Vision

To become an advanced learning Centre in the field of Computer Science and Engineering that make knowledgeable, skillful, socially responsible and ethical professionals.

Mission

To provide matured engineering graduates, who can serve nation and solve real world problems, with strong moral and professional convictions and interdisciplinary research capabilities.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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R19

M.Tech., I Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PC	19B511T	Mathematical foundations of Computer Science	3	0	0	3
2	PC	19B512T	Advanced Data Structures	3	0	0	3
3	PE		PE-1	3	0	0	3
4	PE		PE-2	3	0	0	3
5	MLC	19BE11T	Research Methodology and IPR	2	0	0	2
6	AU	19B114T	Disaster Management	2	0	0	0
Lab Courses							
7	PL	19B512L	Laboratory 1 (Advanced Data Structures)	0	0	4	2
8	PL	19B51GL	Laboratory 2 (Based on Electives)	0	0	4	2
				16	0	08	18

PROFESSIONAL ELECTIVE COURSES 1

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PE1	19B51AT	Machine Learning	3	0	0	3
2	PE1	19B51BT	Wireless Sensor Networks	3	0	0	3
3	PE1	19B51CT	Introduction to Intelligent Systems	3	0	0	3

PROFESSIONAL ELECTIVE COURSES 2

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PE2	19B51DT	Data Analytics	3	0	0	3
2	PE2	19B51ET	Distributed Systems	3	0	0	3
3	PE2	19B51FT	Advanced Wireless and Mobile Networks	3	0	0	3

Department of Computer Science and Engineering

M.Tech. I Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PC	19B521T	Advance Algorithms	3	0	0	3
2	PC	19B522T	Soft Computing	3	0	0	3
3	PE		PE-3	3	0	0	3
4	PE		PE-4	3	0	0	3
5	AU	19BC21T	Academic and Research Report Writing	2	0	0	0
Lab Courses							
6	PL	19B521L	Laboratory 3 (Advance Algorithms)	0	0	4	2
7	PL	19B52GL	Laboratory 4 (Based on Electives)	0	0	4	2
8	PS	19B521P	Mini Project with Seminar	2	0	0	2
				16	0	08	18

PROFESSIONAL ELECTIVE COURSES 3

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PE3	19B52AT	Data Preparation and Analysis	3	0	0	3
2	PE3	19B52BT	Secure Software Design & Enterprise Computing	3	0	0	3
3	PE3	19B52CT	Computer Vision	3	0	0	3

PROFESSIONAL ELECTIVE COURSES 4

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PE4	19B52DT	Human and Computer Interaction	3	0	0	3
2	PE4	19B52ET	GPU Computing	3	0	0	3
3	PE4	19B52FT	Digital Forensics	3	0	0	3

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M.Tech., II Year I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PE		PE-5	3	0	0	3
2	OE		OE	3	0	0	3
3	PW	19B531P	Dissertation-I / Industrial Project	0	0	20	10
				6	0	20	16

PROFESSIONAL ELECTIVE COURSES 5

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PE5	19B53AT	Mobile Applications and Services	3	0	0	3
2	PE5	19B53BT	Advances in Compiler Design	3	0	0	3
3	PE5	19B53CT	Optimization Techniques	3	0	0	3

OPEN ELECTIVE COURSES

S. No.	Category	Course Code	Course Title	Offered by
1	OEC	19B53ET	Business Analytics	CSE
2	OEC	19B13ET	Industrial Safety	CE
3	OEC	19B33DT	Operations Research	ME
4	OEC	19BE3AT	Cost Management of Engineering Projects	MBA
5	OEC	19B33ET	Composite Materials	ME
6	OEC	19B43DT	Wireless Communications	ECE
7	OEC	19B23ET	Energy Conversion Systems	EEE

M.Tech., II Year II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	
1	PW	19B541P	Dissertation II	0	0	32	16
				0	0	32	16

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Title of the Course	:	Mathematical Foundations of Computer Science
Category	:	PC
Course Code	:	19B511T
Year	:	I M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- Simply and evaluate basic logic statements and Express a logic sentence in terms of predicates, quantifiers, and logical connectives
- Solve problems using operations of sets and functions
- Solve problems using recurrence relations and analyze algorithms
- Analyze problems related to Graph theory applications
- Apply techniques on modeling computations

Unit 1 : *Mathematical Logic, Predicates* Learning Hours: 10 hrs

MATHEMATICAL LOGIC: Statements and notations, Connectives, Well-formed formulas, Truth Tables, Tautology, equivalence implication, Normal forms.
Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of Contradiction, Automatic Theorem Proving.

Unit 2 : Set Theory, Functions, Algebraic Structures Learning Hours: 9 hrs

SET THEORY: Properties of binary relations, equivalence, compatibility and partial ordering relations, Hasse diagram, Lattice and its properties.
FUNCTIONS: Inverse functions, Composite of functions, Recursive functions.

Unit 3 : *Advanced Counting Technique* Learning Hours: 9 hrs

Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and recurrence relations, Generating Functions, Inclusion-Exclusion, Applications of Inclusion-Exclusion

Unit 4 : *Graph Theory and its Applications* Learning Hours: 8 hrs

Graphs: Graphs and Graph Models, Graph terminology and Special types of graphs.
Introduction to Trees: Properties of Trees, Applications of Trees, Tree Traversals, Spanning trees, Counting trees, Depth-First Search, Breadth-First Search, Minimum spanning trees-Kruskal's Algorithm and Prim's Algorithm.

Unit 5 : *Modeling Computations* Learning Hours: 9 hrs

Languages and Grammars, Finite-State Machines with output, Finite-State Machines with No Output, Language Recognition, Turing Machines.

Prescribed Text Books:

1. J.P. Tremblay, R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Edition-2009 (UNIT I & II)
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications," Sixth edition, New Delhi: Tata Mc Graw Hill, 2009 (UNIT III, IV & V)

Reference Books:

1. Joe L.Mott and Abraham Kandel, "Discrete Mathematics for Computer Scientists and Mathematicians," Second edition, New Delhi, Prentice Hall of India Private Limited, 2004.
2. C.L. Liu and D.P. Mohapatra, "Elements of Discrete Mathematics," Third edition, New Delhi: McGraw Hill, 2008.
3. Ralph P. Grimaldi and B.V.Ramana, "Discrete and Combinatorial Mathematics- An Applied Introduction," Fifth edition, New Delhi: Pearson Education, 2006.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Deduce solutions using Mathematical Logic	L2, L3
2. Demonstrate the relations and functions and determine their properties	L1, L2
3. Analyze problems related to recurrence relations and divide and conquer	L3
4. Develop solutions to problems related to applications of graphs	L3, L4
5. Model a machine related to applications of computer science and data networking	L4, L5

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Title of the Course : Advanced Data Structures
Category : PC
Course Code : 19B512T
Year : I M.Tech
Semester : I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will able to

- Choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
- Understand the necessary mathematical abstraction to solve problems.
- Familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
- Come up with analysis of efficiency and proofs of correctness.

Unit 1 : *Dictionaries and Hashing* Learning Hours: 9 hrs

Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries.
Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

Unit 2 : *Skip Lists* Learning Hours: 9 hrs

Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists

Unit 3 : Trees Learning Hours: 9 hrs

Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees

Unit 4 : Text Processing Learning Hours: 9 hrs

Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence ,Problem (LCS), Applying Dynamic Programming to the LCS Problem.

Unit 5 : Computational Geometry Learning Hours: 9 hrs

Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quadtrees, k-D Trees. Recent Trends' in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem

Reference Books:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the implementation of symbol table using hashing techniques.	L1, L3
2. Develop and analyze algorithms for red-black trees, B-trees and Splay trees.	L1, L3
3. Develop algorithms for text processing applications.	L1, L3
4. Identify suitable data structures and develop algorithms for computational geometry problems.	L1, L3
5. Understand the implementation of various computational geometry methods for efficiently solving the new evolving problem.	L1

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Title of the Course	:	Machine Learning
Category	:	PE1
Course Code	:	19B51AT
Year	:	I M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- To learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various IoT nodes.
- To design and analyses various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
- Explore supervised and unsupervised learning paradigms of machine learning.
- To explore Deep learning technique and various feature extraction strategies.

Unit 1 : Introduction to machine learning Learning Hours: 9 hrs

Machine learning: what and why, Types of machine learning Supervised learning Classification Regression Unsupervised Learning Discovering Clusters Discovering latent factors Discovering graph structure Matrix completion Some basic concepts in machine learning Parametric vs non-parametric models simple non-parametric classifier: *K*-nearest neighbors The curse of dimensionality Parametric models for classification and regression Linear regression Logistic regression Overfitting Model selection.

Unit 2 : Supervised Learning: Learning Hours: 9 hrs

Introduction Variable Types and Terminology Two Simple Approaches to Prediction: Least Squares and Nearest Neighbors. Linear Models and Least Squares Nearest-Neighbor Methods From Least Squares to Nearest Neighbors Statistical Decision Theory Local Methods in High Dimensions Statistical Models, Supervised Learning and Function Approximation A Statistical Model for the Joint Distribution Pr(X, Y) Supervised Learning Function Approximation Structured Regression Models Difficulty of the Problem Classes of Restricted Estimators Roughness Penalty and Bayesian Methods.

Unit 3 : Unsupervised Learning Learning Hours: 9 hrs

Introduction Association Rules Market Basket Analysis The Apriori Algorithm Example: Market Basket Analysis Unsupervised as Supervised Learning Generalized Association Rules Choice of Supervised Learning Method Example: Market Basket Analysis Cluster Analysis Clustering Algorithms. Combinatorial Algorithms K-means Gaussian Mixtures as Soft K-means Clustering. Archetypal Analysis Multidimensional Scaling the Google PageRank Algorithm.

Unit 4 : Sparce Modeling Learning Hours: 9 hrs

Introduction Bayesian variable selection the spike and slab model. Optimality conditions for lasso Regularization path Model selection Bayesian interface for linear models with Laplace priors regularization: algorithms Coordinate descent LARS and other homotopy methods Proximal and gradient projection methods EM for lasso Automatic relevance determination (ARD)/sparse Bayesian learning (SBL) ARD for linear regression Whence sparsity Connection to MAP estimation Algorithms for ARD ARD for logistic regression Sparse coding Learning a sparse coding dictionary Results of dictionary learning from image patches Compressed sensing Image inpainting and denoising

Unit 5 : Deep learning Learning Hours: 9 hrs

Introduction Deep generative models Deep directed networks Deep Boltzmann machines Deep belief networksGreedy layer-wise learning of DBNs Deep neural networks Deep multi-layer perceptrons Deep auto-encoders Stacked denoising auto-encoders Applications of deep networks Handwritten digit classification using DBNs Data visualization and feature discovery using deep auto-encoders Information retrieval using deep auto-encoders (semantic hashing) Learning audio features using 1d convolutional DBNs Learning image features using 2d convolutional DBNs Sparse Modeling III.

Prescribed Text Books:

1. Kevin Murphy, Machine Learning:A Probabilistic Perspective, MIT Press,2012(Units 1,4 And 5)
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely availableonline)(Units I and 2)
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer,2007.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Extract features that can be used for a particular machine learning approach in various IOT applications	L1
2. compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach	L2
3. mathematically analyses various machine learning approaches and paradigms	L3
4. analyze sparse modeling and coding	L4
5. Evaluate the deep learning and data visualization.	L5

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Title of the Course	:	Wireless Sensor Networks
Category	:	PE1
Course Code	:	19B51BT
Year	:	I M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- Describe basics of Wireless Sensor Networks.
- Elaborate the MAC protocols in Wireless Sensor Networks and the Routing protocols in WSNs
- Give the knowledge in Data Centric protocols.
- Discuss the mechanisms of node clustering and transmission technology.

Unit 1 : Introduction to Wireless Sensor Networks Learning Hours: 9 hrs

Overview of Wireless sensor networks: Network characteristics, Network applications, Network design objectives and Network design challenges, Technological background: MEMS technology, Wireless Communication Technology, Hardware and Software platforms, Wireless Sensor Networks standards.

Unit 2 : Network Architecture and MAC for Wireless Sensor Networks Learning Hours: 9 hrs

Network Architecture: Introduction, Network Architecture for Wireless Sensor Networks: Sensor node structure, Network architectures, Classification of Wireless Sensor Networks, Protocol stack for Wireless Sensor Networks: Application, Transport, Network, Data link and physical layer.

Medium Access Control for Wireless Sensor Networks: Fundamental MAC protocols, MAC design for Wireless Sensor Networks, MAC Protocols for Wireless Sensor Networks, Contention-based protocols, Contention-free protocols and Hybrid protocols.

Unit 3 : Routing and Data Dissemination Learning Hours: 9 hrs

Routing and Data disseminations: Introduction, Challenges of Wireless Sensor Networks, Taxonomy of routing and data dissemination protocols: Location information, Network layering and In-network processing, data centricity, path redundancy, network dynamics, QoS requirements, Network heterogeneity.

Overview of Routing and Data Dissemination Protocols- Location-Aided Protocols, Geographic Adaptive Fidelity, Geographic and Energy-Aware Routing, Coordination of Power Saving with Routing

Unit 4 : Layered and In -Network Processing Based Protocols: Learning Hours: 9 hrs

Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Threshold Sensitive Energy Efficient Sensor Network Protocol, Adaptive Periodic TEEN

Data-Centric Protocols: Sensor Protocols for Information via Negotiation, Rumor Routing, Active Query Forwarding, Energy-Aware Data -Centric Routing, Information - Directed Routing.

Unit 5 : Broadcasting, Multicasting &Node Clustering Learning Hours: 9 hrs

Introduction, Basic Concepts, Broadcasting Mechanisms, Neighborhood aware Broadcasting Mechanisms, Energy Efficient Broadcasting Mechanisms, Reliable broadcasting mechanism, Multicasting Mechanisms, Tree-based Multicasting Mechanisms, Location-based multicasting mechanisms.

NODE CLUSTERING: Wireless Sensor Network Architectures, Node Clustering Structures, Node Clustering Algorithms for Wireless Sensor Networks-Specialties for Clustering in Wireless Sensor Networks, Passive Clustering for Efficient Flooding, Energy-Efficient Adaptive Clustering, Energy-Efficient Distributed Clustering, Algorithm for Cluster Establishment.

Prescribed Text Books:

1. Jun Zheng, Abbas Jamalipour, “Wireless Sensor Networks: A Networking Perspective”, John Wiley and Sons, 2009.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

Reference Books:

1. KazemSohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks-Technology, Protocols And Applications", John Wiley, 2007.
2. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the functionality and characteristics of Wireless Sensor Networks.	L2
2. Recognize the occurrence of collisions in a shared channel and apply the MAC protocols for avoiding the collisions	L2,L3
3. Evaluate and design the routing protocols based on QoS Parameters.	L5,L6
4. Operate the Sensor nodes by conserving the energy	L3
5. Organize the nodes for cluster formation in Wireless Sensor Networks	L4

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	:	Introduction to Intelligent Systems
Category	:	PE1
Course Code	:	19B51CT
Year	:	I M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- The aim of the course is to introduce to the field of Artificial Intelligence (AI) with emphasis on its use to solve real world problems for which solutions are difficult to express using the Traditional algorithmic approach.
- It explores the essential theory behind methodologies for developing systems that demonstrate intelligent behavior including dealing with uncertainty, Learning from experience and following problem solving strategies found in nature.

Unit 1 : Biological foundations to intelligent systems I: Learning Hours: 9 hrs
Artificial neural networks, Back- propagation networks, Radial basis function networks, and recurrent networks.

Unit 2 : Biological foundations to intelligent systems II Learning Hours: 9 hrs
Fuzzy logic, knowledge Representation and inference mechanism, genetic algorithm, and fuzzy neural networks.

Unit 3 : Knowledge Engineering Learning Hours: 9 hrs
Search Methods Basic concepts of graph and tree search. Three simple search methods: breadth-first search, depth-first search, iterative deepening search. Heuristic search methods: best-first search, admissible evaluation functions, hill-climbing search. Optimization and search such as stochastic annealing and genetic algorithm.

Unit 4 : Knowledge Representation Learning Hours: 9 hrs
Knowledge representation and logical inference Issues in knowledge representation. Structured representation, such as frames, and scripts, semantic networks and conceptual graphs. Formal logic and logical inference. Knowledge-based systems structures, its basic components. Ideas of Blackboard architectures.

Unit 5 : Uncertain Knowledge and Reasoning Learning Hours: 9 hrs
Reasoning under uncertainty and Learning Techniques on uncertainty reasoning such as Bayesian reasoning, Certainty factors and Dempster-Shafer Theory of Evidential reasoning, A study of different learning and evolutionary algorithms, such as statistical learning and induction learning. Recent trends in Fuzzy logic, Knowledge Representation

Prescribed Text Books:

1. Luger G.F. and Stubblefield W.A. (2008). Artificial Intelligence: Structures and strategies for Complex Problem Solving. Addison Wesley, 6thedition.
2. Russell S. and Norvig P. (2009). Artificial Intelligence: A Modern Approach. Prentice-Hall, 3rd edition.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Demonstrate foundations of artificial neural networks, and would be able to analyze and compare the relative merits of a variety of AI problem solving techniques.	L3
2. Understand the artificial intelligence algorithms for hands-on experience.	L2
3. Select the appropriate actions with partial knowledge.	L2
4. Analyze the various reasoning and knowledge representation techniques	L4
5. Apply knowledge and reasoning techniques in uncertain environment for obtaining solution	L3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	:	Data Analytics
Category	:	PE2
Course Code	:	19B51DT
Year	:	I M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- Facilitate to understand phases of data analytics lifecycle and big data analytic methods using R.
- Enhance to learn analytical theory and methods of clustering and association rules.
- Make to understand the analytical theory and methods of regression and classification.
- Provide analytical theory and methods of time series analysis and text analysis to analyze the data.
- Facilitate to learn about advanced analytical technology and tools.

Unit 1 : Introduction to Big Data Analytics — Learning Hours: 9 hrs

Big Data Overview, State of the Practice in Analytics, Key Roles for the New Big Data Ecosystem, Examples of Big Data Analytics. Data Analytics Lifecycle: Overview, Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize, Case Study: Global Innovation Network and Analysis (GINA). Review of Basic Data Analytic Methods Using R: Introduction to R, Exploratory Data Analysis, Statistical Methods for Evaluation.

Unit 2 : Advanced Analytical Theory and Methods of Clustering and Association Rules — Learning Hours: 9 hrs

Clustering: Overview, K-means, Additional Algorithms. Association Rules: Overview, A priori Algorithm, Evaluation of Candidate Rules, Applications of Association Rules, an Example: Transactions in a Grocery Store, Validation and Testing, Diagnostics.

Unit 3 : Advanced Analytical Theory and Methods for Regression and Classification — Learning Hours: 10 hrs

Regression: Linear Regression, Logistic Regression, Reasons to Choose and Cautions, Additional Regression Models. Classification: Decision Trees, Naive Bayes, Diagnostics of Classifiers, Additional Classification Methods.

Unit 4 : Advanced Analytical Theory and Methods: Time Series Analysis and Text Analysis — Learning Hours: 10 hrs

Time Series: Overview of Time Series Analysis, ARIMA Model, Additional Methods. Text Analysis: Text Analysis Steps, A Text Analysis Example, Collecting Raw Text, Representing Text, Term Frequency-Inverse Document Frequency (TFIDF), Categorizing Documents by Topics, Determining Sentiments, Gaining Insights.

Unit 5 : Advanced Analytics-Technology and Tools — Learning Hours: 8 hrs

Map Reduce and Hadoop Analytics for Unstructured Data, The Hadoop Ecosystem. In-Database Analytics: SQL Essentials, In- Database Text Analysis.

Prescribed Text Books:

1. Data Science & Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data EMC Education Services, Wiley Publishers.

Reference Books:

1. .Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley & Sons, Inc.,

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Illustrate 6 Phases Of Data Analytics Life Cycle and Make an initial analysis of	L3

	the data using R.	
2.	Determine The Number of Clusters for a Given Use Case Using K-Means Clustering algorithm and identify the Frequent Item Sets for a Given Data Using Apriori Algorithm.	L3
3.	Describe Linear And Logistic Regression Models and Classify The Given Data Using Decision Tree And Naive Bayes Classifier.	L2
4.	Demonstrate Time Series Analysis Using ARIMA Model and Text Analysis.	L3
5.	Describe the Challenges and Tools for Analyzing Text and other Unstructured Data.	L2

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Title of the Course	:	Distributed Systems
Category	:	PE2
Course Code	:	19B51ET
Year	:	I M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will able

- To enhance the previous knowledge of database systems and showing the need for distributed database technology.
- To introduce the concepts and techniques of distributed database including principles, architectures, design, data control and issues of query processing.
- To learn the algorithms of distributed query optimization, the basic concepts of transaction management
- To expose concurrency control in DDBSs and emerging research reliability issues in DDBSs.
- To introduce the architectures, query processing of Parallel Database systems and advanced databases.

Unit 1 : Learning Hours: 10hrs

INTRODUCTION: Distributed data processing; what is a DDBS; Advantages and disadvantages of DDBS; Problem areas; Overview of database and computer network concepts

DISTRIBUTED DATABASE MANAGEMENT SYSTEM ARCHITECTURE

Transparencies in a distributed DBMS; Distributed DBMS architecture; Global directory issues

Unit 2 : Learning Hours: 9hrs

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 : *Title of the Unit* Learning Hours: 9hrs

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

Unit 4 : Learning Hours: 9hrs

CONCURRENCY CONTROL

Concurrency control in centralized database systems; Concurrency control in DDBSs; Distributed concurrency control algorithms; Deadlock management

RELIABILITY

Reliability issues in DDBSs; Types of failures; Reliability techniques; Commit protocols; Recovery protocols

Unit 5 : Learning Hours: 9hrs

PARALLEL DATABASE SYSTEMS

Parallel architectures; parallel query processing and optimization; load balancing

ADVANCED TOPICS

Mobile Databases, Distributed Object Management, Multi-databases

Prescribed Text Books:

1. RamezElmasri&Shamkant B. Navethe, “Fundamentals of Database Systems”, fourth Edition, Pearson Education, 2004.
2. Abraham Silberchatz, Henry F. Korth, S.Sudarsan, “Database System Concepts”, Fifth Edition, McGraw-Hill, 2006
3. Stefano Ceri, Giuseppe Pelagatti, “Distributed Databases Principles and Systems”, McGrawHill International Editions, 1985.

Reference Books:

1. Principles of Distributed Database Systems, M.T. Ozsu and P. Valduriez, Prentice-Hall,1991.
2. Distributed Database Systems, D. Bell and J. Grimson, Addison-Wesley,1992.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Describe the overview of advantages and disadvantages of distributed databases and distributed DBMS architecture.	L1
2. Explain the techniques used for data fragmentation, replication, allocation during the distributed database design process, data control and query decomposition.	L2
3. Apply the algorithms of distributed query optimization and different transaction models in real time.	L3
4. Analyze distributed concurrency control algorithms and issues in DDBSs.	L4
5. Evaluate the parallel query processing techniques and advanced databases.	L4

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Title of the Course	:	Advanced Wireless and Mobile Networks
Category	:	PE2
Course Code	:	19B51FT
Year	:	I M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- Able to learn the basics of Mobile Networks.
- Able to know the MAC protocols in Wireless Networks.
- Able to understand the protocols and tools for Wireless Communication.
- Able to gain the knowledge in Mobile Transport layer.
- Able to understand the MANETs and its applications.

Unit 1 : Introduction to Mobile Communications and Computing Learning Hours: 9 hrs

Mobile Computing (MC): Introduction to MC, Novel applications, limitations and architecture.
GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security and New data services.

Unit 2 : Medium Access Control & Mobile Network Layer Learning Hours: 9 hrs

Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, near and far terminals), SDMA, FDMA, TDMA, CDMA.
Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol.

Unit 3 : Protocols and Tools Learning Hours: 9 hrs

Wireless LAN IEEE 802.11(System architecture, Protocol architecture, 802.11a, 802.11b), Wireless Application Protocol-WAP (Introduction, protocol architecture and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME,WiMax, ZigBee and RFID.

Unit 4 : Mobile Transport Layer Learning Hours: 9 hrs

Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP.

Unit 5 : Mobile Ad hoc Networks Learning Hours: 9 hrs

Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs. Applications of Ad Hoc Wireless Networks, Issues In Ad Hoc Wireless Networks.

Prescribed Text Books:

1. Jochen Schiller, *Mobile Communications*. Addison Wesley ,2004, 2nd Ed.
2. Raj Kamal, *Mobile Computing*. Oxford University Press.
3. C. Siva Ram Murthy, B. S. Manoj, “Ad Hoc Wireless Networks – Architecture and Protocols”, 3rd edition, Pearson Education, 2011

Reference Books:

1. Stallings W., Wireless Communications and Networks, Pearson Education2005
2. Stojmenic Ivan, Handbook of Wireless Networks and Mobile Computing, John Wiley and Sons Inc2002
3. Pandya Raj, Mobile and Personal Communications Systems and Services, PHI2000.

Course Outcomes:

Student will be able to Blooms Level of Learning

1.	Understand the functionality and characteristics of GSM in Mobile Networks.	L2
2.	Recognize the occurrence of collisions in a shared channel.	L2
3.	Use the protocols and tools based on Wireless Scenario.	L3
4.	Understand the mechanism of Transport layer in Mobile Networks.	L2
5.	Examine the Various routing protocols in MANETs and design the new routing protocol based on QoS Parameters.	L4,L6

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	:	Research Methodology and IPR
Category	:	MLC
Course Code	:	19BE11T
Year	:	I M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
2	0	0	2

Course Objectives: This course will

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and in turn brings about, economic growth and social benefits

Unit 1 : Learning Hours: 7 hrs

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit 2 : Learning Hours: 6 hrs

Effective literature studies approaches, analysis Plagiarism, Research ethics

Unit 3 : Learning Hours: 6 hrs

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit 4 : Learning Hours: 7 hrs

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 5 : Learning Hours: 6 hrs

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs..

Prescribed Text Books:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2 nd Edition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

9. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	:	Laboratory 1 (Advanced Data Structures)
Category	:	PL
Course Code	:	19B512L
Year	:	I M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will able to

- Choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
- Understand the necessary mathematical abstraction to solve problems.
- Familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
- Come up with analysis of efficiency and proofs of correctness.

Week1 :
Write a C++ program to implement all the functions of a dictionary ADT using hashing by separate chaining
Week2 :
Write a C++ program to implement all the functions of a dictionary ADT using hashing by linear probing
Week3:
Write a C++ program to implement all the functions of a dictionaryADT using skip list operations
Week4:
Write a C++ program to implement of Binary Search Tree operations
Week5:
Write a C++ program to implement of AVL Tree operations
Week6:
Write a C++ program to implement of B-Tree operations
Week7:
Write a C++ Program to implement Boyer-Moore pattern matching algorithm.
Week8:
Write a C++ Program to implement Knuth-Morris-Pratt pattern matching algorithm.
Week9:
Write a C++ program to implement of the Longest Common Subsequence
Week10:
Write a C++ Program to implement of Trie operations
Week11:
Write a C++ program to implement the K Dimensional Tree search and insertion operations

Text Books:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the implementation of symbol table using hashing techniques.	L1, L3
2. Develop and analyze algorithms for red-black trees, B-trees and Splay trees.	L1, L3
3. Develop algorithms for text processing applications.	L1, L3
4. Identify suitable data structures and develop algorithms for computational geometry problems.	L1, L3
5. Understand the implementation of various computational geometry methods for efficiently solving the new evolving problem.	L1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	:	Advanced Algorithms
Category	:	PC
Course Code	:	19B521T
Year	:	I M.Tech
Semester	:	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- Define the graph search algorithms.
- Explain network flow and linear programming problems.
- Interpret hill climbing and dynamic programming design techniques.
- Develop recursive backtracking algorithms.
- Define NP completeness and randomized algorithms

Unit 1 : Review of Analysis Techniques Learning Hours: 10 hrs

Growth of Functions: Asymptotic notations, Standard notations and common functions, Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method, Amortized Analysis: Aggregate, Accounting and Potential Methods.

Unit 2 : Graph Algorithms and Polynomials and the FFT: Learning Hours: 10 hrs

Bellman - Ford Algorithm, Single source shortest paths in a DAG, Johnson's Algorithm for sparse graphs, Flow networks and Ford-Fulkerson method, Maximum bipartite matching.
Polynomials and the FFT: Representation of polynomials, The DFT and FFT, Efficient implementation of FFT.

Unit 3 : Number -Theoretic Algorithms Learning Hours: 10 hrs

Elementary notions, GCD, Modular Arithmetic, Solving modular linear equations, The Chinese remainder theorem, Powers of an element, RSA cryptosystem, Primality testing, Integer factorization

Unit 4 : String-Matching Algorithms Learning Hours: 10 hrs

Naïve string Matching, Rabin - Karp algorithm, String matching with finite automata, Knuth-Morris-Pratt algorithm, Boyer – Moore algorithms.

Unit 5 : NP-Completeness and Randomization Learning Hours: 10 hrs

Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-completeness proofs, NP-complete problems, The set-covering problem, Randomization and linear programming, The subset-sum problem

Prescribed Text Books:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd EditiPrentice-Hall of India, 2010.
2. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.

Reference Books:

1. Ellis Horowitz, SartajSahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Apply iterative and recursive algorithms.	L3
2. Implement optimization algorithms in specific applications.	L3
3. Apply the number theoretic algorithms	L3
4. Understand and apply string matching algorithms	L2, L3
5. Apply NP complete algorithms	L3

Department of Computer Science and Engineering

(An Autonomous Institution)

Title of the Course	:	Soft Computing
Category	:	PC
Course Code	:	19B522T
Year	:	I M.Tech
Semester	:	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will able

- To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
- To give students knowledge of non-traditional technologies and fundamentals of fuzzy sets, fuzzy logic and fuzzy expert systems.
- To learn the basic concepts of neural networks and advances in neural networks.
- To introduce genetic algorithms using machine learning.
- To provide students hand-on experience on MATLAB to implement various strategies.

Unit 1 : Learning Hours: 10 hrs

INTRODUCTION TO SOFTCOMPUTING AND NEURAL NETWORKS: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics.

Unit 2 : Learning Hours: 9hrs

FUZZY LOGIC: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

Unit 3 : Learning Hours: 9hrs

NEURAL NETWORKS: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks.

Unit 4 : Learning Hours: 9hrs

GENETIC ALGORITHMS: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition.

Unit 5 : Learning Hours: 9hrs

Matlab/Python Lib: Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic. Recent Trends in deep learning, various classifiers, neural networks and genetic algorithm. Implementation of recently proposed soft computing techniques.

Prescribed Text Books:

1. S.N.Sivanandam and S.N.Deepa, “Principles of Soft Computing”, Wiley India Pvt Ltd, 2011.

2. Soft Computing and Intelligent System Design -FakhreddineO.Karray, Clarence D Silva, Pearson Edition, 2004.

3. Matlab: A Practical approach, by Stormy Attaway.

Reference Books:

1. Jyh:Shing Roger Jang, Chuen:Tsai Sun, EijiMizutani, Neuro:Fuzzy and Soft Computing®, Prentice:Hall of India,2003.
2. George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic:Theory and Applications®, Prentice Hall, 1995.
3. MATLAB Toolkit Manual.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Identify and describe soft computing techniques and their roles in building intelligent machines.	L2
2. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.	L3
3. Differentiate supervised and unsupervised learning neural networks.	L4
4. Apply genetic algorithms to combinatorial optimization problems.	L3
5. Evaluate and compare solutions by various soft computing approaches for a given problem using MATLAB tool kit.	L5

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course : Data Preparation and Analysis
Category : PE3
Course Code : 19B52AT
Year : I M.Tech
Semester : II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- Demonstrates different strategies for dealing with imperfect real world data.
- Interpret data from databases and Immaculate the data for statistical analysis in SAS.
- Draw up data marts for statistical analysis using SAS software.
- Transmute data for analysis and generate meaningful Data Visualizations.

Unit 1 : Data Gathering and Preparation Learning Hours: 9 hrs
Data formats, parsing and transformation, Scalability and real-time issues

Unit 2 : Data Cleaning Learning Hours: 9 hrs
Consistency checking, Heterogeneous and missing data, Data Transformation and segmentation

Unit 3 : Exploratory Analysis Learning Hours: 9 hrs
Descriptive and comparative statistics, Clustering and association, Hypothesis generation

Unit 4 : Visualization-I Learning Hours: 9 hrs
Designing visualizations, Time series, Geo located data, Correlations and connections

Unit 5 : Visualization-I Learning Hours: 9 hrs
Hierarchies and networks, Interactivity.

Prescribed Text Books:
1. Making sense of Data : A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt

Reference Books:
E-Text Books:
1. https://www.books.google.co.in/books?id=bVbj9nhvHd4C
2. https://www.books.google.co.in/books?id=GrZHPgAACAAJ&dq=1.+J.S.R.Jang,+C.T.Sun+andE.Mizutani,+Neuro,+Fuzzy+and+Soft+Computing,+PHI,+2004,Pearson+Education.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Identify and understand the difference between data and information with formats.	L3
2. Acquire knowledge to identify the data parsing and transformations.	L3
3. Explain the basic concept of data cleaning for valuable information with a minimum consistency checking & Learn data transformations and segmentation to solve statistical problems.	L2
4. Relate statistical exploratory analysis with hypothesis generation.	L2
5. Extend the concept of correlations and connections for geo located data by visualizing the basic hierarchies in a network for interactivity.	L2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	:	Secure Software Design and Enterprise Computing
Category	:	PE3
Course Code	:	19B52BT
Year	:	I M.Tech
Semester	:	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will able

- To provide knowledge about Security Attacks and Services.
- To learn the vulnerabilities in IP and Web security.
- To study the firewalls, intrusion detection techniques.
- To design and develop secure software containing minimum vulnerabilities and flaws.
- To learn software flaws and bugs in various software.

Unit 1 : Learning Hours: 9 hrs

OSI Security Architecture, Security Attacks –Passive and Active Attacks-Security Services- Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability and Mechanisms - A model for Internetwork security.

Unit 2 : Learning Hours: 9 hrs

IP Security Overview-IP Security Policy-Encapsulating Security Payload- Key Management-Oakley Key Determination Protocol.

Web Security considerations- Secure Socket Layer (SSL) and Transport Layer Security (TLS)- Secure Electronic Transaction –SET overview, key features of SET,SET participants, Dual signature.

Unit 3 : Learning Hours: 9 hrs

Intruders- Intrusion Detection-Types of Malicious Software-classification of Viruses-Characteristics of Firewall – types of firewalls.

Unit 4 : Learning Hours: 9 hrs

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 5 : Learning Hours: 9 hrs

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

Prescribed Text Books:

1. Network Security Essentials (Applications and Standards) by William Stallings
2. Hack Proofing your network, Russell, Dreamtech, Second edition.
3. Theodor Richardson, Charles N Thies, Secure Software Design, Jones &Bartlet
4. Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters, Diana L. Burley, Enterprise Software Security, AddisonWesley

Reference Books:

1. Cryptography and Network Security third Edition by William stallings.

Course Outcomes:

Student will be able	Blooms Level of Learning
1. to identify the network security threats and determine efforts to counter them.	L1
2. to apply knowledge on IP security and Web security services.	L3
3. to conceptualize intrusion detection and firewall designs.	L1

4.	to differentiate between various software vulnerabilities	L1
5.	to learn different software vulnerabilities and flaws	L1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	:	Computer Vision
Category	:	PE3
Course Code	:	19B52CT
Year	:	I M.Tech
Semester	:	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- To Review Image Formation and Processing techniques for Computer Vision
- To Understand Shape and Region Analysis
- To Analyze Hough Transform and its applications to detect lines, circles, ellipses.
- To understand three-dimensional image analysis techniques.
- To Implement various recognition techniques and its applications.

Unit 1 : *Image Formation and Image Processing* Learning Hours: 9 hrs

Introduction to computer vision,Review of image processing techniques – classical filtering operations – thresholding techniques,– edge detection techniques – corner and interest point detection – mathematical morphology –texture.

Unit 2 : *Shapes and Regions* Learning Hours: 9hrs

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 3 : *Hough Transformation* Learning Hours: 9hrs

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 (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation.

Unit 4 : *3D Vision Methods* Learning Hours: 9hrs

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 5 : *Recognition and Applications* Learning Hours: 9hrs

Category recognition- Bag of words- Part-based models, Recognition with segmentation- Context and scene understanding.

Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces.

Prescribed Text Books:

1. E. R. Davies, “Computer & Machine Vision”, Fourth Edition, Academic Press, 2012.
2. D. L. Baggio et al., ―Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.

3. Jan Erik Solem, —Programming Computer Vision with Python: Tools and algorithms for analyzing images‖, O'Reilly Media, 2012.

Reference Books:

1. Mark Nixon and Alberto S. Aquado, —Feature Extraction & Image Processing for Computer Vision‖, Third Edition, Academic Press, 2012.
2. Simon J. D. Prince, —Computer Vision: Models, Learning, and Inference‖, Cambridge University Press, 2012.
3. R. Szeliski, —Computer Vision: Algorithms and Applications‖, Springer 2011.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Implement fundamental image processing techniques required for computer vision	L1
2. To Perform shape analysis.	L1,L3
3. To Apply Hough Transform for line, circle, and ellipse detections.	L3
4. To Analyze 3D techniques	L4
5. To Develop applications using computer vision techniques.	L6

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	:	Human and Computer Interaction
Category	:	PE4
Course Code	:	19B52DT
Year	:	I M.Tech
Semester	:	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- Learn the foundations of Human Computer Interaction
- Be familiar with the design technologies for individuals and persons with disabilities
- Be aware of mobile Human Computer interaction.
- Learn the guidelines for user interface.

Unit 1: Foundations of HCI Learning Hours: 10 hrs

Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models– frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

Unit 2: Design and Software Process Learning Hours: 9 hrs

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules– principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

Unit 3: Models and Theories Learning Hours: 8hrs

Cognitive models –Socio-Organizational issues and stake holder requirements–Communication and collaboration models-Hypertext, Multimedia and WWW.

Unit 4: Mobile HCI Learning Hours: 9hrs

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games-Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

Unit 5: WEB Interface Design Learning Hours: 9hrs

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies. Recent Trends: Speech Recognition and Translation, Multimodal System.

Prescribed Text Books:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004 (UNIT I, II &III)
2. Brian Fling, “Mobile Design and Development”, First Edition, O®Reilly Media Inc., 2009 (UNIT – IV)
3. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O®Reilly,2009. (UNIT-V)

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Classify the fundamental design and evaluation methodologies of computer	L5, L6
2. Design Effective HCI for individuals and persons with disabilities	L6
3. Summarize the cognitive computerized models and HCI implication for designing multimedia, e-learning web sites	L2, L6
4. Design mobile application framework using HCI tools	L2, L5
5. Develop web interface using various tools	L6
	L6

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	:	GPU Computing
Category	:	PE4
Course Code	:	19B52ET
Year	:	I Year
Semester	:	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- To learn parallel programming with Graphics Processing Units (GPUs).

Unit 1 : Introduction Learning Hours: 8 hrs

History, Graphics Processors, Graphics Processing Units. Clock speeds, CPU / GPU comparisons, Heterogeneity, Accelerators, Parallel programming, CUDA OpenCL / OpenACC
Hello World Computation Kernels, Launch parameters, Thread hierarchy,Warps/ Wavefronts, Thread blocks / Workgroups, Streaming multiprocessors, 1D / 2D/ 3D thread mapping, Device properties, Simple Programs

Unit 2 : Memory Learning Hours: 8 hrs

Memory hierarchy, DRAM / global, local / shared, private / local, textures, Constant Memory, Pointers, Parameter Passing, Arrays and dynamic Memory, Multi-dimensional Arrays, Memory Allocation, Memory copying across devices, Programs with matrices, Performance evaluation with different memories

Unit 3 : Synchronization Learning Hours: 10 hrs

Memory Consistency, Barriers (local versus global), Atomics, Memory fence. Prefix sum, Reduction. Programs for concurrent Data Structures such as Worklists, Linked-lists. Synchronization across CPU and GPU
Functions: Device functions, Host functions, Kernels functions, Using libraries(such as Thrust), and developing libraries

Unit 4 : *Support and Stream* Learning Hours: 8 hrs

Support: Debugging GPU Programs. Profiling, Profile tools, Performance aspects
Streams: Asynchronous processing, tasks, Task-dependence, Overlapped data transfers, Default Stream, Synchronization with streams. Events, Event-based-Synchronization- Overlapping data transfer and kernel execution, pitfalls

Unit 5 : *Case Studies* Learning Hours: 8 hrs

Case Studies: Image Processing, Graph algorithms, Simulations, Deep Learning
Advanced topics: Dynamic parallelism, Unified Virtual Memory, Multi-GPUprocessing, Peer access, Heterogeneous processing

Prescribed Text Books:

1. Programming Massively Parallel Processors: A Hands-on Approach; David Kirk, Wen-meiHwu; Morgan Kaufman; 2010 (ISBN:978-0123814722)
2. CUDA Programming: A Developer's Guide to Parallel Computing with GPUs; Shane Cook; Morgan Kaufman; 2012 (ISBN:978-0124159334)

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Learn and memorize the concepts ofparallel programming	L1
2. understand the role of memory in GPU	L2
3. illustrate the concepts of synchronization and functions in GPU	L3
4. Analyze the programs implemented on GPU, and understand the debugging and profiling parallel programs	L4,L1
5. Analyze various case studies and study the advanced topics	L4

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	:	Digital Forensics
Category	:	PE4
Course Code	:	19B52FT
Year	:	I M.Tech
Semester	:	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

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

Unit 1 : Learning Hours: 10 hrs

Introduction to Computer Forensics, Use of Computer Forensics in Law Enforcement,Computer Forensics Assistance to Human Resources/Employment Proceedings,Computer Forensics Services, Benefits of Professional Forensics Methodology.

Unit 2 : Learning Hours: 9 hrs

Types of Military Computer Forensic Technology, Types of Law Enforcement:Computer Forensic Technology, Types of Business Computer Forensic Technology,Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware andAdware.

Encryption Methods and Vulnerabilities,Protecting Data from Being Compromised,Internet Tracing Methods,Security and Wireless Technologies, Avoiding Pitfalls withFirewalls, Biometric Security Systems

Unit 3 : Learning Hours: 9 hrs

Types of Computer Forensics Systems: Internet Security Systems, Intrusion Detection Systems, Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery Systems, Public Key Infrastructure Systems, Wireless Network Security Systems.

Satellite Encryption Security Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems, Identity Management Security Systems ,Identity Theft , Biometric Security Systems,Homeland Security Systems

Unit 4 : Learning Hours: 8 hrs

Data Recovery: Data Recovery Defined, Data Backup and Recovery, The Role of Backup in Data Recovery, The Data-Recovery Solution, Hiding and Recovering Hidden Data

Evidence Collection and Data Seizure: Why Collect Evidence? , Collection Options ,Obstacles ,Types of Evidence, The Rules of Evidence ,Volatile Evidence ,General Procedure Collection and Archiving, Methods of Collection, Artifacts.

Unit 5 : Learning Hours: 9 hrs

Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene, Computer Evidence Processing Step.

Computer Image Verification and Authentication: Special Needs of Evidential Authentication, Practical Considerations.

Prescribed Text Books:

1. John Sammons, The Basics of Digital Forensics, Elsevier, 2015

2. John Vacca, Computer Forensics: Computer Crime Scene Investigation, Charles River Media, 2015

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Understand the definition of computer forensics fundamentals	L2
2. Describe the types of computer forensics technology.	L3
3. Analyze various computer forensics systems.	L3
4. Illustrate the methods for data recovery, evidence collection and data seizure.	L3
5. Summarize duplication and preservation of digital evidence.	L2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
(An Autonomous Institution)

Title of the Course	:	Academic and Research Report Writing
Category	:	AU
Course Code	:	19BC21T
Year	:	I M.Tech
Semester	:	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
2	0	0	0

Section 1: Introduction
- Introduction to Academic & Research Report writing
- The language of Academic & Research Reports
- Thesis and Research Paper writing – A brief

Section 2: Tools and Techniques
- Introduction to Computer Aided Text Processing
- Basic Document Preparation with Latex- Part 1
- Basic Document Preparation with Latex- Part 2
- Writing Mathematical Equation with Latex
- Writing Symbolic Expression with Latex
- Preparing Tables in a Document with Latex
- Inserting Figures in a Document with Latex

Section 3: Thesis Writing-I
- Layout of the Thesis
- Contents Prior to the Chapters
- Preparation of Abstract
- Introduction section for a Thesis
- Literature review for a Thesis

Section -4: Thesis Writing-II
- Computational methodology/Experimental details
- Preliminary studies for a Thesis
- How to write Results and Discussion for a Thesis part – I
- Data Analysis (How to write Results and Discussion for a Thesis part –I
- Writing Conclusions, References and other information for a thesis

Section-5: Research Paper Writing
- Writing a Research Paper
- The Structure of a Research paper
- Abstract for a Paper
- Introduction and Methodology sections for a Paper
- How to Incorporate Figure, Tables, and Equations in a Research Paper
- How to write Results and Discussion, Conclusion sections for a Paper
- Different formats for referencing
- Ways of communicating a Research Paper

Section 6: Academic and Research Report Presentation

Section 7: Mini Project on Thesis Writing (with presentation)

Section 8: Mini project on Research Paper writing (with presentation)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	:	Laboratory 3 (Advanced Algorithms)
Category	:	PL
Course Code	:	19B521L
Year	:	I M.Tech
Semester	:	II Semester

Lecture Hours	Tutorial Hours	Practical	Credits
0	0	4	2

Course Objectives: This course will

- To implement the graph search algorithms.
- To implement the string-matching algorithms.
- To implement the number- theoretic algorithms

List of experiments

1. Write a program to implement the Bellman-Ford algorithm and determine its performance.
2. Write a program to implement the Ford-Fulkerson method
3. Write a program to implement a Monte Carlo algorithm to test the primality of a given integer and determine its performance.
4. Write a program to implement Integer factorization problem
5. Write a program to solve string matching problem using naïve approach and the KMP algorithm. Compare their performances.
6. Write a program to solve String matching problem using Finite Automata and determine its performance.
7. Write a program to solve String matching problem using Robin Karp algorithm
8. Write a program to implement the Hamiltonian-cycle problem

References:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition,Prentice-Hall of India, 2010.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Apply graph search algorithms	L3
2. Apply number theoretic algorithms	L3
3. Implement string matching algorithms.	L3

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	:	Mobile Applications and Services
Category	:	PE5
Course Code	:	19B53AT
Year	:	II M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- This course presents the three main mobile platforms and their ecosystems, namely Android, iOS, and PhoneGap/WebOS
- It explores emerging technologies and tools used to design and implement feature-rich mobile applications for smartphones and tablets
- It also take into account both the technical constraints relative to storage capacity, processing capacity, display screen, communication interfaces, and the user interface, context and profile.

Unit 1 : Learning Hours: 9 hrs

Introduction: Introduction to Mobile Computing, Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User.

Unit 2 : Learning Hours: 9 hrs

More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing theRight UI, Multichannel and Multimodal Uis, . Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting theModel Right, Android Storing and Retrieving Data, Working with a Content Provider.

Unit 3 : Learning Hours: 9 hrs

Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading, Graphics and UI Performance, Android Graphics.

Unit 4 : Learning Hours: 9 hrs

Putting It All Together: Packaging and Deploying, Performance Best Practices, Android Field Service App, Location Mobility and Location Based Services Android Multimedia: Mobile Agents and Peer-to-Peer Architecture, Android Multimedia.

Unit 5 : Learning Hours: 9 hrs

Platforms and Additional Issues : Development Process, Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing, Security and Hacking , Active Transactions, More on Security, Hacking Android Recent trends in Communication protocols for IOT nodes, mobile computing techniques in IOT, agents based communications in IOT.

Prescribed Text Books:

1. Wei-Meng Lee, Beginning Android™ 4 Application Development, 2012 by John Wiley & Sons

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. identify the target platform and users and be able to define and sketch a mobile application	L1
2. understand the fundamentals, frameworks, and development lifecycle of mobile application platforms including iOS, Android, and Phone Gap	L2

3.	experiment on communications via network and the web	L4
4.	Construct application by Putting It All Together and multimedia	L5
5.	Design and develop a mobile application prototype in one of the platform (challenge project)	L6

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course	:	Advances in Compiler Design
Category	:	PE5
Course Code	:	19B53BT
Year	:	II M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- To memorize modern Structure of Compilers in High Performance Computing Environment.
- To summarize Components, Phases of Modern Compilers.
- To analyze the concepts of Optimizations, Programming languages in High Performance Computing Systems.

Unit 1: High Performance Systems Learning Hours: 9 hrs

Structure of a Compiler, Programming Language Features, Languages for High Performance.
Overview of Compilation: Phases of Compilation-Lexical Analysis, Pass and Phases of translation, interpretation, bootstrapping, Symbol table- LEX lexical analyzer generator.

Unit 2: Parsing Learning Hours: 9 hrs

Top down parsing-Backtracking,LL(1),recursive descent parsing,Predictive parsing.
Bottom up parsing: Shift Reduce parsing,LR and LALR parsing,handling ambiguous grammars.
Semantic Analysis: Intermediate forms of source programs,Syntax directed translation,Type checker.
Code Generation: Processing the intermediate Code- Code generation,Simple code generation,code generation for basic blocks,BURS Code generation and dynamic programming,Register allocation by graph coloring,Evaluation of code generation techniques processing the intermediate code, post processing the target code, machine code generation.

Unit 3: Data flow Analysis Learning Hours: 9 hrs

Dataflow Analysis, Intermediate representation for flow analysis, Various dataflow analysis, Transformation using dataflow analysis speeding up dataflow analysis, Alias Analysis.
Loop Optimizations: Dominators, Loop-invariant computations, Induction variables, Array bounds checks, Loop unrolling.

Unit 4: Data Dependence: Learning Hours: 9 hrs

Data Dependence in Loops, Data Dependence in Conditionals, Data Dependence in Parallel Loops, Program Dependence Graph.
Scalar Analysis with Factored Use-Def Chains: Constructing Factored Use-Def Chains, FUD Chains for Arrays, Induction Variables Using FUD Chains, Constant Propagation with FUD Chains, Data Dependence for Scalars, DataDependence Analysis for Arrays.

Unit 5: Array Region Analysis Learning Hours: 9 hrs

Array Region Analysis, Pointer Analysis, I/O Dependence, Procedure Calls, Inter-procedural Analysis.
Loop Restructuring: Simple Transformations, Loop Fusion, Loop Fission, Loop Reversal, Loop Interchanging, Loop Skewing, Linear Loop Transformations, Strip-Mining, Loop Tiling, Other Loop Transformations, and Inter-proceduralTransformations.
Optimizing for Locality: Single Reference to Each Array, Multiple References,General Tiling, Fission and Fusion for Locality.

Prescribed Text Books:

1. Principles of compiler design-A.V. Aho .J. D. Ullman; Pearson Education(UNIT I,II &III)
2. Michael Wolfe, High-Performance Compilers for Parallel Computing, PearsonEdition-I(UNIT – IV&V)

Reference Books:

1. Advanced Compiler Design Implementation, S.S. Muchnick, Elsevier.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.
3. Compiler Construction, Louden, Thomson.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. To define the Structure of compiler.	L1, L2
2. To use Top down parsing, Bottom up parsing and explain Syntax directed translation.	L2,L3
3. To apply different optimization techniques and develop code generation algorithms in the design of compiler.	L4, L5
4. To solve Data Dependencies and its types in loops.	L4, L5
5. To analyze loop restricting and principles of locality.	L5

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES RAJAMPET
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Title of the Course : Optimization Techniques
Category : PE5
Course Code : 19B53CT
Year : II M.Tech
Semester : I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- To provide insight to the mathematical formulation of real world problems.
- To optimize these mathematical problems using nature based algorithms. And the solution is especially useful for NP-Hard problems.

Unit 1 : Learning Hours: 9 hrs
Engineering application of Optimization, Formulation of design problems as mathematical programming problems

Unit 2 : Learning Hours: 7 hrs
General Structure of Optimization Algorithms, Constraints, The Feasible Region.

Unit 3 : Learning Hours: 10 hrs
Branches of Mathematical Programming: Optimization using calculus, Graphical Optimization, Linear Programming, Quadratic Programming, Integer Programming, Semi Definite Programming.

Unit 4 : Learning Hours: 10 hrs
Optimization Algorithms like Genetic Optimization, Particle Swarm Optimization, Ant Colony Optimization etc.

Unit 5 : Learning Hours: 10 hrs
Real life Problems and their mathematical formulation as standard programming problems.
Recent trends: Applications of ant colony optimization, genetics and linear and quadratic programming in real world applications.

Prescribed Text Books:

1. Laurence A Wolsey (1998).Integerprogramming.Wiley.ISBN978-0-471-28366-9.
2. Practical Optimization Algorithms and Engineering Applications Andreas Antoniou.
3. An Introduction to Optimization Edwin K., P. Chong & Stanislaw h.Zak.
4. Dimitris Bertsimas; Robert Weismantel (2005). Optimization over integers. Dynamic Ideas. ISBN978-0-9759146-2-5.
5. John K. Karlof (2006). Integer programming: theory and practice. CRC Press. ISBN 978-0-8493- 1914-3.
6. H. Paul Williams (2009). Logic and Integer Programming. Springer. ISBN978-0-387-92279-9.

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Define and understand the formulation of optimization problems.	L1,L2
2. Understand and apply the concept of optimality criteria for various types of optimization problems.	L2,L3
3. Solve various constrained and unconstrained problems in Single variable as well as multivariable.	L3
4. Understand and apply different types of optimization algorithms to solve real time problems.	L2,L3
5. Apply the methods of optimization in real life situation	L3

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Title of the Course	:	Business Analytics
Category	:	OEC
Course Code	:	19B53ET
Year	:	II M.Tech
Semester	:	I Semester

Lecture Hours	Tutorial Hours	Practical	Credits
3	0	0	3

Course Objectives: This course will

- Understand the role of business analytics within an organization.
- Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization
- To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision-making.

Unit 1 : Learning Hours: 9 hrs

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 2 : Learning Hours: 9 hrs

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 3 : Learning Hours: 9 hrs

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 4 : Learning Hours: 9 hrs

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 5 : Learning Hours: 9 hrs

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.

Prescribed Text Books:

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

Course Outcomes:

Student will be able to	Blooms Level of Learning
1. Define the importance of business analytics.	L1
2. Describe the ability of think critically in making decisions based on data and deep analytics.	L2
3. demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.	L3
4. use the translate data into clear, actionable insights.	L3
5. experiment on decision analysis.	L4

Department of Computer Science and Engineering

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET

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II Year M.Tech, I Semester

Industrial Safety

Unit-I: Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Unit-II: Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit-III: Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit-IV: Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit-V: Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

Department of Computer Science and Engineering

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II Year M.Tech, I Semester

Operations Research

Course Outcomes: At the end of the course, the student should be able to

1. Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.
2. Students should able to apply the concept of non-linear programming
3. Students should able to carry out sensitivity analysis
4. Student should able to model the real world problem and simulate it.

Unit 1:

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit 2

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Unit 3:

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Unit 4

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit 5

Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

Department of Computer Science and Engineering

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II Year M.Tech, I Semester

Cost Management of Engineering Projects

Introduction and Overview of the Strategic Cost Management Process

Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Project: meaning, Different types, why to manage, cost overruns centers, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non- technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

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II Year M.Tech, I Semester

Composite Materials

UNIT–I: INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT – II: REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT – III: Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–IV: Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – V: Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.

2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

References:

1. Hand Book of Composite Materials-ed-Lubin.

2. Composite Materials – K.K.Chawla.

3. Composite Materials Science and Applications – Deborah D.L. Chung.

4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.