulation languages/software to solve real world problems in the manufacturing as well as services sectors.
3. To discuss the modeling techniques of entities, queues, resources and entity transfers in discrete event environment.
4. To teach the necessary skills to formulate and build valid models, implement the model, perform simulation analysis of the system and analyze results.

Course Outcomes:

Upon successful completion of the course, students will be able to:

1. Apply simulation concepts to achieve in business, science, engineering, industry and services goals
2. Demonstrate formulation and modeling skills
3. Perform a simulation using spreadsheets as well as simulation language/package
4. Generate pseudorandom numbers using the Linear Congruential Method
5. Evaluate the quality of a pseudorandom number generator using statistical tests
6. Analyze and fit the collected data to different distributions

UNIT-I

Introduction to Simulation: Advantages and Disadvantages of simulation, Areas of application, System and System Environment, Components of a System, Discrete And Continuous Systems, Model of a System, Types of Models, Discrete-Event System Simulation, Steps in a Simulation Study, Simulation Examples.

UNIT-II

Overview of Statistical models and queuing systems: Programming languages for simulation, Continuous and discrete simulation languages-FOTTRAN, GPSS, SIMAN, SIMSCRIPT, SLAM and MODSIM III

UNIT-III

Random Numbers: generation, properties of random numbers, generation of pseudo-random numbers, tests for random numbers

Random variants: generation, inverse transformation technique, uniform distribution, exponential distribution. Weibul's distribution, triangular 38 distributions, direct transformation for the normal distribution, convolution method of Erlang distribution, **Acceptance rejection techniques:** Poisson distribution, Gamma distribution.

UNIT-IV

Input data analysis: Data Collection, Identify the distribution, parameter and estimation. Goodness of fit tests: Chi square test- KS test, Multivariate and time series input models, Verification and validations of simulation models, Model building.

V**erification and Validation:** Verification of simulation models, calibration and validation of models face validity, Validation of model assumptions, validation input/output Transformations, Input/output validation using historical input data, Input/output validation using Turning test.

UNIT-V

Output data analysis: stochastic nature of output data, Types of simulation with respect to output analysis. Measures of performance and their estimation, Output analysis for terminating simulations, Output analysis for steady-state simulations.

Comparison and evaluation of alternative system designs: Comparison of several system designs. Statistical models for estimating the effect of design alternatives.

Text Books:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, and David M. Nicol, "Discrete-Event System Simulation", Pearson Education Asia, 2001.
2. Narsingh Deo, "System Simulation with Digital Computers", Prentice Hall of India, 1979.

Suggesting Reading:

1. Anerill M Law and W. David Kelton, "Simulation Modeling and Analysis", McGraw Hill, 2009.

IT 484

SECURITY POLICIES AND PROCEDURES
(Elective-IV)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Information Security

Course Objectives:

1. To understand various security policies, procedures, standards and its central role in an Information security program.
2. To have an overview of information security strategy and architecture.
3. To obtain a thorough knowledge to identify and prioritize information assets.
4. To know how to sell policies, Standards and procedures.
5. To study the concepts of Corporate Communications, Electronic Communications, Internet security, Information protection techniques.
6. To learn the concepts like Corporate Information Security policy, Information Security program Administration, Responsibilities.

Course Outcomes:

Students who complete this course should be able to

1. Aware of corporate and organizational policies and also key factors in establishing development cost.
2. Aware of overview of the field of Information Security from a management perspective.
3. Exposed to the spectrum of security activities, methods, methodologies, and procedures.
4. Apply project management principles to an information security program.
5. Select appropriate techniques to tackle and solve problems in the discipline of information security.
6. Understand why security and its management are important for any modern organisation.

UNIT- I

Introduction: corporate Policies, Organization wide(Tier 1) policies, Organization wide policy Document, Legal Requirements, Duty of loyalty, Duty of Care, Other Laws and Regulations, Business Requirements.

Planning and Preparation: Objectives of Policies, Standards And Procedures, Employee Benefits, Preparation Activities, core and Support Teams, Focus Groups, Development Responsibilities.

key factors in Establishing the Development Cost: Research, collect, and organize the information, conduct interviews, write the initial draft and prepare illustrations ,proofread and Edit, choosing the medium, maintenance. Responsibilities, Development Checklist.

UNIT-II

Developing Policies: Why Implement Information Security Policy, Definitions, Policy key Elements, Policy Format

Asset Classification Policy: why classify Information, what is Information Classification, Employee Responsibilities, Record Management policy, Information Classification Methodology, Authorization for Access

Developing Standards: overview, where Do standards Belong, what Does a standard look like, where Do I Get standards.

Developing Procedures: important procedure requirements, key elements in procedure writing, procedure checklist, procedure styles, and procedure development review.

Understanding How to sell policies, Standards and procedures: Effective Communication, keeping management Interested in security, Need for controls.

UNIT-III

Typical Tier 1 policies: Employee Standards of Conduct, Conflict Of interest, Employment Practices.

Records Management: role of retention center, role of records manager, role of management personnel, types of documents maintained in retention center, services, transferring records, record retrieval, and record destruction.

Corporate Communications, Electronic Communications, Internet security, Employee Discipline General Security, Business Continuity Planning, Information Protection, Information Classification.

UNIT-IV

Typical Tier2 Policies: Computer and Network management, Anti-virus policy, personnel security, systems Development and maintenance policy, Application Access Control policy, **Data and software Exchange:** policy, responsibilities, scope, compliance, supporting standards policy, Network Access Control, Network management policy, Information systems operational policy, physical and Environmental security, User Access policy.

UNIT-V

Sample Standards manual: Corporate Information Security policy.

Responsibilities: Manager, Information systems manager/team leader, information and system owner, information and system user, ISM, Information security Administration.

Standards: risk management, personnel security issues, physical and environmental security controls, security management, Information Classification process.

Sample Information security manual: What Are we protecting, User Responsibilities, Access Control policy, penalty for security violation, security Incident Handling Procedures.

Tools of Information security, Information processing, Information Security program Administration.

Text Book:

1. Thomas R. Peltier, "Information security Policies and Procedures A practitioner's Reference", Second Edition.
2. Thomas R Peltier, JustingPeltier, John Blackley, "Information Security. Fundamentals", Auerbacj Publications 2010.

Suggested Reading:

1. Michael E. Whitman and Hebert J Mattord, Principles of Information Security, 4th edition Ed. Cengage Learning 2011
2. Detmar W Straub, Seymor Goodman, Richard L Baskerville, Information Security. Policy proceses and practices PHI 2008

Online Resources:

1. http://www.lse.ac.uk/intranet/LSEServices/IMT/about/policies/home.aspx
2. https://www.crcpress.com/Information-Security-Policies-and-Procedures-A-Practitioners-Reference/Peltier/p/book/9780849319587#googlePreviewContainer
3. https://www.sans.org/security-resources/policies

IT 485

DISTRIBUTED DATABASES
(Elective-IV)

Instruction	4 L periods per week
Duration of End Semester Examination	3 Hours
End Semester Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Prerequisites: Database Systems, Distributed Systems

Course Objectives:

1. To introduce the features of distributed databases and different levels of Distribution transparency.
2. Impart knowledge about the design of distributed database and working of fragment queries
3. To provide understanding about optimization of queries and management of distributed transactions
4. To discuss the basics of distributed concurrency control and reliability
5. To teach about distributed database administration and heterogeneous distributed database systems

Course Outcomes:

After successful completion of the course, students will be able to

1. Explain the features of distributed databases and different levels of distribution transparency.
2. Understand the intricacies of distributed database design.
3. Gain knowledge to handle all types of queries, query optimization techniques.
4. Understand and analyse distributed Concurrency Control.
5. Understand the administration of distribute databases
6. Analyse the working of Heterogeneous distributed databases

UNIT -I

Distributed Databases: An overview: Features of distributed versus centralised databases, why distributed databases?, distributed database management systems. **Principles of Distributed Databases:** Levels of Distribution Transparency: Reference architecture for distributed databases, types of data fragmentation, distribution transparency for read-only applications, distribution transparency for update applications, distributed database access primitives, integrity constraints in distributed databases.

UNIT - II

Distributed Database design: A framework for Distributed Database Design, The design of database fragmentation, the allocation of fragments. **Translation of global queries to fragment queries:** Equivalence transformations for queries, transforming global queries into fragment queries, distributed grouping and aggregate function evaluation, parametric queries.

UNIT - III

Optimization of Access Strategies: A framework for query optimization, join queries, general queries. **The management of distributed transactions:** A framework for transaction management, supporting atomicity of distributed transactions, concurrency control for distributed transactions, architectural aspects of distributed transactions.

UNIT - IV

Concurrency control: Foundations of distributed concurrency control, distributed deadlocks, concurrency control based on timestamps, optimistic methods for distributed concurrency control. **Reliability:** Basic Concepts, Non blocking Commitment protocols, reliability and concurrency control, determining a consistent view of the network, detection and resolution of inconsistency, checkpoints and cold restart

UNIT - V

Distributed Database Administration: Catalog management in distributed databases, Authorization and protection. **Heterogeneous Distributed Database System:** Problems of Heterogeneous Distributed Databases, MULTIBASE, DDTS: A Distributed Testbed System, Heterogeneous SIRIUS-DELTA

Text Books:

1. Stefano Ceri, Giuseppe Pelagaui, "Distributed Databases Principles & Systems", TMH, 1988.
2. M. Tamer Ozsu, Patrick Valduriez, "Principles of Distributed Database Systems", Pearson Education, 3rd Edition, 2011.

Suggested Reading:

1. Chhanda Ray, "Distributed Database Systems", Pearson Education, 2009.
2. Donald K. Burleson, "Managing distributed databases: building bridges between database islands", Wiley, 1994.

Web Resources:

1. http://docs.oracle.com/cd/B10501_01/server.920/a96521/ds_concepts.htm
2. http://www.csee.umbc.edu/portal/help/oracle8/server.815/a67781/c30dstdb.htm
3. http://cadp.inria.fr/

ME 464

Entrepreneurship (Elective – IV)

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

Course 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

Course 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.

ME 472

Intellectual Property Rights (Elective – III)

Instruction	4 Periods per week
Duration of End Semester Examination	3 Hours
End Semester 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: At the end of the course, a student

1. Will 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:

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

IT 901 **PROJECT**

Instruction	6 Periods per week
Duration of End Semester Examination	Viva-voce
End Semester 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.

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

Common norms are established for final documentation of the project report, the students are directed to download from the website regarding the guidelines for preparing the project report and the project report format.

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

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

Break up for 100 Marks in the end examination:

1. Power point presentation 20 Marks
2. Thesis/Report preparation 40 Marks
3. Viva-voce 40 Marks