MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

Sponsored by CMR Educational Society

(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – 'A' Grade - ISO 9001:2015 Certified)

Maisammaguda, Dhulapally (Post Via Hakimpet), Secunderabad – 500100, Telangana State, India.

Contact Number: 040-23792146/64634237, E-Mail ID: mrcet2004@gmail.com, website: www.mrcet.ac.in

MASTER OF TECHNOLOGY
COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE AND SYLLABUS

(Batches admitted from the academic year 2020 - 2021)

Note: The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.

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VISION

❖ To acknowledge quality education and instill high patterns of discipline making and the students technology superior and ethically strong which involves the improvement in the quality of life in human race Mission

MISSION

❖ To achieve and impart holistic technical education using the best infrastructure, outstanding technical and teaching expertise to establish the students into competent and confident engineers.

❖ Evolving the center of excellence through creative and innovative teaching learning practices for promoting academic achievement to produce internationally accepted competitive and world class professionals.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PE01: To provide an environment that gives hands on experience in Modeling, Designing, Implementing, and evaluating various software development concepts, processes and products.

PE02: To afford graduates with both fundamental and advanced knowledge which prepares them to posses integrated and ethical behavior as an individual, team member and a leader to handle diverse career paths.

PE03: To produce high quality graduates to design and implement solutions for rapidly changing computing and information system problems and to encourage lifelong learning to adapt innovation.

PROGRAM OUTCOMES (POs)

PO1: RESEARCH SKILLS
An ability to independently carry out research I investigation and development work to solve practical problems.

PO2: SOFT SKILLS
Ability to write and present a substantial technical report/ document.

PO3: SCHOLAR SHIP OF KNOWLEDGE
Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program at a level higher than the relevant bachelor program.

PO4: PROBLEM SOLVING
Apply the knowledge of engineering principles to develop software systems,

products and processes thus to solve real world multifaceted problems.

POS5: COLLABORATIVE AND MULTIDISCIPLINARY WORK
Posses knowledge and understand group dynamics, collaborate and contribute in the design, development and conducting experiments, procedures and technical skills necessary for multidisciplinary engineering exploration to solve societal problems and environmental contexts for sustainable development."

PO6: ETHICAL PRACTICES AND SOCIAL RESPONSIBILITY
Acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and to be responsible in contributing for the sustainable development of the society.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: DEVELOPMENT AND ASSESSMENTSKILLS:
Ability to Design, Develop and Analyze software development tools, processes and systems using formal methods in applying problem solving skills and be employable in product or service oriented Industry.

PSO2: RESEARCH & DEVELOPMENT& INNOVATION SKILLS:
Ability to take up effectively the challenges in higher Studies, Research & Development, and Entrepreneurship in the modern high speed computing environment.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
M.TECH – COMPUTER SCIENCE AND ENGINEERING
R 20 - COURSE STRUCTURE

I Year I Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R20D5801	Mathematical foundations of Computer Science	3	-	3	30	70
2	R20D5802	Advanced Data Structures	3	-	3	30	70
3	R20D5803 R20D5804 R20D5805	Elective –I 1.Machine Learning 2.Wireless Sensor Networks 3. Software Process and Project Management	3	-	3	30	70
4	R20D5806 R20D5807 R20D5808	Elective –II 1.Data Science 2.Distributed Systems 3.Advanced Wireless and Mobile Networks	3	-	3	30	70
5	R20DHS53	Research Methodology	3	-	3	30	70
6	R20D5881	Advanced Data Structures lab	-	3	2	30	70
7	R20D5882	Machine Learning lab	-	3	2	30	70
8	R20DHS54	Audit Course I - Value Education	2	-	-	50	-
		Total	**17**	**6**	**19**	**260**	**490**

*Audit course: Non-credit course, 50% of scoring is required for the award of the degree

I Year II Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R20D5809	Advance Algorithms	3	-	3	30	70
2	R20D5810	Soft Computing	3	-	3	30	70
3	R20D5811 R20D5812 R20D5813	Elective –III 1. Internet of Things 2.Secure Software Design & Enterprise Computing 3.Computer Vision	3	-	3	30	70
4	R20D5814 R20D5815 R20D5816	Elective –IV 1.Human and Computer Interaction 2. Information Security 3.Digital Forensics	3	-	3	30	70
5	R20D5885	Mini Project	3	-	3	30	70
6	R20D5883	Advance Algorithms lab	-	3	2	30	70
7	R20D5884	Internet of Things Lab	-	3	2	30	70
8	R20DHS55	Audit Course II - English for Research Paper Writing	2	-	-	50	-
		Total	**17**	**6**	**19**	**260**	**490**

*Audit course: Non-credit course, 50% of scoring is required for the award of the degree

II Year I Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/D	C	MAX MARKS	
						INT	EXT
1	R20D5817 R20D5818 R20D5819	**Program Elective 5 – 1.Mobile Applications and Services 2.Compiler for HPC 3.Optimization Techniques**	3	-	3	30	70
2	OE	OE	3	-	3	30	70
3	R20D5886	Dissertation-I /Industrial Project	-	-	8	100	-
		Total	6	-	14	160	140

II Year II Semester

S.NO.	SUBJECT CODE	SUBJECT	L	T/P/ D	C	MAX MARKS	
						INT	EXT
1	R20D5887	Dissertation II	-	-	14	100	200
		Total	-	-	14	100	200

OPEN ELECTIVE	
Subject Code	**Subject Name**
R20DME51	**Non-Conventional Energy Sources**
R20DME52	**Industrial Safety**
R20DME53	**Operations Research**
R20DHS51	**Business Analytics**
R20DCS51	**Scripting Languages**
R20DAE51	**Mathematical Modeling Techniques**
R20DEC51	**Embedded Systems Programming**

M.Tech – I Year – I Sem
(R20D5801)MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Objectives:
1. Introduces the elementary discrete mathematics for computer science and engineering.
2. Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory.
3. permutations and combinations, counting principles; recurrence relations and generating functions.

Outcomes:
1. Ability to understand and construct precise mathematical proofs
2. Ability to use logic and set theory to formulate precise statements
3. Ability to analyze and solve counting problems on finite and discrete structures
4. Ability to describe and manipulate sequences
5. Ability to apply graph theory in solving computing problems

UNIT - I
The Foundations: Logic and Proofs Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT - II
Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations Sets, Functions , Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT - III
Algorithms, Induction and Recursion Algorithms, The Growth of Functions, Complexity of Algorithms. Induction and Recursion Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.

UNIT - IV
Discrete Probability and Advanced Counting Techniques An Introduction to Discrete Probability . Probability Theory, Bayes' Theorem, Expected Value and Variance. 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 - V
Graphs-Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring. **Trees**-Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees.

Textbook:
1. Discrete Mathematics and Its Applications with Combinatorics and Graph Theory- Kenneth H Rosen, 7th Edition, TMH.

References:
1. Discrete Mathematical Structures with Applications to Computer Science- J.P.Tremblay & R.Manohar, TMH,
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott , Abraham Kandel, Teodore P. Baker, 2nd ed. , Pearson Education.
3. Discrete Mathematics- Richard Johnsonbaugh, 7Th Edtn., Pearson Education.
4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter.
5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th edition , Pearson Education,.

M.Tech – I Year – I Sem
(R20D5802) ADVANCED DATA STRUCTURES

Objectives:

1. The fundamental design, analysis, and implementation of basic data structures. Basic concepts in the specification and analysis of programs.
2. Principles for good program design, especially the uses of data abstraction. Significance of algorithms in the computer field
3. Various aspects of algorithm development Qualities of a good solution

Outcomes:

1. Ability to select the data structures that efficiently model the information in a problem
2. Ability to understand how the choice of data structures impact the performance of programs
3. Can Design programs using a variety of data structures, including hash tables, search structures and digital search structures

UNIT I

Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples. Data structures-Linear and non linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation, Vector representation, singly linked lists -insertion, deletion, search operations, doubly linked lists- insertion, deletion operations, circular lists. Representation of single, two dimensional arrays, Sparse matrices and their representation.

UNIT II

Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack, implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap, java.util package-ArrayList, Linked List, Vector classes, Stacks and Queues in java.util, Iterators in java.util.

UNIT III

Searching–Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods- Open Addressing, Chaining, Hashing in java.util-HashMap, HashSet, Hashtable. Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort, comparison of sorting methods.

UNIT IV

Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non recursive traversals, Java code for traversals, Threaded binary trees. Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods- dfs and bfs, Java code for graph traversals, Applications of Graphs-Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for Single Source Shortest Path Problem.

UNIT V

Search trees- Binary search tree-Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees – Definition and examples only, B-Trees-definition, insertion and searching operations, Trees in java.util- TreeSet, Tree Map Classes, Tries(examples only),Comparison of Search trees. Text compression-Huffman coding and decoding, Pattern matching-KMP algorithm.

TEXT BOOKS:
1. Data structures, Algorithms and Applications in Java, S.Sahni, Universities Press.
2. Data structures and Algorithms in Java, Adam Drozdek, 3rd edition, Cengage Learning.
3. Data structures and Algorithm Analysis in Java, M.A.Weiss, 2nd edition,
4. Addison-Wesley (Pearson Education).

REFERENCE BOOKS:
1. Java for Programmers, Deitel and Deitel, Pearson education.
2. Data structures and Algorithms in Java, R.Lafore, Pearson education.
3. Java: The Complete Reference, 8th editon, Herbert Schildt, TMH.
4. Data structures and Algorithms in Java, M.T.Goodrich, R.Tomassia, 3rd edition, Wiley India Edition.
5. Data structures and the Java Collection Frame work,W.J.Collins, Mc Graw Hill.
6. Classic Data structures in Java, T.Budd, Addison-Wesley (Pearson Education).
7. Data structures with Java, Ford and Topp, Pearson Education.
8. Data structures using Java, D.S.Malik and P.S.Nair, Cengage learning.
9. Data structures with Java, J.R.Hubbard and A.Huray, PHI Pvt. Ltd.
10. Data structures and Software Development in an Object-Oriented Domain, J.P.Tremblay and G.A.Cheston, Java edition, Pearson Education.

M.Tech – I Year – I Sem
(R20D5803) Machine Learning
(Elective -I)

Objectives:
1. This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
2. To understand computational learning theory.
3. To study the pattern comparison techniques.

Outcomes
1. Understand the concepts of computational intelligence like machine learning
2. Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
3. Understand the Neural Networks and its usage in machine learning application.

UNIT - I

Introduction Well-posed learning problems, designing a learning system Perspectives and issues in machine learning Concept learning and the general to specific ordering Introduction, A concept learning task, concept learning as search, Find-S: Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate Elimination algorithm, Remarks on Version Spaces and Candidate Elimination, Inductive Bias. Decision Tree Learning-Introduction, Decision Tree Representation, Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Learning Algorithm Hypothesis Space Search in Decision Tree Learning, Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

UNIT - II

Artificial Neural Networks -Introduction, Neural Network Representation, Appropriate Problems for Neural Network Learning, Perceptions, Multilayer Networks and the Back propagation Algorithm. Discussion on the Back Propagation Algorithm, An illustrative Example: Face Recognition

UNIT - III

Bayesian learning-Introduction, Byes Theorem, Bayes Theorem and Concept Learning Maximum Likelihood and Least Squared Error Hypotheses, Maximum Likelihood Hypotheses for Predicting Probabilities, Minimum Description Length Principle , Bayes Optimal Classifier, Gibs Algorithm, Naïve Bayes Classifier, An Example: Learning to Classify Text, Bayesian Belief Networks, EMAlgorithm.
Instance-Based Learning-Introduction, k-Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.

UNIT -IV

Pattern Comparison Techniques-Temporal patterns, Dynamic Time Warping Methods, Clustering,Introduction to clustering,K-means clustering, K-ModeClustering. Codebook Generation, Vector Quantization.

UNIT - V

Genetic Algorithms: Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity. Dimensionality reduction: feature selection, principal component analysis, linear discriminate analysis, factor analysis, independent component analysis, multidimensional scaling, and manifold learning.

Textbooks:

1. Machine Learning – Tom M.Mitchell,-MGH
2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang Juang.
   Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Prentice Hall of
   India,   3rd Edition2014.
3. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar " Foundations of Machine Learning",
   MIT Press,2012

References:

1. Machine Learning : An Algorithmic Perspective, Stephen Marsland, Taylor & Francis .

M.Tech – I Year – I Sem
(R20D5804)Wireless Sensor Networks
(Elective -I)

COURSE OBJECTIVE
- Architect sensor networks for various application setups.
- Devise appropriate data dissemination protocols and model links cost.
- Understanding of the fundamental concepts of wireless sensor networks and have a basic
- knowledge of the various protocols at various layers.
- Evaluate the performance of sensor networks and identify bottlenecks.

UNIT I
FUNDAMENTALS OF SENSOR NETWORKS Introduction and Overview - Overview of sensor network protocols, architecture, and applications, Challenges, Main features of WSNs; Research issues and trends, Platforms-Standards and specifications-IEEE802.15.4/Zigbee, Hardware: Telosb, Micaz motes ,Software: Overview of Embedded operating systems-Tiny OS, Introduction to Simulation tools-TOSSIM, OPNET, Ns-2.

UNIT II
COMMUNICATION CHARACTERISTICS AND DEPLOYMENT MECHANISMS   Wireless Communication characteristics - Link quality, fading effects, Shadowing, Localization, Connectivity and Topology - Sensor deployment mechanisms, Coverage issues, Node discovery protocols.

UNIT III
MAC LAYER Fundamentals of Medium access protocol- Medium access layer protocols - Energy efficiency, Power allocation and Medium access control issues.

UNIT IV NETWORK LAYER AND TRANSPORT LAYER Network layer protocols-Data dissemination and processing, multichip and cluster based routing protocols- Energy efficient routing- Geographic routing, Transport layer- Transport protocol Design issues- Performance of Transport Control Protocols.

UNIT V
MIDDLEWARE AND SECURITY ISSUES Middleware and Application layer -Data dissemination, Data storage, Query processing, Security -Privacy issues, Attacks and Countermeasures

TEXT BOOKS:
 1. W. Dargie and C. Poellabauer, "Fundamentals of Wireless Sensor Networks –Theory and Practice", Wiley 2010
 2. Kazem Sohraby, Daniel manoli , "Wireless Sensor networks- Technology, Protocols and Applications", Wiley InterScience Publications 2010.
 REFERENCE BOOKS:

 1. Bhaskar Krishnamachari , " Networking Wireless Sensors", Cambridge University Press, 2005. 4. C.S Raghavendra, Krishna M.Sivalingam, Taieb znati , "Wireless Sensor Networks", Springer Science 2004.,
2. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, "Wireless Sensor Network
        Technologies for the Information Explosion Era", springer 2010

M.Tech – I Year – I Sem
(R18D5805) SOFTWARE PROCESS AND PROJECT MANAGEMENT
(Elective -I)

Objectives:
1. Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. Compare and differentiate organization structures and project structures.
3. Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

UNIT I
Software Process Maturity
Software maturity Framework**,** Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.
Process Reference Models
Capability Maturity Model (CMM)**,** CMMI, PCMM, PSP, TSP.

UNIT II
Software Project Management Renaissance
Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.
Life-Cycle Phases and Process artifacts
Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.

UNIT III
Workflows and Checkpoints of process
Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments.
Process Planning
Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT IV
Project Organizations
Line-of- business organizations, project organizations, evolution of organizations, process automation.
Project Control and process instrumentation
The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, and metrics automation.

UNIT V
CCPDS-R Case Study and Future Software Project Management Practices
Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

TEXT BOOKS:
1. Managing the Software Process, *Watts S. Humphrey*, Pearson Education.
2. Software Project Management, *Walker Royce,* Pearson Education.

REFERENCE BOOKS:
1. Effective Project Management: Traditional, Agile, Extreme, Robert Wysocki, Sixth edition, Wiley India, rp2011.
2. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
3. Process Improvement essentials, James R. Persse, O'Reilly, 2006
4. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
5. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
6. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
7. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
8. The Art of Project Management, Scott Berkun, SPD, O'Reilly, 2011.
9. Applied Software Project Management, Andrew Stellman & Jennifer Greene, SPD, O'Reilly, rp2011.
10. Agile Project Management, Jim Highsmith, Pearson education, 2004.

M.Tech – I Year – I Sem
(R20D5806) Data Science
(Elective -II)

COURSE OBJECTIVE:
Provide you with the knowledge and expertise to become a proficient data scientist.
  ➢ Demonstrate an understanding of statistics and machine learning concepts that are vital for data science;
  ➢ Produce Python code to statistically analyze a dataset;
  ➢ Critically evaluate data visualizations based on their design and use for communicating stories from data;

UNIT 1:
Introduction to core concepts and technologies: Introduction, Terminology, data
science process, data science toolkit, Types of data, Example applications.

UNIT 2:
Data collection and management: Introduction, Sources of data, Data collection
and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources

UNIT 3:
Data analysis: Introduction, Terminology and concepts, Introduction to statistics,
Central tendencies and distributions, Variance,Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression,SVM, Naive Bayes.

UNIT 4:
Data visualisation:Introduction, Types of data visualisation,Data for visualisation:Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.

UNIT 5:
Applications of Data Science,Technologies for visualisation, Bokeh (Python) Recent trends in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science.

TEXT BOOKS:
   1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly.
REFERENCE BOOKS:
   1. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge
      University Press.

M.Tech – I Year – I Sem
(R20D5807)Distributed Systems
(Elective -II)

COURSE OBJECTIVE:
To introduce the fundamental concepts and issues of managing large volume of shared data in a parallel and distributed environment, and to provide insight into related research problems.

UNIT 1:
INTRODUCTION
Data Fragmentation; Replication; and allocation techniques for DDBMS; Methods for designing and implementing DDBMS, designing a distributed relational database; Architectures for DDBMS: cluster federated, parallel databases and client server architecture.

UNIT 2:
DISTRIBUTED DATABASE DESIGN-Alternative design strategies; Distributed design issues; Fragmentation; Data allocation
SEMANTICS DATA CONTROL-View management; Data security; Semantic Integrity Control QUERY PROCESSING ISSUES Objectives of query processing; Characterization of query processors; Layers of query processing; Query decomposition; Localization of distributed data

UNIT 3:
DISTRIBUTED QUERY OPTIMIZATION-Factors governing query optimization; Centralized query optimization; Ordering of fragment queries; Distributed query optimization algorithms
TRANSACTION MANAGEMENT-The transaction concept; Goals of transaction management; Characteristics of transactions; Taxonomy of transaction models, **CONCURRENCY CONTROL -** Concurrency control in centralized database systems; Concurrency control in DDBSs; Distributed concurrency control algorithms; Deadlock management

UNIT 4:
RELIABILITY-Reliability issues in DDBSs; Types of failures; Reliability techniques; Commit protocols; Recovery protocols

UNIT 5:
PARALLEL DATABASE SYSTEMS -Parallel architectures; parallel query processing and optimization; load balancing, Mobile Databases, Distributed Object Management, Multi-databases,Spatial Database and Web Databases.

TEXT BOOKS:
1.Distributed Databases - Principles and Systems; Stefano Ceri; Guiseppe Pelagatti;TMH
2.Fundamental of Database Systems; Elmasri & Navathe; Pearson Education,Asia
3.Database System Concepts; Korth & Sudarshan; TMH
REFERENCE BOOKS:

1.Principles of Distributed Database Systems; M. Tamer Özsu; and Patrick Valduriez Prentice Hall
2.Data Base Management System; Leon & Leon; Vikas Publications
3.Introduction to Database Systems; Bipin C Desai; Galgotia
4. Distributed Database Systems, D. Bell and J. Grimson, Addison-Wesley, 1992.

M.Tech – I Year – I Sem
(R20D5808)Advanced Wireless and Mobile Networks
(Elective -II)

COURSE OBJECTIVE
1. The students should get familiar with the wireless/mobile market and the future needs and challenges.
2. To get familiar with key concepts of wireless networks, standards, technologies and their basic operations
3. To learn how to design and analyse various medium access
4. To learn how to evaluate MAC and network protocols using network simulation software tools.
5. The students should get familiar with the wireless/mobile market and the future needs and challenges.

COURSE OUTCOMES
After completion of course, students would be:
1. Demonstrate advanced knowledge of networking and wireless networking and understand various types of wireless networks, standards, operations and use cases.
2. Be able to design WLAN, WPAN, WWAN, Cellular based upon underlying propagation and performance analysis.
3. Demonstrate knowledge of protocols used in wireless networks and learn simulating wireless networks.
4. Design wireless networks exploring trade-offs between wire line and wireless links.
5. Develop mobile applications to solve some of the real world problems.

UNIT 1:
INTRODUCTION: Wireless Networking Trends, Key Wireless Physical Layer Concepts, Multiple Access Technologies -CDMA, FDMA, TDMA, Spread Spectrum technologies, Frequency reuse, Radio Propagation and Modelling, Challenges in Mobile Computing: Resource poorness, Bandwidth, energy etc.
WIRELESS LOCAL AREA NETWORKS:
IEEE 802.11 Wireless LANs Physical & MAC layer, 802.11 MAC Modes (DCF & PCF) IEEE 802.11 standards, Architecture & protocols, Infrastructure vs.Adhoc Modes, Hidden Node & Exposed Terminal Problem, Problems, Fading Effects in Indoor and outdoor WLANs, WLAN Deployment issues

UNIT 2:
WIRELESS CELLULAR NETWORKS:1G and 2G, 2.5G, 3G, and 4G, Mobile IPv4, Mobile IPv6, TCP over Wireless Networks, Cellular architecture, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Improving coverage and capacity in cellular systems, Spread spectrum Technologies.

UNIT 3:
WiMAX (Physical layer, Media access control, Mobility and Networking), IEEE 802.22 Wireless Regional Area Networks, IEEE 802.21 Media Independent Handover Overview . **WIRELESS SENSOR NETWORKS:**Introduction, Application, Physical, MAC layer and Network Layer, Power Management, Tiny OS Overview.

UNIT 4:
WIRELESS PANs: Bluetooth AND Zigbee, Introduction to Wireless Sensors,.
 SECURITY:Security in wireless Networks Vulnerabilities, Security techniques, Wi-Fi
Security, DoS in wireless communication.

UNIT 5:
ADVANCED TOPICS
IEEE 802.11x and IEEE 802.11i standards, Introduction to Vehicular Adhoc Networks

Text Books:
    1. Schiller J., Mobile Communications, Addison Wesley 2000
    2. Stallings W., Wireless Communications and Networks, Pearson Education 2005
References:
    1.Stojmenic Ivan, Handbook of Wireless Networks and Mobile Computing, John Wiley and
Sons Inc 2002
    2.Yi Bing Lin and Imrich Chlamtac, Wireless and Mobile Network Architectures, John Wiley
      and Sons Inc 2000
    3. Pandya Raj, Mobile and Personal Communications Systems and Services, PHI 200.

M.Tech – I Year – I Sem
(R20DHS53) Research Methodology

Objectives:

1. Introduce research paper writing and induce paper publication skills.
2. Give the introduction to Intellectual Property Rights

Outcomes:

1. Ability to distinguish research methods
2. Ability to write and publish a technical research paper
3. Ability to review papers effectively
4. IPR and Patent filing
5. Ability to write a report.

UNIT - I

Introduction-Objective of Research; Definition and Motivation; Types of Research; Research Approaches, Steps in Research Process; Criteria of Good Research; Ethics in Research. Research Formulation and Literature Review: Problem Definition and Formulation; Literature Review; Characteristics of Good Research Question; Literature Review Process.

UNIT - II

Data Collection-Primary and Secondary Data; Primary and Secondary Data Sources; Data Collection Methods; Data Processing; Classification of Data. Data Analysis-Statistical Analysis; Multivariate Analysis; Correlation Analysis; Principle Component Analysis; Samplings.

UNIT - III

Research Design-Need for Research Design; Features of a Good Design; Types of Research Designs; Induction and Deduction. Hypothesis Formulation -Hypothesis; Important Terms; Types of Research Hypothesis; Making a Decision; Types of Errors; ROC Graphics.

UNIT - IV

Hypothesis Test Procedures-Parametric and Non Parametric Tests; ANOVA ; Z-Test; t-Test; f-Test; Mann-Whitney Test; Kruskal- Wallis Test; Chi-Square Test; Multi-Variate Analysis Regression Analysis.

UNIT – V

Presentation of the Research Work- Business Report; Technical Report; Research Report; General Tips for Writing .   Report Presentation of Data; Oral Presentation; Bibliography and References; Intellectual Property Rights; Open-Access Initiatives; Plagiarism.

Textbooks:

1. Research Methodology. Methods & Technique : Kothari. C.R.
2. Research Methodology, S.S Vinod Chandra, S Anand Hareendran, Pearson
3. Intellectual Property – Copyrights, Trademarks, and Patents by Richard Stim, Cengage Learning

References:

1. Practical Research : planning and Design(8th Edition) – Paul D. Leedy and Jeanne E. Ormrod.
2. A Hand Book of Education Research – NCTE

3. Methodology of Education Research – K.S. Sidhu.
4. Tests, Measurements and Research methods in Behavioural Sciences- A.K. Singh.
5. Statistical Methods- Y.P. Agarwal.
6. Methods of Statistical Ananlysis- P.S Grewal.
7. Fundamentals of Statistics – S.C. Gupta, V.K. Kapoor.
8. Intellectual Property Rights by Deborah E. Bouchoux, Cengage Learning.
9. Managing Intellectual Property – The Strategic Imperative, Vinod V.Sople, 2nd Edition, PHI Learning Private Limited.
10. Research methodology – S.S. Vinod Chandra, S. Anand Hareendran

M.Tech – I Year – I Sem
(R20D5881)Advanced Data Structures lab

Objectives:

- The fundamental design, analysis, and implementation of basic data structures.
- Basic concepts in the specification and analysis of programs.
- Principles for good program design, especially the uses of data abstraction.
- To make the students to write programs for various real time application of Stack and Queue.
- To make the students to write programs for implementing tree's.

1) Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:
   a) Linear search b) Binary search

2) Write Java programs to implement the following using arrays and linked lists
   a) List ADT

3) Write Java programs to implement the following using an array.
   a) Stack ADT b) Queue ADT

4) Write a Java program that reads an infix expression and converts the expression to postfix form. (Use stack ADT).

5) Write a Java program that uses both a stack and a queue to test whether the given string is a palindrome or not.

6) Write Java programs to implement the following using a singly linked list.
   a) Stack ADT b) Queue ADT

7) Write a Java program to perform the following operations:
   a) Construct a binary search tree of elements.
   b) Search for a key element in the above binary search tree.
   c) Delete an element from the above binary search tree.

8) Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.

9) Write Java programs that use recursive and non-recursive functions to traverse the given binary tree in Preorder   b) Inorder   c) Postorder.

10) Write Java programs for the implementation of bfs and dfs for a given graph.

11) Write Java programs for implementing the following sorting methods:
    a) Bubble sort   d) Merge sort   g) Binary tree sort
    b) Insertion sort   e) Heap sort
    c) Quick sort   f) Radix sort

12) Write a Java program to perform the following operations:
    a) Insertion into a B-tree   b) Searching in a B-tree

REFERENCE BOOKS:

1. Data Structures and Algorithms in java, 3rd edition, A.Drozdek, Cengage Learning.
2. Data Structures with Java, J.R.Hubbard, 2nd edition, Schaum's Outlines, TMH.
3. Data Structures and algorithms in Java, 2nd Edition, R.Lafore, Pearson Education.
4. Data Structures using Java, D.S.Malik and P.S. Nair, Cengage Learning.
5. Data structures, Algorithms and Applications in java, 2nd Edition, S.Sahani, Universities

Press.
6. Design and Analysis of Algorithms, P.H.Dave and H.B.Dave, Pearson education.
7. Data Structures and java collections frame work, W.J.Collins, Mc Graw Hill.
8. Java: the complete reference, 7th editon, Herbert Schildt, TMH.
9. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education / Java: How to Program P.J.Deitel and H.M.Deitel , 8th edition, PHI.
10. Java Programming, D.S.Malik,Cengage Learning.
    A Practical Guide to Data Structures and Algorithms using Java, S.Goldman & K.Goldman, Chapman & Hall/CRC, Taylor & Francis Group.
    (Note: Use packages like java.io, java.util, etc)

OUTCOMES:
At the end of the course the students are able to:
➢ Implement and analyze the difference between binary and linear search
➢ implement Various Types of linked list and can analyze the time complexity
➢ Implement Stacks, Queues and linked list and analyze the same to determine the time and computation complexity.
➢ Implement various applications of Stack and Queue.
➢ write program for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
➢ Implement and analyze implementing of various tree data Structure..

M.Tech – I Year – I Sem
(R20D5882) Machine Learning lab

Objectives

1. To get an overview of the various machine learning techniques .
2. Understand complexity of Machine Learning algorithms and their limitations;

Course outcomes: The students should be able to:

1. Understand the implementation procedures for the machine learning algorithms.
2. Design Java/Python programs for various Learning algorithms.
3. Apply appropriate data sets to the Machine Learning algorithms.
4. Identify and apply Machine Learning algorithms to solve real world problems.

Programs:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

4. Implement k-nearest neighbours classification and linear regression.

5. Implement an algorithm to demonstrate the significance of genetic algorithm

6. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

7. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

8. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

9. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

10. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

11. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

12. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Textbooks:

1. Machine Learning – Tom M.Mitchell,-MGH
2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang Juang.
Reference:
1. Machine Learning : An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

M.Tech – I Year – I Sem
(R20DHS01)Audit Course I - Value Education

UNIT I:

Values and self-development

Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non- moral valuation. Standards and principles, Value judgments

UNIT II:

Importance of cultivation of values

Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity. Power of faith, National Unity, Patriotism, Love for nature, Discipline

UNIT III:

Personality and Behavior Development

Soul and Scientific attitude, Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness ,Avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship, Happiness Vs suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature

UNIT IV:

Character and Competence

Holy books vs Blind faith, Self-management and Good health, Science of reincarnation, Equality, Nonviolence ,Humility, Role of Women, All religions and same message, Mind your Mind, Self-control, Honesty, Studying effectively

TEXT BOOKS:

1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

M.Tech – I Year – II Sem
(R20D5809) Advance Algorithms

Objectives

1. Introduces the recurrence relations for analyzing the algorithms
2. Introduces the graphs and their traversals.
3. Describes major algorithmic techniques (divide-and-conquer, greedy, dynamic programming , Brute Force , Transform and Conquer approaches) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-case, average   case and best-case analysis.
5. Introduces string matching algorithms
6. Introduces linear programming.

Outcomes

1. Ability to analyze the performance of algorithms
2. Ability to choose appropriate data structures and algorithm design methods for a specified application
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT - I

Classification of algorithms, Algorithm Specifications, Mathematical analysis of Recursive Algorithms ,Introduction to recurrence equations, formulation of recurrence equations, Techniques for solving recurrence equations, Solving recurrence equations, Solving Recurrence Equations using polynomial reduction, Divide and conquer recurrences

UNIT - II

Graphs: Graph representations, Graph traversals Brute Force Approaches, Computational Geometry Problems-Closest pair problem, Convex Hull Problem, Exhaustive Searching- Magic Squares problem, Container Loading problem, Knapsack Problem, Assignment Problem

UNIT - III

Divide and Conquer approach   Multiplication of long integers, Strassen's matrix multiplication, Fourier Transform Greedy algorithms:- Coin change problem, Scheduling problems, knapsack problem, optimal storage on tapes, optimal tree problems, optimal graph problems

UNIT - IV

Transform and Conquer approach Matrix operations- Gaussian Elimination method, LU decomposition, Crout's method of decomposition, Dynamic Programming Computing binomial coefficients, Multistage graph problem, Transitive Closure and Warshall algorithm, Floyd warshall all pairs shortest path problem, TSP, Flow shop scheduling algorithm

UNIT - V

String algorithms Basic string algorithms, Longest Common Subsequences.
Linear Programming, Graphical method for solving LPP, Simplex method, Minimization problems, Principle of Duality, Max Flow problem

Textbook:

1. Design and Analysis of Algorithms, S.Sridhar, OXFORD University Press

References:

1. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein,PHI Pvt. Ltd./ Pearson Education.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
3. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education

M.Tech – I Year – II Sem
(R20D5810)   Soft Computing

Objectives

1. Familiarize with soft computing concepts
2. Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
3. Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
4. Learn the concepts of Genetic algorithm and its applications
5. Acquire the knowledge of Rough Sets.

Outcomes

1. Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
2. Understand fuzzy logic and reasoning to handle and solve engineering problems
3. Apply the Classification and clustering techniques on various applications.
4. Understand the advanced neural networks and its applications
5. Perform various operations of genetic algorithms, Rough Sets.
6. Comprehend various techniques to build model for various applications

UNIT-I

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT-II

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT-III

Fuzzy Decision Making, Particle Swarm Optimization,

UNIT-IV

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT-V

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

Text Books

1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

References:

1. S. N. Sivanandam & S.N.Deepa, "Principles of Soft Computing", 2nd edition, Wiley India, 2008.
2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning", Pearson Education.
3. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education 2004.
4. G.J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.

5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill
International Editions, 1995

M.Tech – I Year – II Sem
(**R20D5811**)**Internet of Things**
(Elective-III)

Objectives
1. To introduce the terminology, technology and its applications
2. To introduce the raspberry PI platform, that is widely used in IoT applications
3. To introduce the implementation of web based services on IoT devices

Outcomes
1. Understand the new computing technologies
2. Able to apply the latest computing technologies like cloud computing technology and Big Data
3. Ability to introduce the concept of M2M (machine to machine) with necessary protocols
4. Get the skill to program using python scripting language which is used in many IoT devices

UNIT - I
Introduction to Internet of Things Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.

UNIT - II
IoT and M2M Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

UNIT - III
Introduction to Python Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib.

UNIT - IV
IoT Physical Devices and Endpoints Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT - V
IoT Physical Servers and Cloud Offerings Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

Textbooks:
1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

M.Tech – I Year – II Sem
(R20D5812)Secure Software Design & Enterprise Computing
(Elective-III)

COURSE OBJECTIVE:
1. To fix software flaws and bugs in various software.
2. To make students aware of various issues like weak random number generation,
3. information leakage, poor usability, and weak or no encryption on data traffic
4. Techniques for successfully implementing and supporting network services on an
5. enterprise scale and heterogeneous systems environment.
6. Methodologies and tools to design and develop secure software containing minimum vulnerabilities and flaws.

UNIT 1:

Secure Software Design

Identify software vulnerabilities and perform software security analysis, Master security programming practices, Master fundamental software security design concepts, Perform security testing and quality assurance.

UNIT 2:

Enterprise Application Development Describe the nature and scope of enterprise software applications, Design distributed N-tier software application, Research technologies available for the presentation, business and data tiers of an enterprise software application, Design and build a database using an enterprise database system, Develop components at the different tiers in an enterprise system, Design and develop a multi-tier solution to a problem using technologies used in enterprise system, Present software solution.

UNIT 3:

Enterprise Systems Administration Design, implement and maintain a directory-based server infrastructure in a heterogeneous systems environment, Monitor server resource utilization for system reliability and availability, Install and administer network services (DNS/DHCP/Terminal Services/Clustering/Web/Email).

UNIT 4:

Obtain the ability to manage and troubleshoot a network running multiple services, Understand the requirements of an enterprise network and how to go about managing them.

UNIT 5:

Handle insecure exceptions and command/SQL injection, Defend web and mobile applications against attackers, software containing minimum vulnerabilities and flaws.
Case study of DNS server, DHCP configuration and SQL injection attack.

Text Books:
1. Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett
2. Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters, Diana L. Burley, Enterprise Software Security, Addison Wesley.

M.Tech – I Year – II Sem
(R20D5813) Computer Vision
(Elective-III)

Objectives
1. To review image processing techniques for computer vision
2. To understand shape and region analysis
3. To understand Hough Transform and its applications to detect lines, circles, ellipses
4. To understand three-dimensional image analysis techniques
5. To understand motion analysis
6. To study some applications of computer vision algorithms

Outcomes
1. Identify basic concepts, terminology, theories, models and methods in the field of computer vision.
2. Describe known principles of human visual system.
3. Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition,
4. Suggest a design of a computer vision system for a specific problem

UNIT - I
Image Processing Foundations Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture

UNIT - II
Shapes and regions Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures –active contours – shape models and shape recognition – centroidal profiles – handling occlusion –boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments

UNIT - III
Hough Transform Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform – spatial matched filtering – GHT for ellipse detection – object location– GHT for feature collation

UNIT - IV
3D Vision And Motion Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline based motion – optical flow – layered motion.

UNIT - V
Applications Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians

Textbook:
1. E. R. Davies, "Computer & Machine Vision", Fourth Edition, Academic Press, 2012.

References:
1. R. Szeliski, "Computer Vision: Algorithms and Applications", Springer 2011.
2. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 2012.
3. Mark Nixon and Alberto S. Aquado, "Feature Extraction & Image Processing for Computer Vision", Third Edition, Academic Press, 2012.
4. D. L. Baggio et al., "Mastering OpenCV with Practical Computer Vision Projects", Packt Publishing, 2012.
5. Jan Erik Solem, "Programming Computer Vision with Python: Tools and algorithms for analyzing images", O'Reilly Media, 2012.

M.Tech – I Year – II Sem
(R20D5814) Human and Computer Interaction
(Elective-IV)

Objectives
1. To understand the design principles of developing a Human Computer Interface (HCI).
2. To learn tools and devices required for designing a good interface

Outcomes
1. Acquire knowledge on principles and components of HCI.
2. Analyze product usability evaluations and testing methods
3. Design an effective user interface for software application using the building tools and techniques

UNIT - I
Introduction Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design The graphical user interface Popularity of graphics, direct manipulation, graphical system, Characteristics, Web user – interface popularity, characteristics- Principles of user interface.

UNIT - II
Design process Human interaction with computers, important of human characteristics in design, human considerations in design, Human interaction speeds, understanding business junctions.

UNIT - III
Screen Designing Interface design goals, Screen meaning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presenting information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT - IV
Windows - Window characteristics, components of a window, presentation styles, types, management, organizing window functions, operations Selection of device based and screen based controls.

UNIT - V
Write clear text and messages - Create meaningful Graphics, Icons, Images, Choose proper colors Interaction Devices - Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

Text Books
1. Wilbent. O. Galitz ,"The Essential Guide To User Interface Design", Second Edition, Wiley India Edition
2. Ben Sheiderman, "Designing The User Interface", Third Edition, Addison-Wesley
Reference
1. Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd.,
2002.

M.Tech – I Year – II Sem
(R20D5815)   Information Security
(Elective-IV)

Objective:
To introduce the fundamental concepts and techniques in computer and network security, giving students an overview of information security and auditing, and to expose students to the latest trend of computer attack and defense. Other advanced topics on information security such as mobile computing security, security and privacy of cloud computing, as well as secure information system development will also be discussed.

UNIT I
A model for Internetwork security, Conventional Encryption Principles & Algorithms (DES, AES, RC4, Blowfish), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution.
Public key cryptography principles, public key cryptography algorithms (RSA, Diffie-Hellman, ECC), public Key Distribution.

UNIT II
Approaches of Message Authentication, Secure Hash Functions (SHA-512, MD5) and HMAC, Digital Signatures, Kerberos, X.509 Directory Authentication Service, Email Security: Pretty Good Privacy (PGP) IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT III
Web Security: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Firewalls: Firewall Design principles, Trusted Systems, Intrusion Detection Systems

UNIT IV
Auditing For Security: Introduction, Basic Terms Related to Audits, Security audits, The Need for Security Audits in Organization, Organizational Roles and Responsibilities for Security Audit, Auditors Responsibility In Security Audits, Types Of Security Audits.

UNIT V
Auditing For Security: Approaches to Audits, Technology Based Audits Vulnerability Scanning And Penetration Testing, Resistance to Security Audits, Phase in security audit, Security audit Engagement Costs and other aspects, Budgeting for security audits, Selecting external Security Consultants, Key Success factors for security audits.

TEXT BOOKS:
1. Cryptography and Network Security by William Stallings, Fourth Edition, Pearson Education 2007.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education, 2008.
3. Cryptography & Network Security by Behrouz A. Forouzan, TMH 2007.
4. Information Systems Security by Nina Godbole, WILEY 2008.

REFERENCE BOOKS:
1. Information Security by Mark Stamp, Wiley – INDIA, 2006.
2. Fundamentals of Computer Security, Springer.

3. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
4. Computer Security Basics by Rick Lehtinen, Deborah Russell & G.T.Gangemi Sr., SPD O'REILLY 2006.
5. Modern Cryptography by Wenbo Mao, Pearson Education 2007.
6. Principles of Information Security, Whitman, Thomson.

M.Tech – I Year – II Sem
(R20D5816) Digital Forensics
(Elective-IV)

COURSE OBJECTIVE:
1. Provides an in-depth study of the rapidly changing and fascinating field of computer forensics.
2. Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes.
3. Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools.
4. E-evidence collection and preservation, investigating operating systems and file systems,network forensics, art of steganography and mobile device forensics

UNIT 1:
Digital Forensics Science: Forensics science, computer forensics, and digital forensics.Computer Crime: Criminalistics as it relates to the investigative process, analysis of cyber-criminalistics area, holistic approach to cyber-forensics

UNIT 2:
Cyber Crime Scene Analysis: Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.

UNIT 3:
Evidence Management & Presentation: Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, Explain what the normal case would look like, Define who should be notified of a crime, parts of gathering evidence, Define and apply probable cause.

UNIT 4:
Computer Forensics: Prepare a case, Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation, Complete a case, Critique a case, Network Forensics: open-source security tools for network forensic analysis, requirements for preservation of network data.

UNIT 5:
Mobile Forensics: mobile forensics techniques, mobile forensics tools. Legal Aspects of Digital Forensics: IT Act 2000, amendment of IT Act 2008. Recent trends in mobile forensic technique and methods to search and seizure electronic evidence

Text Books:
1. John Sammons, The Basics of Digital Forensics, Elsevier
2. John Vacca, Computer Forensics: Computer Crime Scene Investigation, Laxmi Publications.

M.Tech – I Year – II Sem
(R20D5883)   Advance Algorithms lab

Objective

➢ The student can able to attain knowledge in advance algorithms.

Outcome

➢ The student can able to analyze the performance of algorithms

List of Experiments

1. Implement assignment problem using Brute Force method
2. Perform multiplication of long integers using divide and conquer method.
3. Implement solution for knapsack problem using Greedy method.
4. Implement Gaussian elimination method.
5. Implement LU decomposition
6. Implement Warshall algorithm
7. Implement Rabin Karp algorithm.
8. Implement KMP algorithm.
9. Implement Harspool algorithm
10. Implement max-flow problem.

Textbook:

➢ Design and Analysis of Algorithms, S.Sridhar, OXFORD University Press

References:

1. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein,PHI Pvt. Ltd./ Pearson Education.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
3. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education

M.Tech – I Year – II Sem
(R20D5884)   Internet of Things Lab

Python Basic exercises

1. Write a Python program that reads 10 integers from keyboard and prints the average of even numbers and odd numbers separately
 2. Write a Python program that prints the grade of a student when internal and external marks are given. A candidate is declared Failed (Grade = F), if Total marks < 50 or External marks < 25.
If a candidate is passed, then Grade is given as follows:
3. Create a table in MySQL that stores the status of devices in a house with the following data (Device ID, Device Name and Device State, last altered date and time). Now write a Python program that reads and alters the state of a given device. The date format is "YYYY-MM-DD:HH-mm-ss" where mm is minutes and ss is seconds.
 4. Write a Python program that loads all the states of the devices into a dictionary from the table mentioned above.
5. Write a Python program that reads a page from internet and prints it on the screen.
6. Write a Python program that reads and modifies an XML file
 7. Write a Python program that reads and alters JSON data from a database table
8. Write a client-server Python program that uses socket connection to implement a time server. The client will connect to the server and the server sends the current time as "YYYY-MM-DD:HH-mm-ss" format. This value should be printed on the client side.
9. Write a Python program that generates 10 random numbers and stores them in a text file one per line. Now write another Python program that reads this data into a list and shows them
10. Write a program that reads key-value pair data from a file and stores them in a database table
11. Write a Python program that reads a time string in the format of "YYYY-MM-DD:HH-mm-ss" and prints its components separately.
12. Write a Python program that reads data from a table and writes it to a text file using tab as field separator and new line as record separator and vice versa.

Raspberry Pi Experiments:

 Use Raspberry Pi for all the experiments
 1. Connect an LED to GPIO pin 25 and control it through command line
2. Connect an LED to GPIO pin 24 and a Switch to GPIO 25 and control the LED with the switch. The state of LED should toggle with every press of the switch
3. Use DHT11 temperature sensor and print the temperature and humidity of the room with an interval of 15 seconds
4. Use joystick and display the direction on the screen
5. Use Light Dependent Resistor (LDR) and control an LED that should switch-on/off depending on the light.
 6. Create a traffic light signal with three colored lights (Red, Orange and Green) with a duty cycle of 5-2-10 seconds.
7. User rotary encoder and print the position of the shaft on the console
8. Control a servo motor angle that is taken from the keyboard
9. Switch on and switch of a DC motor based on the position of a switch
10. Convert an analog voltage to digital value and show it on the screen.

11. Create a door lock application using a reed switch and magnet and give a beep when the door is opened.

12. Simulate an earthquake alarm using vibration sensor and give an alarm when vibration is detected.

13. Create an application that has three LEDs (Red, Green and white). The LEDs should follow the cycle (All Off, Red On, Green On, White On) for each clap (use sound sensor).

14. Create a web application for the above applications wherever possible with suitable modifications to get input and to send output.

M.Tech – I Year – II Sem
(R18DHS55)English For Research Paper Writing
(AUDIT COURSE II)

UNIT I:
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and vagueness

UNIT II:
Clarifying Who Did What, Highlighting Your Findings, Hedging, and Critics in paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT III:
 Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT IV:
Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature

UNIT V:
Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions: useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

TEXT BOOKS:
1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book .
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

OUTCOMES:

Students will be able to:

1) Write in a clear, coherent, and direct style appropriate for academic research
2) Draft coherent and unified paragraphs with adequate supporting details.
3) Develop the strategy to use lexical terms effectively.
4) Adopt appropriate syntactic and semantic techniques
5) Demonstrate analytical and inferencing skills.
6) Comprehend and employ the various forms of scholarly composition.

II Year I Semester
(R20DME51)   Non-Conventional Energy Sources
(OPEN ELECTIVE I)

UNIT-I
Introduction: Energy Scenario, Survey of energy resources. Classification and need for conventional energy resources.
Solar Energy: The Sun-sun-Earth relationship, Basic matter to waste heat energy circuit, Solar Radiation, Attention, Radiation measuring instruments.
Solar Energy Applications: Solar water heating. Space heating, Active and passive heating, Energy storage, Selective surface, Solar stills and ponds, solar refrigeration, Photovoltaic generation.

UNIT -II
Geothermal Energy: Structure of earth, Geothermal Regions, Hot springs. Hot Rocks, Hot Aquifers. Analytical methods to estimate thermal potential. Harnessing techniques, Electricity generating systems.

UNIT-III
Direct Energy Conversion: Nuclear Fusion, Fusion reaction, P-P cycle, Carbon cycle, Deuterium cycle, Condition for controlled fusion, Fuel cells and photovoltaic, Thermionic and Thermoelectric generation and MHD generator.
Hydrogen Gas as Fuel: Production methods, Properties, I.C. Engines applications, Utilization strategy, Performances.

UNIT-IV
Bio energy: Biomass energy sources. Plant productivity, Biomass wastes, aerobic and anaerobic bioconversion processes, Raw material and properties of bio-gas, Bio-gas plant technology and status, the energetic and economics of biomass systems, Biomass gasification

UNIT-V
Wind Energy: Wind, Beaufort number, Characteristics, Wind energy conversion systems, Types, Betz model. Interference factor. Power coefficient, Torque coefficient and Thrust coefficient, Lift machines and Drag machines. Matching Electricity generation.
Energy from Oceans: Tidal energy, Tides, Diurnal and semi-diurnal nature, Power from tides, Wave Energy, Waves, Theoretical energy available. Calculation of period and phase velocity of waves, Wave power systems, submerged devices. Ocean thermal Energy, Principles, Heat exchangers, Pumping requirements, Practical considerations.
TEXTBOOKS:
1.Non-conventional Energy Sources / GD Rai/Khanna publications.
2.Non-Conventional Energy Sources and Utilisation (Energy Engineering)/ R KRajput/ S.Chand.
3.Renewable Energy Sources /Twidell & Weir/Taylor and Francis/ 2nd special Indian edition .
REFERENCE BOOKS:
1.Renewable Energy Resources- Basic Principles and Applications/ G.N.Tiwari and M.K.GhosalNarosa Publications.
2.Renewable Energy Resources/ John Twidell & Tony Weir/Taylor & Francis/2nd edition.
3.Non Conventional Energy / K.Mittal/ Wheeler.

II Year I Semester
(R20DME52) Industrial Safety
(OPEN ELECTIVE I)

Objectives:
 ➢ To explain the concept of various industrial safety methods.
 ➢ To outline division aspects measurements of safety performance .

UNIT-I :
Importance of Safety, health and environment. Health safety and environmental policy, fundamentals of safety, classification of accidents, Managements responsibility, objectives of safety management, National safety council, Employees state insurance act 1948, approaches to prevent accidents, principles of safety management, safety organization, safety auditing, maintenance of safety, measurements of safety performance, industrial noise and noise control, Industrial Psychology, Industrial accidents and prevention. Introduction to OSHAS 18001 AND OSHA.

UNIT II:
Process safety management (P.S.M) as per OSHA, legal aspects of safety, safety with respect to plant and machinery, the explosive act 1884, Petroleum act 1934, personal protective equipment, classification of hazards, protection of respiratory system, work permit system, hazards in refineries and process plants, safety in process plants, pollution in some typical process industry.

UNIT III:
Safe working practices, housekeeping, safe working environment, safety device and tools, precaution in use of ladders, safety instruction during crane operation, safety instruction for welding, burning and cutting and gas welding equipment, electrical safety, case studies, safety in use of electricity, electric shock phenomena, Occurrence of electric shock, medical analysis of electric shock and its effect, safety procedures in electric plants, installation of Earthing system,

UNIT IV:
Safety in hazardous area, hazard in industrial zones, classification of industrial Enclosures for gases and vapors. Mechanical, Chemical, Environmental and Radiation hazards, Machine guards and safety devices, slings, load limits, lifting tackles and lifting equipment, hydrostatic test, Chemical hazards, industrial toxicology, toxic chemicals and its harmful effects on humans, factors influencing the effect of toxic materials, Units of concentration, control measure, environmental hazards, devices for measuring radiation, safety analysis and risk analysis, risk management, First aid, Safety measures to avoid occupational diseases.

UNIT V
Factories act – 1948 Stuatutory authorities – inspecting staff, health, safety, provisions relating to hazardous processes,welfare, working hours, employment of young persons – special provisions – penalties and procedures- Indian Boiler Act 1923, static and mobile pressure vessel rules (SMPV), motor vehicle rules, mines act 1952, workman compensation act, rules – electricity act and rules
Text books :
  1. Industrial safety management By: L.M. Deshmukh Publishers: Tata Megraw Hill ,New Delhi Year: 2006 Edition: First
  2. The Factories Act 1948, Madras Book Agency, Chennai, 2000

References:
1. Industrial safety health and environment Management system By: R.K. Jain & Sunil S. Rao Publishers: Khanna Publishers Year: 2008 Edition: Second
2. The Indian boilers act 1923, Commercial Law Publishers (India) Pvt.Ltd., Allahabad.
3."Accident prevention manual for industrial operations", N.S.C.,Chicago, 1982.
4. Industrial Safety and Environment by Amit Gupta
5. "Safety in Industry" N.V. Krishnan JaicoPublishery House, 1996.

Outcome of course:

> Educate students about how to reduce work place hazards and to encourage the standard of Safety ,Health & Environment programme , so as to aim 0% accidents and 100% safety in different industries in which Industrial Safety plays an important role. This has the blending mixture of both Learning and Skills.

II Year I Semester
(R20DME53)   Operations Research
(OPEN ELECTIVE I)

Objectives:
1. To familiarize the students with the use of practice oriented mathematical applications for optimization functions in an organization.
2. To familiarize the students with various tools of optimization, probability, statistics and simulation,
3. To applicable in particular scenarios in industry for better management of various resources.

UNIT–I
Introduction: Development – Definition– Characteristics and Phases – Types of models – operation Research models– applications.
Allocation: Linear Programming Problem Formulation – Graphical solution – Simplex method – Artificial variables techniques -Two–phase method, Big-M method.

UNIT–II
Transportation Problem – Formulation – Optimal solution, unbalanced transportation problem – Degeneracy.Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem-Traveling Salesman problem.
Sequencing – Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.

UNIT–III
Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement.
Theory of Games: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle – m X 2 & 2 X n games -graphical method.

UNIT–IV
Waiting Lines: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.
Inventory: Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.
UNIT–V
Dynamic Programming: Introduction – Bellman's Principle of optimality – Applications of dynamic programming- capital budgeting problem – shortest path problem – linear programming problem.
Simulation: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

TEXT BOOKS :
1. Operations Research / S.D.Sharma-Kedarnath
2. Introduction to O.R/Hiller &Libermann (TMH).

3. Introduction to O.R /Taha/PHI

REFERENCE BOOKS:
1. Operations Research /A.M.Natarajan,P.Balasubramani,A. Tamilarasi/Pearson .   Education.
2. Operations Research / R.Pannerselvam,PHI Publications.
3. Operation Research /J.K.Sharma/MacMilan.

OUTCOMES:
➢ Student will be able to Illustrate the need to optimally utilize the resources in various types of industries.
➢ Apply and analyze mathematical optimization functions to various applications.
➢ Demonstrate cost effective strategies in various applications in industry.

II Year I Semester
(R20DHS51)   Business Analytics
(OPEN ELECTIVE I)

Learning Objective:
    To understand the importance of ever-increasing volume, variety and velocity of data in organization and application of data analytical tools for decision making.

Learning Outcome:
    Students will be able to understand a) Importance of Analytics b) Understanding the analytical tools c) Application of Analytical tools to solve business problems.

UNIT I:
Business Analytics
 Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics, Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview

UNIT II:
Trendiness and Regression Analysis
Modelling Relationships and Trends in Data, simple Linear Regression, Important Resources, Business Analytics Personnel, Data and models for Business, analytics, problem solving, Visualizing and Exploring Data, Business Analytics, Technology.

UNIT III:
Organization Structures of Business analytics:
 Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes, Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics,analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

UNIT IV:
Forecasting Techniques
Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models.
Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

UNIT V:
Decision Analysis
 Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making. Recent Trends in Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism

TEXT BOOKS:
1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara
G.Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.

II Year I Semester
(R20DCS51)   Scripting Languages
(OPEN ELECTIVE I)

Objectives:
The course demonstrates an in depth understanding of the tools and the scripting languages necessary for design and development of applications dealing with Bio-information/ Bio-data. The instructor is advised to discuss examples in the context of Bio-data/ Bio-information application development.

UNIT I
Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL-Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines, advance perl - finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT II
PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Datatypes, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT III
Advanced PHP Programming Php and Web Forms, Files, PHP Authentication and Methodologies - Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World – Translating Websites- Updating Web sites Scripts, Creating the Localization Repository, Translating Files, text, Generate Binary Files, Set the desired language within your scripts, Localizing Dates, Numbers and Times.

UNIT IV
TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk- Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding , Perl-Tk.

UNIT V
Python Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling, Integrated Web Applications in Python – Building Small, Efficient Python Web Systems, Web Application Framework.

TEXT BOOKS:
1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
3. Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, Apress Publications (Dreamtech)

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
2. Programming Python, M.Lutz, SPD.
3. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
4. PHP 5.1,I.Bayross and S.Shah, The X Team, SPD.
5. Core Python Programming, Chun, Pearson Education.
6. Guide to Programming with Python, M.Dawson, Cengage Learning.
7. Perl by Example, E.Quigley, Pearson Education.
8. Programming Perl, Larry Wall, T.Christiansen and J.Orwant, O'Reilly, SPD.
9. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
10. PHP and MySQL by Example, E.Quigley, Prentice Hall(Pearson).
11. Perl Power, J.P.Flynt, Cengage Learning.
12. PHP Programming solutions, V.Vaswani, TMH.

II Year I Semester
(R20DAE51)   Mathematical Modeling Techniques
(OPEN ELECTIVE I)

UNIT-I: **INTRODUCTION TO MODELING AND SINGULAR PERTURBATION METHODS**
Definition of a model, Procedure of modeling: problem identification, model formulation, reduction, analysis, Computation, model validation, Choosing the model, Singular Perturbations: Elementary boundary layer theory, Matched asymptotic expansions, Inner layers, nonlinear oscillations

UNIT-II: **VARIATIONAL PRINCIPLES AND RANDOM SYSTEMS**
Variational calculus: Euler's equation, Integrals and missing variables, Constraints and Lagrange multipliers, Variational problems: Optics-Fermat's principle, Analytical mechanics: Hamilton's principle, Symmetry: Noether's theorem, Rigid body motion, Random systems: Random variables, Stochastic processes, Monte Carlo method

UNIT-III: **FINITE DIFFERENCES: ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS**
ODE: Numerical approximations, Runge-Kutta methods, Beyond Runge-Kutta, PDE: Hyperbolic equations-waves, Parabolic equations-diffusion, Elliptic equations-boundary values, **CELLULAR AUTOMATA AND LATTICE GASES:** Lattice gases and fluids, Cellular automata and computing

UNIT- IV: **FUNCTION FITTING AND TRANSFORMS**
Function fitting: Model estimation, Least squares, Linear least squares: Singular value decomposition, Non-linear least squares: Levenberg-Marquardt method, Estimation, Fisher information, and Cramer-Rao inequality, Transforms:Orthogonal transforms, Fourier transforms, Wavelets, Principal components
FUNCTION FITTING ARCHITECTURES: Polynomials: Pade approximants, Splines, Orthogonal functions, Radial basis functions, Over-fitting, Neural networks: Back propagation, Regularization

UNIT-V: **OPTIMIZATION AND SEARCH:** Multidimensional search, Local minima, Simulated annealing, Genetic algorithms **FILTERING AND STATE ESTIMATION:** Matched filters, Wiener filters, Kalman filters, Non-linearity and entrainment, Hidden Markov models

TEXT BOOK:
1. *The Nature of Mathematical Modeling*, Neil Gershenfeld, Cambridge University Press, 2006, ISBN 0-521-57095-6

REFERENCE BOOKS:
1. *Mathematical Models in the Applied Sciences*, A. C. Fowler, Cambridge University Press, 1997, ISBN 0-521-46140-5
2. *A First Course in Mathematical Modeling*, F. R. Giordano, M.D. Weir and W.P. Fox, 2003, Thomson, Brooks/Cole Publishers
3. *Applied Numerical Modeling for Engineers*, Donald De Cogan, Anne De Cogan, Oxford University Press, 1997

II Year I Semester
(R20DEC51)   Embedded Systems Programming
(OPEN ELECTIVE I)

Unit 1 - Embedded OS (Linux) Internals
Linux internals: Process Management, File Management, Memory Management, I/O Management. Overview of POSIX APIs, Threads – Creation, Cancellation, POSIX Threads Inter Process Communication - Semaphore, Pipes, FIFO, Shared Memory
Kernel: Structure, Kernel Module Programming Schedulers and types of scheduling.
Interfacing: Serial, Parallel Interrupt Handling Linux Device Drivers: Character, USB, Block & Network

Unit 2 – Open source RTOS
Basics of RTOS: Real-time concepts, Hard Real time and Soft Real-time, Differences between General Purpose OS & RTOS, Basic architecture of an RTOS, Scheduling Systems, Inter-process communication, Performance Matric in scheduling models, Interrupt management in RTOS environment, Memory management, File systems, I/O Systems, Advantage and disadvantage of RTOS.

Unit 3 – Open Source RTOS Issues
POSIX standards, RTOS Issues - Selecting a Real Time Operating System, RTOS comparative study. Converting a normal Linux kernel to real time kernel, Xenomai basics.
Overview of Open source RTOS for Embedded systems (Free RTOS/ Chibios-RT) and application development.

Unit 4 – VxWorks / Free RTOS
VxWorks/ Free RTOS Scheduling and Task Management - Realtime scheduling, Task Creation, Intertask Communication, Pipes, Semaphore, Message Queue, Signals, Sockets, Interrupts I/O Systems - General Architecture, Device Driver Studies, Driver Module explanation, Implementation of Device Driver for a peripheral

Unit 5 – Case study
Cross compilers, debugging Techniques, Creation of binaries & porting stages for Embedded Development board (Beagle Bone Black, Rpi or similar), Porting an Embedded OS/ RTOS to a target board ().Testing a real time application on the board

TEXT BOOKS:
1. Essential Linux Device Drivers, Venkateswaran Sreekrishnan
2. Writing Linux Device Drivers: A Guide with Exercises, J. Cooperstein
3. Real Time Concepts for Embedded Systems – Qing Li, Elsevier
REFERENCES:
1. Embedded Systems Architecture Programming and Design: Raj Kamal, Tata McGraw Hill
2. Embedded/Real Time Systems Concepts, Design and Programming Black Book, Prasad, KVK
3. Software Design for Real-Time Systems: Cooling, J E Proceedings of 17the IEEE Real-Time Systems Symposium December 4-6, 1996 Washington, DC: IEEE Computer Society
4. Real-time Systems – Jane Liu, PH 2000
5. Real-Time Systems Design and Analysis : An Engineer's Handbook: Laplante, Phillip A
6. Structured Development for Real - Time Systems V1 : Introduction and Tools: Ward, Paul T & Mellor, Stephen J

7. Structured Development for Real - Time Systems V2 : Essential Modeling Techniques: Ward, Paul T & Mellor, Stephen J

8. Structured Development for Real - Time Systems V3 : Implementation Modeling Techniques: Ward, Paul T & Mellor, Stephen J

9. Monitoring and Debugging of Distributed Real-Time Systems: TSAI, Jeffrey J P & Yang, J H

10. Embedded Software Primer: Simon, David E.

11. Embedded Systems Architecture Programming and Design: Raj Kamal, Tata McGraw Hill

II Year I Semester
(R20D5886)DISSERTATION PHASE I

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain

The student should complete the following:

- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Implementation and Verification
- Report and presentation

Press.

6. Design and Analysis of Algorithms, P.H.Dave and H.B.Dave, Pearson education.

7. Data Structures and java collections frame work, W.J.Collins, Mc Graw Hill.

8. Java: the complete reference, 7th editon, Herbert Schildt, TMH.

9. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education / Java: How to Program P.J.Deitel and H.M.Deitel , 8th edition, PHI.

10. Java Programming, D.S.Malik,Cengage Learning.

    A Practical Guide to Data Structures and Algorithms using Java, S.Goldman & K.Goldman, Chapman & Hall/CRC, Taylor & Francis Group.

    (Note: Use packages like java.io, java.util, etc)

OUTCOMES:
At the end of the course the students are able to:
- Implement and analyze the difference between binary and linear search
- implement Various Types of linked list and can analyze the time complexity
- Implement Stacks, Queues and linked list and analyze the same to determine the time and computation complexity.
- Implement various applications of Stack and Queue.
- write program for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
- Implement and analyze implementing of various tree data Structure..