COURSE STRUCTURE
&
DETAILED SYLLABUS

for

M.Tech. Degree Course

(Applicable for the batch admitted from 2018-19)

DEPARTMENT OF
COMPUTER SCIENCE & ENGINEERING

GURU NANAK INSTITUTIONS TECHNICAL CAMPUS
(AUTONOMOUS)
SCHOOL OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
M. Tech. (Computer Science & Engineering)
COURSE STRUCTURE
(Applicable for the Batch admitted from 2018-19)

I YEAR **I SEMESTER**

S. No.	Subject Code	Group	Name of the Subject	L	T	P	Credits
1	1CS01	PC	**Program Core – I** Mathematical Foundations of Computer Science	3	0	0	3
2	1CS02	PC	**Program Core – II** Advanced Data Structures	3	0	0	3
3	1CSP1 1CSP2 1CSP3	PE	**Program Elective – I** Machine Learning Wireless Sensor Networks Network Security & Cryptography	3	0	0	3
4	1CSP4 1CSP5 1CSP6	PE	**Program Elective – II** Data Science Distributed Systems Software Architecture & Design Patterns	3	0	0	3
5	1A001	AC	Research Methodology and IPR	2	0	0	2
6	1A002	AC	Audit Course – I	2	0	0	0
7	1CS03	PC	Advanced Data Structures Lab	0	0	4	2
8	1CS04	PC	Lab based on Program Elective – I	0	0	4	2
			Total Credits				**18**

I YEAR **II SEMESTER**

S. No.	Subject Code	Group	Name of the Subject	L	T	P	Credits
1	2CS05	PC	**Program Core – III** Advanced Algorithms	3	0	0	3
2	2CS06	PC	**Program Core – IV** Soft Computing	3	0	0	3
3	2CSP7 2CSP8 2CSP9	PE	**Program Elective – III** Data Analytics Internet of Things Cloud Computing	3	0	0	3
4	2CSPA 2CSPB 2CSPC	PE	**Program Elective – IV** Human and Computer Interaction Optimization Techniques Digital Forensics	3	0	0	3
5	2A003	AC	Audit Course – II	2	0	0	0
6	2CS07	PC	Advanced Algorithms Lab	0	0	4	2
7	2CS08	PC	Lab based on Program Elective – III	0	0	4	2
8	2CS09	PC	Mini Project with Seminar	0	0	4	2
			Total Credits				**18**

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II YEAR **I SEMESTER**

S. No.	Subject Code	Group	Name of the Subject	L	T	P	Credits
1	3CSPD 3CSPE 3CSPF	PE	**Program Elective – V** Mobile Applications and Services High Performance Computing GPU Computing	3	0	0	3
2	3CSO1 3CSO2 3CSO3 3CSO4 3CSO5 3CSO6	OE	**Open Elective** Business Analytics Industrial Safety Operations Research Cost Management of Engineering Projects Composite Materials Waste to Energy	3	0	0	3
3	3CS10	PC	Dissertation - I / Industrial Project	0	0	20	10
			Total Credits				**16**

II YEAR **II SEMESTER**

S. No.	Subject Code	Group	Name of the Subject	L	T	P	Credits
1	4CS11	PC	Dissertation – II	0	0	32	16
			Total Credits				**16**

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LIST OF PROFESSIONAL ELECTIVES

PROFESSIONAL ELECTIVE – I :
1) 1CSP1 : Machine Learning
2) 1CSP2 : Wireless Sensor Networks
3) 1CSP3 : Network Security & Cryptography

PROFESSIONAL ELECTIVE – II :
1) 1CSP4 : Data Science
2) 1CSP5 : Distributed Systems
3) 1CSP6 : Software Architecture & Design Patterns

PROFESSIONAL ELECTIVE – III :
1) 2CSP7 : Data Analytics
2) 2CSP8 : Internet of Things
3) 2CSP9 : Cloud Computing

PROFESSIONAL ELECTIVE – IV :
1) 2CSPA : Human and Computer Interaction
2) 2CSPB : Optimization Techniques
3) 2CSPC : Digital Forensics

PROFESSIONAL ELECTIVE – V :
1) 3CSPD : Mobile Applications and Services
2) 3CSPE : High Performance Computing
3) 3CSPF : Parallel Computing

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LIST OF OPEN ELECTIVES

1) 3CSO1 : Business Analytics
2) 3CSO2 : Industrial Safety
3) 3CSO3 : Operations Research
4) 3CSO4 : Cost Management of Engineering Projects
5) 3CSO5 : Composite Materials
6) 3CSO6 : Waste to Energy

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LIST OF AUDIT COURSES

1) 1A002 : English for Research Paper Writing
2) 1A003 : Disaster Management
3) 1A004 : Value Education
4) 2A001 : Pedagogy Studies
5) 2A002 : Stress Management by Yoga
6) 2A003 : Personality Development through Life Enlightenment Skills

M.Tech. (CSE) I Year I – Sem

L	T	P	C
3	0	0	3

PROGRAM CORE - I
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (1CS01)

PRE-REQUISITE:

1. A course on "Discrete Mathematics"

COURSE OBJECTIVE:

This course is intended to equip the students with an understanding of the mathematical fundamentals that are prerequisites for a variety of courses like Data Mining, Network Protocols, Analysis of Web Traffic, Computer Security, Software Engineering, Computer Architecture, Operating Systems, Distributed Systems, Bioinformatics, Machine Learning.

SYLLABUS:

UNIT – I

Probability mass, density, and cumulative distribution functions, Parametric families of distributions, Expected value, variance, conditional expectation, Applications of the univariate and multivariate Central Limit Theorem, Probabilistic inequalities, Markov chains.

UNIT – II

Random samples, sampling distributions of estimators**,** Methods of Moments and Maximum Likelihood.

UNIT – III

Statistical inference**,** Introduction to multivariate statistical models: regression and classification problems, principal components analysis**,** The problem of over fitting model assessment.

UNIT – IV

Graph Theory: Isomorphism, Planar graphs, graph colouring, hamilton circuits and euler cycles.

Permutations and Combinations with and without repetition. Specialized techniques to solve combinatorial enumeration problems.

UNIT – V

Computer science and engineering applications:

Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.

Recent Trends in various distribution functions in mathematical field of computer science for varying fields like bio-informatics, soft computing, and computer vision.

TEXT BOOK:

1. John Vince, Foundation Mathematics for Computer Science, Springer.

REFERENCE BOOKS:

1. K. Trivedi.Probability and Statistics with Reliability, Queuing, and Computer Science Applications. Wiley.
2. M. Mitzenmacher and E. Upfal.Probability and Computing: Randomized Algorithms and Probabilistic Analysis.
3. Alan Tucker, Applied Combinatorics, Wiley

COURSE OUTCOMES:

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

CO 1: Describe the basic notions of discrete and continuous probability

CO 2: Express the methods of statistical inference, and the role that sampling distributions play in those methods

CO 3: Perform correct and meaningful statistical analyses of simple to moderate complexity

M.Tech. (CSE) I Year I – Sem

L	T	P	C
3	0	0	3

PROGRAM CORE - II
ADVANCED DATA STRUCTURES (1CS02)

PRE-REQUISITE:

1. A course on "Data Structures"

COURSE OBJECTIVE:

This course endow the students to choose appropriate data structures, understand the ADT/libraries, use it to design algorithms for a specific problem and come up with analysis of efficiency and proofs of correctness.

SYLLABUS:

UNIT – I

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 – II

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 – III

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

UNIT – IV

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 – V

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 Trands in Hashing, Trees, and various computational geometry methods for effeciently solving the new evolving problem.

TEXT BOOK:

1. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

REFERENCE BOOK:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.

COURSE OUTCOMES:

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

CO 1: Identify suitable data structures for computational geometry problems

CO 2: Describe the implementation of symbol table using hashing techniques

CO 3: Analyze algorithms for red-black trees, B-trees and Splay trees

CO 4: Develop algorithms for text processing applications

M.Tech. (CSE) I Year I – Sem

L	T	P	C
2	0	0	2

RESEARCH METHODOLOGY AND IPR (1A001)

COURSE OBJECTIVE:

This course is introduced to understand research problem formulation and analyze research related information by following research ethics

SYLLABUS:

UNIT – I

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 – II

Effective literature studies approaches, analysis, Plagiarism, Research ethics.

UNIT – III

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 – IV

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 – V

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.

TEXT BOOK:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"

REFERENCE BOOKS:

1. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
2. Ranjit Kumar, 2 nd Edition , "Research Methodology: A Step by Step Guide for beginners"
3. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
4. Mayall , "Industrial Design", McGraw Hill, 1992.
5. Niebel , "Product Design", McGraw Hill, 1974.
6. Asimov , "Introduction to Design", Prentice Hall, 1962.
7. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
8. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

COURSE OUTCOMES:

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

CO 1: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity

CO 2: Emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular

CO 3: 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 social benefits

M.Tech. (CSE) I Year I – Sem

L	T	P	C
0	0	4	2

LAB BASED ON PROGRAM CORE – II
ADVANCED DATA STRUCTURES LAB (1CS03)

PRE-REQUISITE:

1. A course on "Computer Programming"

COURSE OBJECTIVE:

This course is intended to work on abstract data types (ADTs) and a variety of data structures such as hash tables, search trees, tries, heaps, B-trees

SOFTWARE REQUIREMENTS:

C / C++

SYLLABUS:

1. Write a program to implement the Randomized n-Queens problem
2. Write a program to implement the Randomized Quick sort
3. Write a program to implement the Optimal Binary Search Tree
4. Write a program to implement the operations of AVL trees
5. Write a program to implement the operations of Leftist tree
6. Write a program to implement the operations of Fibonacci Heap
7. Write a program to implement the Operations of Digital Search trees
8. Write a program to implement the Operations of Binary Tries

TEXT BOOK:

1. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.

REFERENCE BOOK:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.

COURSE OUTCOMES:

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

CO 1: select the data structures that efficiently model the information in a problem

CO 2: assess efficiency trade-offs among different data structure implementations or combinations

CO 3: Design programs using a variety of data structures, including binary and general tree structures, search trees, tries, heaps and B-trees

M.Tech. (CSE) I Year I – Sem

L	T	P	C
0	0	4	2

LAB BASED ON PROGRAM ELECTIVE – I
MACHINE LEARNING LAB (1CS04)

PRE-REQUISITE:

1. A course on "Machine Learning"
2. A course on "Data Mining"

COURSE OBJECTIVE:

This course is intended to work on various machine learning algorithms, generate the required rules and attain the knowledge from various datasets

SOFTWARE REQUIREMENTS:

WEKA / Clementine

SYLLABUS:

1. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.
2. Suppose you use your above model trained on the complete dataset, and classify class good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy?
3. Is testing on the training set as you did above a good idea? Why or Why not?
4. One approach for solving the problem encountered in the previous question is using cross validation? Describe what is cross-validation? Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why?
5. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model?

6. Perform classification of the same dataset using Bayesian and K – nearest neighbour approaches. Report the model obtained after training and compare the results to that of decision tree.
7. Come up with various clusters using k-means partitioning clustering technique.
8. Apply Dimensionality Reduction on an appropriate dataset using PCA Algorithm.

TEXT BOOK:

1. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

REFERENCE BOOK:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Elsevier.

COURSE OUTCOMES:

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

CO 1: Select the appropriate data sets useful for the application

CO 2: Analyze the interesting patterns obtained by the application of various algorithms

CO 3: Evaluate the accuracy of supervised and unsupervised models and algorithms

M.Tech. (CSE) I Year I – Sem

L	T	P	C
0	0	4	2

LAB BASED ON PROGRAM ELECTIVE – I
WIRELESS SENSOR NETWORKS LAB (1CS05)

PRE-REQUISITES:

1. A course on "Wireless Sensor Networks"
2. A course on "Computer Networks"

COURSE OBJECTIVE:

This course is introduced to have a state-of-the art experimental facility for wireless sensor & ad-hoc networks, which serves as a basis for the development of novel mobile context aware services and applications

SOFTWARE/HARDWARE REQUIREMENTS:

C / C++ / Java

Micaz mote, multimeters, sensor board MTS310, mib board

SYLLABUS:

1. Write a program to initiate a connection through the PC to the WSN starter Kit.
2. Write a program for configuring visual data representation.
3. Write a program for setting sampling rate, acquiring unique identifier, adding an alert, and exporting database.
4. Implement the configuration file, module file and make file for the leaf node, cluster head, sink node and gateway node for an end-user application.
5. Three source nodes generate random numbers and transmit the values to a cluster node. The cluster node averages the received values and send it to a sink node. Write a program to implement the scenario assuming that there are 3 cluster heads and three source nodes under each cluster.
6. In an ECG monitoring system, 6 sensor nodes(or electrodes) are placed at predetermined positions of human body(N1: left limb, N2: right limb, N3: left arm, N4:right arm, N5: left chest and N6: right chest). All the six nodes sense electric impulses from corresponding positions and the 6th node(master node) collects data from all other nodes. Design and implement a WSN for this application and analyse the result for different power levels varying from -3dB to -31dB.

7. The same ECG monitoring system in Q3 is used by 3 different patients in different rooms of a hospital. The master node of all the three patients are communicating to a clinic station which is recording the patients data and send it to doctors phone through an android app. Design and implement a WSN for the above said scenario for the same power levels mentioned in Q3.
8. Five source nodes sensing temperature values are deployed in the ground floor of a building and these nodes send the values to a sink node deployed in the same floor of the building. A hierarchichal network having 2 cluster nodes and three source nodes under each cluster is implemented in the first floor of a building for sensing light intensities. The sink nodes of both networks average the received values and send it to a gateway node located in the second floor. Write a program for implementing this scenario.

TEXT BOOK:

1. Kazem Sohraby, Daniel Minoli and Taieb Znati, "wireless sensor networks – Technology, Protocols, and Applications", Wiley Interscience 2007.

REFERENCE BOOKS:

1. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, "Wireless Sensor Network Technologies for the Information Explosion Era", springer 2010.

COURSE OUTCOMES:

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

CO 1: Architect sensor networks for various application setups

CO 2: Devise appropriate data dissemination protocols and model links cost

M.Tech. (CSE) I Year I – Sem

L	T	P	C
0	0	4	2

LAB BASED ON PROGRAM ELECTIVE – I
NETWORK SECURITY LAB (1CS06)

PRE-REQUISITE:

1. A course on "Network Security"

COURSE OBJECTIVE:

This course tries to present several hands-on exercises to help reinforce the students knowledge and understanding of the various network security aspects

SOFTWARE REQUIREMENTS:

C / C++ / Java

SYLLABUS:

1. Write a C program that contains a string(char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string(char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms a. Ceaser cipher b. Substitution cipher c. Hill Cipher
4. Write a C program to implement the DES algorithm logic.
5. Write a Java program to implement the DES algorithm logic.
6. Write a Java program that contains functions, which accept a key and input text to be encrypted/decrypted. This program should use the key to encrypt/decrypt the input by using the triple Des algorithm. Make use of Java Cryptography package.
7. Write a C/Java program to implement the Blowfish algorithm logic.
8. Write a C/Java program to implement the Rijndael algorithm logic.
9. Write the RC4 logic in Java
10. Using Java cryptography, encrypt the text "Hello world" using Blowfish. Create your own key using Java keytool.

11. Implement DES-2 and DES-3 using Java cryptography package.
12. Write a Java program to implement RSA algorithm.
13. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties(Alice) and the JavaScript application as the other party(Bob)
14. Create a digital certificate of your own by using the Java key tool.
15. Write a Java program to encrypt users passwords before they are stored in a database table, and to retrieve them whenever they are to be brought back for verification.
16. Write a program in Java, which performs a digital signature on a given text.

TEXT BOOK:

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

COURSE OUTCOMES:

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

CO 1: Implement of cryptographic algorithms

M.Tech. (CSE) I Year II – Sem

L	T	P	C
3	0	0	3

PROGRAM CORE - III
ADVANCED ALGORITHMS (2CS05)

PRE-REQUISITE:

1. A course on "Design and Analysis of Algorithms"

COURSE OBJECTIVE:

This course is introduced to familiarize students with basic paradigms of data structures, advanced methods of designing and analyzing algorithms and recent developments in the area of algorithmic design.

SYLLABUS:

UNIT – I

Sorting: Review of various sorting algorithms, topological sorting

Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkasra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

UNIT – II

Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.

UNIT – III

Flow-Networks: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.

UNIT – IV

Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming.

Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem.

Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm

UNIT – V

Linear Programming: Geometry of the feasibility region and Simplex algorithm
NP-completeness: Examples, proof of NP-hardness and NP-completeness.
One or more of the following topics based on time and interest:
Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm
Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.

TEXT BOOK:

1. "The Design and Analysis of Computer Algorithms" by Aho, Hopcroft, Ullman.

REFERENCE BOOKS:

1. "Introduction to Algorithms" by Cormen, Leiserson, Rivest, Stein.
2. "Algorithm Design" by Kleinberg and Tardos.

COURSE OUTCOMES:

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

CO 1: Determine the appropriate data structure for solving a particular set of problems

CO 2: Analyze the complexity/performance of different algorithms

CO 3: Categorize the different problems in various classes according to their complexity

CO 4: Have an insight of recent activities in the field of the advanced data structures

CO 5: Understand different classes of problems concerning their computation difficulties

M.Tech. (CSE) I Year II – Sem

L	T	P	C
3	0	0	3

PROGRAM CORE - IV
SOFT COMPUTING (2CS06)

PRE-REQUISITE:

1. A course on "Mathematics"

COURSE OBJECTIVE:

This course is intended to introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario

SYLLABUS:

UNIT – I

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

UNIT – II

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 – III

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 – IV

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

UNIT – V

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.

TEXT BOOK:

1. Jyh:Shing Roger Jang, Chuen:Tsai Sun, EijiMizutani, Neuro:Fuzzy and Soft Computing®, Prentice:Hall of India, 2003.

REFERENCE BOOKS:

1. George J. Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic:Theory and Applications®, Prentice Hall, 1995.
2. MATLAB Toolkit Manual

COURSE OUTCOMES:

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

CO 1: Describe non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms

CO 2: Identify soft computing techniques and their roles in building intelligent machines

CO 3: Implement soft computing based solutions for real-world problems

CO 4: Attain hand-on experience on MATLAB to implement various strategies

CO 5: Evaluate and compare solutions by various soft computing approaches for a given problem

M.Tech. (CSE) I Year II – Sem

L	T	P	C
0	0	4	2

LAB BASED ON PROGRAM CORE – III
ADVANCED ALGORITHMS LAB (2CS07)

PRE-REQUISITE:

1. A course on "Advanced Algorithms"

COURSE OBJECTIVE:

This course is intended to introduce the advanced methods of designing and analyzing algorithms

SOFTWARE REQUIREMENTS:

C / C++ / Java

SYLLABUS:

1. Write a Program to implement Recursive Binary Search & Linear Search.
2. Write a Program to implement Heap Sort.
3. Write a Program to implement Merge Sort.
4. Write a Program to implement Selection Sort.
5. Write a Program to implement Insertion Sort.
6. Write a Program to implement Quick Sort.
7. Write a Program to implement Fast Fourier Transformation.
8. Write a Program to implement Cook's theorem.

SUGGESTED BOOK:

1. The Design and Analysis of Computer Algorithms, Aho, Hopcroft, Ullman

COURSE OUTCOME:

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

CO 1: familiarize with basic paradigms and data structures used to solve advanced algorithmic problems

M.Tech. (CSE) I Year II – Sem

L	T	P	C
0	0	4	2

LAB BASED ON PROGRAM ELECTIVE – III
DATA ANALYTICS LAB (2CS08)

PRE-REQUISITE:

1. A course on "Soft Computing"
2. A course on "Data Mining"

COURSE OBJECTIVE:

This course is intended to learn about way of solving problems using Big Data – R Programming

SOFTWARE REQUIREMENTS:

R language

SYLLABUS:

1. Write an R program to evaluate the following expression ax+b/ax-b.
2. Write an R program to read input from keyboard(hint: readLine()).
3. Write an R program to find the sum of n natural numbers: 1+2+3+4+….n
4. Write an R program to read n numbers. Find the following
   (i) Sum of all even numbers (ii) Total number of even numbers.
   (iii) Total number of odd numbers (iv) Sum of all odd numbers
5. Write an R program to to obtain (i)sum of two matrices A and B (ii) subtraction of two matrices A and B (iii) Product of two matrices.
6. Write an R program that uses functions to add n numbers reading from keyboard
7. Write an R program uses functions to swap two integers.
8. Write an R program that use both recursive and non-recursive functions for implementing the Factorial of a given number, n .
9. Write an R program to reverse the digits of the given number .
   { example 1234 to be written as 4321}
10. Write an R program to implement (i)Linear search (ii) Binary Search.
11. Write an R program to implement (i)Bubble sort (ii) selection sort .

12. Write a R program to implement the data structures (i) Vectors (ii) Array (iii) Matrix (iv) Data Frame (v) Factors
13. Write a R program to implement scan( ),merge( ), read.csv( ) and read.table( ) commands.
14. Write an R program to implement "Executing Scripts" written on the note pad, by calling to the R console.
15. Write a R program ,Reading data from files and working with datasets (i) Reading data from csv files, inspection of data . (ii) Reading data from Excel files.
16. Write a R program to implement Graphs (i)Basic high-level plots (ii)Modifications of scatter plots (iii)Modifications of histograms, parallel box plots .

SUGGESTED BOOK:

1. Big data – Black Book : 2015 edition: dreamtech press

COURSE OUTCOME:

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

CO 1: obtain hands-on experience with R Tool

M.Tech. (CSE) I Year II – Sem

L	T	P	C
0	0	4	2

LAB BASED ON PROGRAM ELECTIVE – III
INTERNET OF THINGS LAB (2CS0A)

PRE-REQUISITE:

1. A course on "Internet of Things"

COURSE OBJECTIVE:

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

SOFTWARE REQUIREMENTS:

Raspberry Pi / python

SYLLABUS:

1. Start Raspberry Pi and try various Linix commands in command terminal window:

   ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.

2. Run some python programs on Pi like:

   Read your name and print Hello message with name

   Read two numbers and print their sum, difference, product and division.

   Word and character count of a given string

   Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input

   Print a name 'n' times, where name and n are read from standard input, using for and while loops.

   Handle Divided by Zero Exception.

   Print current time for 10 times with an interval of 10 seconds.

   Read a file line by line and print the word count of each line.

3. Light an LED through Python program
4. Get input from two switches and switch on corresponding LEDs
5. Flash an LED at a given on time and off time cycle, where the two times are taken from a file.

6. Access an image through a Pi web cam.
7. Control a light source using web page.
8. Implement an intruder system that sends an alert to the given email.

SUGGESTED BOOK:

1. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014.

COURSE OUTCOME:

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

CO 1: Master the interfacing and programming for IoT devices

M.Tech. (CSE) I Year II – Sem

L	T	P	C
0	0	4	2

LAB BASED ON PROGRAM ELECTIVE – III
CLOUD COMPUTING LAB (2CS0B)

PRE-REQUISITE:

1. A course on "Cloud Computing"

COURSE OBJECTIVE:

This course is intended to learn about shared pool of resources, including data storage space, networks, Computer processing power, and specialized corporate and user applications

SOFTWARE REQUIREMENTS:

JAVA / Hadoop

SYLLABUS:

1. Create a Warehouse Application in SalesForce.com.
2. Create an Application in SalesForce.com using Apex programming Language.
3. Implement SOAP Web services in JAVA Applications.
4. Implement Para-Virtualization using VM Ware's Workstation/ Oracle's Virtual Box and Guest O.S.
5. Install and Configure Hadoop.
6. Create an application (Ex: Word Count) using Hadoop Map/Reduce.
7. Perform a Case Study: PAAS(Facebook, Google App Engine)
8. Perform a Case Study: Amazon Web Services.

SUGGESTED BOOK:

1. Cloud Computing Explained: Implementation Handbook for Enterprises, John Rhoton Publication.

COURSE OUTCOME:

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

CO 1: Implement a public cloud instance using a public cloud service provider

M.Tech. (CSE) I Year I – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - I
MACHINE LEARNING (1CSP1)

PRE-REQUISITES:

1. A course on " Data Mining"
2. A course on " Artificial Intelligence"

COURSE OBJECTIVE:

This course is introduced to learn the concept of how to extract patterns and concepts from data without being explicitly programmed in various IOT nodes

SYLLABUS:

UNIT – I

Supervised Learning (Regression/Classification)

Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes, Linear models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Nonlinearity and Kernel Methods, Beyond Binary Classification: Multi-class/Structured Outputs, Ranking.

UNIT – II

Unsupervised Learning

Clustering: K-means/Kernel K-means, Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion, Generative Models (mixture models and latent factor models).

UNIT – III

Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests).

UNIT – IV

Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning

UNIT – V

Scalable Machine Learning (Online and Distributed Learning):

A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference.

Recent trends in various learning techniques of machine learning and classification methods for IOT applications. Various models for IOT applications.

TEXT BOOK:

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009.
2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

COURSE OUTCOMES:

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

CO 1: Explore supervised and unsupervised learning paradigms of machine learning

CO 2: Design and analyse various machine learning algorithms and techniques with a modern outlook focusing on recent advances

CO 3: Explore Deep learning technique and various feature extraction strategies

CO 4: Extract features that can be used for a particular machine learning approach in various IOT applications

CO 5: 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

M.Tech. (CSE) I Year I – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - I
WIRELESS SENSOR NETWORKS (1CSP2)

PRE-REQUISITE:

1. A course on "Wireless Communication"

COURSE OBJECTIVE:

This course is intended to comprehend the fundamental concepts of wireless sensor networks and have a basic knowledge of the various protocols at various layers.

SYLLABUS:

UNIT – I

Introduction to Wireless Sensor Networks: Course Information, Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors

Network Architecture: Traditional layered stack, Cross-layer designs, Sensor Network Architecture.

Hardware Platforms: Motes, Hardware parameters.

UNIT – II

Introduction to ns-3: Introduction to Network Simulator 3 (ns-3), Description of the ns-3 core module and simulation example.

UNIT – III

Medium Access Control Protocol design: Fixed Access, Random Access, WSN protocols: synchronized, duty-cycled.

Introduction to Markov Chain: Discrete time Markov Chain definition, properties, classification and analysis.

MAC Protocol Analysis: Asynchronous duty-cycled, X-MAC Analysis (Markov Chain).

UNIT – IV

Security: Possible attacks, countermeasures, SPINS, Static and dynamic key distribution.

UNIT – V

Routing protocols: Introduction, MANET protocols.

Routing protocols for WSN: Resource-aware routing, Data-centric, Geographic Routing, Broadcast, Multicast.

Opportunistic Routing Analysis: Analysis of opportunistic routing (Markov Chain), Advanced topics in wireless sensor networks.

Advanced Topics

Recent development in WSN standards, software applications.

TEXT BOOK:

1. W. Dargie and C. Poellabauer, “Fundamentals of Wireless Sensor Networks –Theory and Practice”, Wiley 2010

REFERENCE BOOKS:

2. KazemSohraby, Daniel Minoli and TaiebZnati, “wireless sensor networks – Technology, Protocols, and Applications”, Wiley Interscience 2007.
3. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, “Wireless Sensor Network Technologies for the Information Explosion Era”, springer 2010

COURSE OUTCOMES:

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

CO 1: Describe radio standards and communication protocols for wireless sensor networks

CO 2: Explain the function of the node architecture and use of sensors for various applications

CO 3: Architect sensor networks for various application setups

CO 4: Devise appropriate data dissemination protocols and model links cost

CO 5: Evaluate the performance of sensor networks and identify bottlenecks

M.Tech. (CSE) I Year I – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - I
NETWORK SECURITY & CRYPTOGRAPHY (1CSP3)

PRE-REQUISITE:

1. A course on "Computer Networks"

COURSE OBJECTIVE:

The objective of the course is to comprehend the basic categories of threats to computers & networks and to focus on web security and firewalls

SYLLABUS:

UNIT – I

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security.

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT – II

Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution.

Asymmetric key Ciphers: Principles of public key cryptosystems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution.

UNIT – III

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.

UNIT – IV

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, key management.

UNIT – V

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction.

Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.

TEXT BOOKS:

1. Cryptography and Network Security : William Stallings, Pearson Education,5th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 2nd Edition.
3. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 2nd Edition
3. Information Security, Principles and Practice : Mark Stamp, Wiley India.
4. Principles of Computer Sceurity: WM.Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Principles of Information security by Michael E Whitman and Herbert J.Mattord.

COURSE OUTCOMES:

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

CO 1: Explore the basic categories of threats to computers and networks

CO 2: Analyze various cryptographic algorithms

CO 3: Describe E-Mail security

CO 4: Discuss Web security and Firewalls

M.Tech. (CSE) I Year I – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - II
DATA SCIENCE (1CSP4)

PRE-REQUISITE:

1. A course on "Data Mining"

COURSE OBJECTIVE:

This course is introduced to understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists

SYLLABUS:

UNIT – I

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

UNIT – II

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 – III

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 – IV

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

UNIT – V

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 BOOK:

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly.

REFERENCE BOOK:

1. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press.

COURSE OUTCOMES:

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

CO 1: Demonstrate an understanding of statistics and machine learning concepts that are vital for data science

CO 2: Explain how data is collected, managed and stored for data science

CO 3: Critically evaluate data visualizations based on their design and use for communicating stories from data

CO 4: Produce Python code to statistically analyze a dataset

CO 5: Implement data collection and management scripts using MongoDB

M.Tech. (CSE) I Year I – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - II
DISTRIBUTED SYSTEMS (1CSP5)

PRE-REQUISITE:

1. A course on "Database Management Systems"

COURSE OBJECTIVE:

This course is intended 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

SYLLABUS:

UNIT – I

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 – II

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 – III

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 – IV

RELIABILITY

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

UNIT – V

PARALLEL DATABASE SYSTEMS

Parallel architectures; parallel query processing and optimization; load balancing.

ADVANCED TOPICS

Mobile Databases, Distributed Object Management, Multi-databases.

TEXT BOOK:

1. Principles of Distributed Database Systems, M.T. Ozsu and P. Valduriez, Prentice-Hall, 1991.

REFERENCE BOOK:

1. Distributed Database Systems, D. Bell and J. Grimson, Addison-Wesley, 1992.

COURSE OUTCOMES:

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

CO 1: Analyze remote method invocation and objects

CO 2: Apply network virtualization

CO 3: Design trends in distributed systems

M.Tech. (CSE) I Year I – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - II
SOFTWARE ARCHITECTURE & DESIGN PATTERNS (1CSP6)

PRE-REQUISITES:

1. A course on "Software Engineering"

COURSE OBJECTIVE:

This course is introduced to make students familiar with the key concepts of software architecture, design strategies to be followed and usage of design patterns to keep code quality high without overdesign

SYLLABUS:

UNIT – I

Envisioning Architecture

The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

Creating an Architecture

Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT – II

Analyzing Architectures

Architecture Evaluation, Architecture design decision making, ATAM, CBAM.

UNIT – III

Moving from one system to many

Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT – IV

Patterns

Pattern Description, Organizing catalogs, role in solving design problems, selection and usage.

Creational and Structural patterns

Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight, Proxy.

UNIT – V

Behavioral patterns

Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

Case Studies

A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development.

TEXT BOOKS:

1. Software Architecture in Practice, second edition, Len Bass, Pau Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education, 1995.

REFERENCE BOOKS:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006
6. J2EE Patterns, Deepak Alur, John Crupi & Dan Malks, Pearson education, 2003.
7. Design Patterns in C#, Steven John metsker, Pearson education, 2004.

COURSE OUTCOMES:

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

CO 1: Add functionality to designs while minimizing complexity

CO 2: Discuss the presentation tier design patterns and their affect on: sessions, client access, validation and consistency

CO 3: Relate specific design patterns for the system / software architecture

M.Tech. (CSE) I Year II – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - III
DATA ANALYTICS (2CSP7)

PRE-REQUISITES:

1. A course on "Data Base Management Systems"
2. A course on "Data Mining"

COURSE OBJECTIVE:

This course is introduced for the students to prepare the data for analysis and develop meaningful Data Visualizations

SYLLABUS:

UNIT – I

Data Gathering and Preparation:

Data formats, parsing and transformation, Scalability and real-time issues

UNIT – II

Data Cleaning:

Consistency checking, Heterogeneous and missing data, Data Transformation and segmentation

UNIT – III

Exploratory Analysis:

Descriptive and comparative statistics, Clustering and association, Hypothesis generation

UNIT – IV

Visualization:

Designing visualizations, Time series, Geolocated data, Correlations and connections, Hierarchies and networks, interactivity

UNIT – V

Working with Tools:

WEKA, Informatica, R, MongoDB, Python

TEXT BOOK:

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

REFERENCE BOOK:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009

COURSE OUTCOMES:

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

CO 1: Extract the data for performing the Analysis

CO 2: Work with various data formats

CO 3: Apply data cleaning techniques

CO 4: Transform the data from one form to another, as per the requirement

CO 5: Visualize the data sets and the patterns generated

M.Tech. (CSE) I Year II – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - III
INTERNET OF THINGS (2CSP8)

PRE-REQUISITES:

1. A course on "Computer Networks"
2. A course on "Scripting Languages"

COURSE OBJECTIVE:

This course is intended to introduce the terminology, technology and platforms dealing with the applications of machine to machine with necessary protocols

SYLLABUS:

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.

TEXT BOOKS:

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

COURSE OUTCOMES:

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

CO 1: Gain the basics of Internet of Things

CO 2: Identify the key technologies in IoT

CO 3: Comprehend the architecture and framework of IoT

CO 4: Analyze the domain specific applications of IoT

CO 5: Master the interfacing and programming for IoT devices

M.Tech. (CSE) I Year II – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - III
CLOUD COMPUTING (2CSP9)

PRE-REQUISITES:

1. A course on "Computer Networks"
2. A course on "Information Security"

COURSE OBJECTIVE:

This course is introduced to be familiar with how to apply trust-based security model to real-world security problems through cloud infrastructures

SYLLABUS:

UNIT – I

Introduction to Cloud Computing: Online Social Networks and Applications, Cloud introduction and overview, Different clouds, Risks, Novel applications of cloud computing.

UNIT – II

Cloud Computing Architecture: Requirements, Introduction Cloud computing architecture, On Demand Computing Virtualization at the infrastructure level, Security in Cloud computing environments, CPU Virtualization, A discussion on Hypervisors Storage Virtualization Cloud Computing Defined, The SPI Framework for Cloud Computing, The Traditional Software Model, The Cloud Services Delivery Model **Cloud Deployment Models**: Key Drivers to Adopting the Cloud, The Impact of Cloud Computing on Users, Governance in the Cloud, Barriers to Cloud Computing Adoption in the Enterprise.

UNIT – III

Security Issues in Cloud Computing: Infrastructure Security, Infrastructure Security: The Network Level, The Host Level, The Application Level, Data Security and Storage, Aspects of Data Security, Data Security Mitigation Provider Data and Its Security.

Identity and Access Management: Trust Boundaries and IAM, IAM Challenges, Relevant IAM Standards and Protocols for Cloud Services, IAM Practices in the Cloud, Cloud Authorization Management

UNIT – IV

Security Management in the Cloud: Security Management Standards, Security Management in the Cloud, Availability Management: SaaS, PaaS, IaaS.

Privacy Issues: Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Protecting Privacy, Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing, Legal and Regulatory Implications, U.S. Laws and Regulations, International Laws and Regulations.

UNIT – V

Audit and Compliance: Internal Policy Compliance, Governance, Risk, and Compliance (GRC), Regulatory/External Compliance, Cloud Security Alliance, Auditing the Cloud for Compliance, Security-as-a-Cloud.

Advanced Topics: Recent developments in hybrid cloud and cloud security.

TEXT BOOK:

1. Cloud Computing Explained: Implementation Handbook for Enterprises, John Rhoton Publication.

REFERENCE BOOK:

1. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, O'Reilly Media, 2009

COURSE OUTCOMES:

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

CO 1: Describe the basic cloud types and delivery models

CO 2: Identify the security aspects of each cloud model

CO 3: Develop a risk-management strategy for moving to the Cloud

CO 4: Implement a public cloud instance using a public cloud service provider

CO 5: Apply trust-based security model to different layer

M.Tech. (CSE) I Year II – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - IV
HUMAN AND COMPUTER INTERACTION (2CSPA)

PRE-REQUISITES:

1. A course on " Computer Organization"
2. A course on " Mobile Computing"

COURSE OBJECTIVE:

This course is introduced to learn the foundations of Human Computer Interaction and be familiar with the design technologies for individuals and persons with disabilities

SYLLABUS:

UNIT – I

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 – II

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 – III

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

UNIT – IV

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 – V

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

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004
2. Brian Fling, "Mobile Design and Development", First Edition , O®Reilly Media Inc., 2009
3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O®Reilly, 2009

COURSE OUTCOMES:

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

CO 1: Describe mobile Human Computer interaction

CO 2: Explain the guidelines for user interface

CO 3: Analyze the structure of models and theories of human computer interaction and vision

CO 4: Design an interactive web interface on the basis of models studied

M.Tech. (CSE) I Year II – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - IV
OPTIMIZATION TECHNIQUES (2CSPB)

PRE-REQUISITES:

1. A course on "Design and Analysis of Algorithms"
2. A course on "Numerical Methods"

COURSE OBJECTIVE:

The objective of this course is to provide insight to the mathematical formulation of real world problems, to optimize these mathematical problems using nature based algorithms

SYLLABUS:

UNIT – I

Engineering application of Optimization, Formulation of design problems as mathematical programming problems.

UNIT – II

General Structure of Optimization Algorithms, Constraints, The Feasible Region.

UNIT – III

Branches of Mathematical Programming: Optimization using calculus, Graphical Optimization, Linear Programming, Quadratic Programming, Integer Programming, Semi Definite Programming.

UNIT – IV

Optimization Algorithms like Genetic Optimization, Particle Swarm Optimization, Ant Colony Optimization.

UNIT – V

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.

TEXT BOOKS:

1. Laurence A. Wolsey (1998). Integer programming. Wiley.
2. Practical Optimization Algorithms and Engineering Applications Andreas Antoniou.
3. An Introduction to Optimization Edwin K., P. Chong & Stanislaw h. Zak.

REFERENCE BOOKS:

1. Dimitris Bertsimas; Robert Weismantel (2005). Optimization over integers. Dynamic Ideas.
2. John K. Karlof (2006). Integer programming: theory and practice.CRC Press.
3. H. Paul Williams (2009). Logic and Integer Programming. Springer.

COURSE OUTCOMES:

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

CO 1: Formulate optimization problems

CO 2: Apply the concept of optimality criteria for various types of optimization problems

CO 3: Solve various constrained and unconstrained problems in Single variable as well as multivariable

CO 4: Apply the methods of optimization in real life situation

M.Tech. (CSE) I Year II – Sem

L	T	P	C
3	0	0	3

PROGRAM ELECTIVE - IV
DIGITAL FORENSICS (2CSPC)

PRE-REQUISITES:

1. A course on "Computer Networks"
2. A course on "Computer Forensics"

COURSE OBJECTIVE:

This course is introduced to provide an in-depth study of the rapidly changing and fascinating field of computer forensics

SYLLABUS:

UNIT – I

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 – II

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 – III

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 – IV

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 – V

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 BOOK:

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

REFERENCE BOOK:

1. John Vacca, Computer Forensics: Computer Crime Scene Investigation, Laxmi Publications.

COURSE OUTCOMES:

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

CO 1: Comprehend relevant legislation and codes of ethics

CO 2: Describe Computer forensics, digital detective, various processes, policies and procedures

CO 3: Explain E-discovery, guidelines and standards, E-evidence, tools and environment

CO 4: Identify web forensics and network forensics

M.Tech. (CSE) II Year I – Sem

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PROGRAM ELECTIVE - V
MOBILE APPLICATIONS AND SERVICES (3CSPD)

PRE-REQUISITE:

1. A course on " Mobile Computing"

COURSE OBJECTIVE:

This course is intended to present the three main mobile platforms and their ecosystems, namely Android, iOS, and PhoneGap/WebOS

SYLLABUS:

UNIT – I

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 – II

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

UNIT – III

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 – IV

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 – V

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.

TEXT BOOK:

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

COURSE OUTCOMES:

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

CO 1: Analyze the fundamentals, frameworks, and development lifecycle of mobile application platforms including iOS, Android, and PhoneGap

CO 2: Explore emerging technologies and tools used to design and implement feature-rich mobile applications for smartphones and tablets

CO 3: Identify the target platform and users and be able to define and sketch a mobile application

CO 4: Develop a mobile application prototype in one of the platform

M.Tech. (CSE) II Year I – Sem

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PROGRAM ELECTIVE - V
HIGH PERFORMANCE COMPUTING (3CSPE)

PRE-REQUISITES:

1. A course on "Computer Organization & Architecture"
2. A course on " Operating Systems"

COURSE OBJECTIVE:

The objective of this course is to pioneer various distributed and parallel computing architectures and improve the system performance

SYLLABUS:

UNIT – I

Grid Computing: Data & Computational Grids, Grid Architectures And Its Relations To Various Distributed Technologies. Autonomic Computing, Examples Of The Grid Computing Efforts (Ibm).

UNIT – II

Cluster Setup & Its Advantages, Performance Models & Simulations; Networking Protocols & I/O, Messaging Systems. Process Scheduling, Load Sharing And Balancing; Distributed Shared Memory, Parallel I/O.

UNIT – III

Example Cluster System – Beowulf; Cluster Operating Systems: Compas And Nanos Pervasive Computing Concepts & Scenarios; Hardware & Software; Human – Machine Interface.

UNIT – IV

Device Connectivity; Java For Pervasive Devices; Application Examples.

UNIT – V

Classical Vs Quantum Logic Gates; One, Two & Three Qubit Quantum Gates; Fredkin & Toffoli Gates; Quantum Circuits; Quantum Algorithms.

TEXT BOOK:

1. "Selected Topics In Advanced Computing" Edited By Dr. P. Padmanabham And Dr. M.B. Srinivas, 2005 Pearson Education.

REFERENCES:

1. J. Joseph & C. Fellenstien: 'Grid Computing ', Pearson Education
2. J. Burkhardt et.al: 'pervasive computing' Pearson Education
3. Marivesar:' Approaching quantum computing', pearson Education.
4. Raj kumar Buyya:'High performance cluster computing', pearson Education.
5. Neilsen & Chung L:'Quantum computing and Quantum Information', Cambridge University Press.
6. A networking approach to Grid Computing , Minoli , Wiley

COURSE OUTCOMES:

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

CO 1: Realize the concepts in grid computing

CO 2: Set up cluster and run parallel applications

CO 3: Comprehend the cluster projects and cluster OS

CO 4: Identify the concepts of pervasive computing & quantum computing

CO 5: Gain knowledge of different computing technologies

M.Tech. (CSE) II Year I – Sem

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PROGRAM ELECTIVE - V
PARALLEL COMPUTING (3CSPF)

PRE-REQUISITES:

1. A course on "Computer Organization and Architecture"
2. A course on "Data Structures"

COURSE OBJECTIVE:

This course is introduced to outline and analyze the features of micro-architecture parallel systems and understand the methodologies employed for synchronization, memory consistency and cache coherence in shared memory systems

SYLLABUS:

UNIT – I

Introduction to Parallel Computing Architectures, parallel hardware/multi-cores, Processes and threads, Programming models: shared memory and message passing, Amdahl's Law.

UNIT – II

Introduction to parallel hardware: Multi-cores and multiprocessors, shared memory and message passing architectures, cache hierarchy and coherence, sequential consistency.

UNIT – III

Introduction to parallel software: Steps involved in developing a parallel program, Dependence analysis, Domain decomposition, Task assignment: static and dynamic, Performance issues: 4C cache misses, inherent and artifactual communication, false sharing, computation-to-communication ratio as a guiding metric for decomposition, hot spots and staggered communication.

UNIT – IV

Shared memory parallel programming: Synchronization Locks and barriers, Hardware primitives for efficient lock implementation, Lock algorithms, Relaxed consistency models, High-level language memory models (such Java and/or C++), Memory fences. Developing parallel programs with UNIX fork model: IPC with shared memory and message passing, UNIX semaphore and its all-or-none semantic. Developing parallel programs with POSIX thread library, Thread creation, Thread join, Mutex, Condition variables. Developing parallel programs with OpenMP directives: Parallel for, Parallel section, Static, dynamic, guided, and runtime scheduling, Critical sections and atomic operations, Barriers Reduction.

UNIT – V

Introduction to GPU programming: GPU architecture, Introduction to CUDA programming, Concept of SIMD and SIMT computation, Thread blocks, Warps, Global memory, Shared memory, Thread divergence in control transfer.
Recent trends in Parallel Programming Models and Paradigms.
Case study of parallel hardware which include shared memory architecture and message passing architectures for efficient computing.

TEXT BOOK:

1. Peter S Pacheco, An Introduction to Parallel Programming, Morgan Kaufmann,2011.

REFERENCE BOOKS:

1. M Herlihy and N Shavit, The Art of Multiprocessor Programming Morgan Kaufmann, 2008.
2. JL Hennessy and DA Patterson, Computer Architecture: A Quantitative Approach,4th Ed., Morgan Kaufmann/Els India, 2006.

COURSE OUTCOMES:

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

CO 1: Classify parallel architectures parameters that are essential for the classification of modern parallel processing systems

CO 2: Describe the methodologies employed for synchronization and memory consistency and cache coherence in shared memory systems

CO 3: Compare the different types of interconnects employed in parallel processing systems

CO 4: Illustrate how the performance of a parallel system can be measured, list possible sources for performance losses and propose ways to improve the performance of a system

M.Tech. (CSE) II Year I – Sem

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OPEN ELECTIVE
BUSINESS ANALYTICS (3CSO1)

PRE-REQUISITES:

1. A course on "Data Mining"
2. A course on "Data Analytics"

COURSE OBJECTIVE:

This course is introduced to gain an understanding of the role of business analytics within an organization through decision-making tools/Operations research techniques

SYLLABUS:

UNIT – I

Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, 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 BOOK:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.

REFERENCE BOOK:

1. Business Analytics by James Evans, persons Education.

COURSE OUTCOMES:

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

CO 1: Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization

CO 2: Gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making

CO 3: Use technical skills in predicative and prescriptive modeling to support business decision-making

CO 4: Translate data into clear, actionable insights and be familiar with processes needed to develop, report, and analyze business data

CO 5: 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

M.Tech. (CSE) II Year I – Sem

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OPEN ELECTIVE
INDUSTRIAL SAFETY (3CSO2)

SYLLABUS:

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.

TEXT BOOK:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.

REFERENCE BOOKS:

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

M.Tech. (CSE) II Year I – Sem

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OPEN ELECTIVE
OPERATIONS RESEARCH (3CSO3)

SYLLABUS:

UNIT – I

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

UNIT – II

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

UNIT – III

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

UNIT – IV

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

UNIT – V

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

TEXT BOOKS:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.

REFERENCE BOOKS:

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

COURSE OUTCOMES:

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

CO 1: Apply the dynamic programming to solve problems of discreet and continuous variables

CO 2: Demonstrate the concept of non-linear programming

CO 3: Model the real world problem and simulate it

M.Tech. (CSE) II Year I – Sem

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OPEN ELECTIVE
COST MANAGEMENT OF ENGINEERING PROJECTS (3CSO4)

SYLLABUS:

UNIT – I

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.

UNIT – II

Project: meaning, Different types, why to manage, cost overruns centres, 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.

UNIT – III

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.

UNIT – IV

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.

UNIT – V

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

TEXT BOOK:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi

REFERENCE BOOKS:

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

M.Tech. (CSE) II Year I – Sem

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OPEN ELECTIVE
COMPOSITE MATERIALS (3CSO5)

SYLLABUS:

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.

REFERENCE BOOKS:

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.

M.Tech. (CSE) II Year I – Sem

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OPEN ELECTIVE
WASTE TO ENERGY (3CSO6)

SYLLABUS:

UNIT – I

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors.

UNIT – II

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

UNIT – III

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT – IV

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT – V

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

TEXT BOOK:

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.

REFERENCE BOOKS:

1. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
2. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
3. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

GURU NANAK INSTITUTIONS TECHNICAL CAMPUS
(AUTONOMOUS)

M.Tech. (CSE) I Year

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AUDIT COURSE
ENGLISH FOR RESEARCH PAPER WRITING (1A002)

COURSE OBJECTIVE:

This course is introduced to improve the writing skills and level of readability

SYLLABUS:

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 Criticising, 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.

SUGGESTED STUDIES:

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

COURSE OUTCOME:

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

CO 1: Ensure the good quality of paper at very first-time submission

M.Tech. (CSE) I Year

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AUDIT COURSE
DISASTER MANAGEMENT (1A003)

COURSE OBJECTIVE:

This course is introduced to develop critical understanding of key concepts in disaster risk reduction and humanitarian response

SYLLABUS:

UNIT – I

Introduction

Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

UNIT – II

Repercussions of Disasters and Hazards: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem.

Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT – III

Disaster Prone Areas in India

Study of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics

UNIT – IV

Disaster Preparedness and Management

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

UNIT – V

Risk Assessment

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co- Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

Disaster Mitigation

Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

SUGGESTED READINGS:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies", New Royal book Company.
2. Sahni, Pardeep Et.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies", Deep &Deep Publication Pvt. Ltd., New Delhi.

COURSE OUTCOMES:

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

CO 1: Analyze the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

CO 2: Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations

CO 3: Evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives

M.Tech. (CSE) I Year

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AUDIT COURSE
VALUE EDUCATION (1A004)

COURSE OBJECTIVE:

This course is introduced to understand value of education and self- development by imbibing good values and character in students

SYLLABUS:

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.

UNIT – IV

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 – V

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.

SUGGESTED READING:

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

COURSE OUTCOMES:

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

CO 1: Attain the Knowledge of self-development

CO 2: Learn the importance of Human values

CO 3: Develop the overall personality

M.Tech. (CSE) I Year

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AUDIT COURSE
PEDAGOGY STUDIES (2A001)

COURSE OBJECTIVE:

This course is introduced to review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers

SYLLABUS:

UNIT – I

Introduction and Methodology:

Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education, Conceptual framework, Research questions**,** Overview of methodology and Searching.

UNIT – II

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries, Curriculum, Teacher education.

UNIT – III

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies, How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change, Strength and nature of the body of evidence for effective pedagogical practices, Pedagogic theory and pedagogical approaches, Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT – IV

Professional development: alignment with classroom practices and follow- up support
Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes.

UNIT – V

Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

SUGGESTED READING:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign. www.pratham.org/images/resource%20working%20paper%202.pdf.

COURSE OUTCOMES:

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

CO 1: Describe pedagogical practices are being used by teachers in formal and informal classrooms in developing countries

CO 2: Discuss the evidence on the effectiveness of these pedagogical practices

CO 3: Comprehend teacher education (curriculum and practicum), the school curriculum and guidance materials best support effective pedagogy

CO 4: Identify critical evidence gaps to guide the development

M.Tech. (CSE) I Year

L	T	P	C
2	0	0	0

AUDIT COURSE
STRESS MANAGEMENT BY YOGA (2A002)

COURSE OBJECTIVE:

This course is introduced to achieve overall health of body & mind and to overcome stress

SYLLABUS:

UNIT – I

Definitions of Eight parts of yog. (Ashtanga)

UNIT – II

Yam and Niyam

Do`s and Don't's in life.

i) Ahinsa, satya, astheya, bramhacharya and aparigraha

ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT – III

Asan and Pranayam

i) Various yog poses and their benefits for mind & body

ii) Regularization of breathing techniques and its effects-Types of pranayam

SUGGESTED READING:

1. "Yogic Asanas for Group Tarining-Part-I" : Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

COURSE OUTCOMES:

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

CO 1: Develop healthy mind in a healthy body thus improving social health and also improve in efficiency

M.Tech. (CSE) I Year

L	T	P	C
2	0	0	0

AUDIT COURSE

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS (2A003)

COURSE OBJECTIVE:

This course is introduced to awaken wisdom in students by attaining stable mind, pleasing personality and determination so that even the highest goal can be achieved happily

SYLLABUS:

UNIT – I

Neetisatakam-Holistic development of personality:

Verses- 19,20,21,22 (wisdom), Verses- 29,31,32 (pride & heroism), Verses- 26,28,63,65 (virtue), Verses- 52,53,59 (dont's), Verses- 71,73,75,78 (do's)

UNIT – II

Approach to day to day work and duties:

Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48

UNIT – III

Statements of basic knowledge:

Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68, Chapter 12 -Verses 13, 14, 15, 16,17, 18

Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39, Chapter18 – Verses 37,38,63

SUGGESTED READING:

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

COURSE OUTCOMES:

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

CO 1: Develop his/her personality and achieve the highest goal in life

CO 2: Lead the nation and mankind to peace and prosperity

CO 3: Develop versatile personality among them