UGC AUTONOMOUS

B.Tech in Computer Science and Engineering

Data Science

III &IV YEAR Course Structure (2020-2021 Admitted Batch)

III YEAR I SEMESTER

S.No	Course Code	Course Title	Periods Per weak			Credits	Scheme Of Examination Max.Marks		
			L	T	P		CIE	SEE	Total
THEORY									
1	DS3101PC	R Programming	3	0	0	3	25	75	100
2	DS3102PC	Design and Analysis of Algorithms	3	0	0	3	25	75	100
3	DS3103PC	Data Mining	3	0	0	3	25	75	100
4	DS3104PC	Introduction to Data Science	3	0	0	3	25	75	100
PRACTICALS									
5	DS3105PC	R Programming & Data Mining Lab	0	0	3	1.5	25	75	100
6	DS3106PC	Design and Analysis of Algorithms Lab	0	0	3	1.5	25	75	100
7	EN3107HS	Advanced Communication Skills Lab	0	0	2	1	25	75	100
8	**PROFESSIONAL ELECTIVE 1**		3	0	0	3	25	75	100
9	**PROFESSIONAL ELECTIVE 2**		3	0	0	3	25	75	100
		Total Credits	**18**	**0**	**8**	**22**	**225**	**675**	**900**

Professional Elective-I

COURSE CODE	COURSE TITLE
DS3108PE	InformationTheory & Coding
DS3109PE	AdvancedComputerArchitecture
DS3110PE	DataAnalytics
DS3111PE	ImageProcessing
DS3112PE	PrinciplesofProgrammingLanguages

Professional Elective-II

COURSE CODE	COURSE TITLE
DS3113PE	ComputerGraphics
DS3114PE	AdvancedOperating Systems
DS3115PE	InformationalRetrievalSystems
DS3116PE	DistributedDatabases
DS3117PE	Natural LanguageProcessing

III YEAR II SEMESTER

S.No.	Course Code	Course Title	Periods Per weak			Credits	Scheme Of Examination Max.Marks		
			L	T	P		CIE	SEE	Total
THEORY									
1	DS3201PC	Big Data Analytics through HADOOP	3	1	0	4	25	75	100
2	DS3202PC	CompilerDesign	3	1	0	4	25	75	100
3	DS3203PC	Computer Networks	3	1	0	4	25	75	100
PRACTICALS									
4	DS3204PC	Big Data Analytics through HADOOP Lab	0	0	2	1	25	75	100
5	DS3205PC	CompilerDesignLab	0	0	3	1.5	25	75	100
6	DS3206PC	Computer Networks Lab	0	0	3	1.5	25	75	100
7	PROFESSIONAL ELECTIVE III		3	0	0	3	25	75	100
8	OPEN ELECTIVE 1		3	0	0	3	25	75	100
MANDATORY/VALUE ADDED COURSES									
9	MC3001*	Cyber Security	3	0	0	0	Ref:8.4 Academic Regulations,UG. 20		
		TotalCredits	**18**	**3**	**8**	**22**	**200**	**600**	**800**

Professional Elective-III

COURSE CODE	COURSE TITLE
DS3207PE	Data Visualization
DS3208PE	Data Intensive Computing
DS3209PE	Social Network Analysis for Big Data
DS3210PE	Data Preparation and Analysis
DS3211PE	Data Storage Technologies and Networks

Open Elective-I

COURSE CODE	COURSE TITLE	DEPARTMENT OFFERING COURSE
CS3211OE	Introduction to Data Science	Computer Science and Engineering
CS3212OE	Data mining	Computer Science and Engineering
CS3213OE	Computer Forensics	Computer Science and Engineering
EE3211OE	Electrical Installation and Costing	Electrical and Electronics Engineering
EE3212OE	Electrical Engineering Material	Electrical and Electronics Engineering
EC3211OE	Fundamentals of Internet of Things	Electronics and Communication Engineering
ME3211OE	Operation Research	Mechanical Engineering
ME3212OE	Fundamentals of Mechanical Engineering	Mechanical Engineering
ME3213OE	Metallurgy of Non-Metallurgists	Mechanical Engineering
CE3211OE	Basics of Civil Engineering	Civil Engineering
CE3212OE	Building Materials and Construction	Civil Engineering

IV YEAR I SEMESTER

S.No.	Course Code	Course Title	Periods Per weak			Credits	Scheme Of Examination Max.Marks		
			L	T	P		CIE	SEE	Total
THEORY									
1	DS4101PC	Information Security	3	0	0	3	25	75	100
2	DS4102PC	Machine Learning	2	0	0	2	25	75	100
3		Professional Elective-IV	3	0	0	3	25	75	100
4		Professional Elective-V	3	0	0	3	25	75	100
5		Open Elective-II	3	0	0	3	25	75	100
PRACTICALS									
6	DS4103PC	Machine Learning Lab	0	0	2	1	25	75	100
7	DS4104PC	IndustrialOrientedMiniProject/ summer Internship	0	0	0	2	25	75	100
8	DS4105PC	Seminar	0	0	2	1	25	75	100
9	DS4106PC	ProjectStage -I	0	0	6	3	25	75	100

MANDATORY/VALUE ADDED COURSES									
10	MC4001*	Intellectual Property Rights	3	0	0	0	Ref:8.4 Academic Regulations,UG.20		
		Total credits	**17**	**0**	**10**	**21**	**225**	**675**	**900**

*Mandatory Non Credit Course

Note: Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summervacation between 6th and 7th semesters. Students should submit report of Industrial Oriented MiniProject/ Summer Internship for evaluation.

Professional Elective-IV

COURSE CODE	COURSE TITLE
DS4107PE	Graph Theory
DS4108PE	Introduction toEmbeddedSystems
DS4109PE	E-Commerce
DS4110PE	Cloud Computing
DS4111PE	Ad-hoc&SensorNetworks

Professional Elective-V

COURSE CODE	COURSE TITLE
DS4112PE	Advanced Algorithms
DS4113PE	RealTimeSystems
DS4114PE	SoftComputing
DS4115PE	Internet of Things
DS4116PE	SoftwareProjectManagement

Open Elective-II

COURSE CODE	COURSE TITLE	DEPARTMENT OFFERING COURSE
CS4121OE	Python Programming	Computer Science and Engineering
CS4122OE	R Programming	Computer Science and Engineering
CS4123OE	JAVA Programming	Computer Science and Engineering
EE4121OE	Renewable Energy Sources	Electrical and Electronics Engineering
EE4122OE	Reliability Engineering	Electrical and Electronics Engineering
EC4121OE	Principles of Computer Communications and Networks	Electronics and Communication Engineering
ME4121OE	Fabrication Processes	Mechanical Engineering

ME4122OE	Total Quality Management	Mechanical Engineering
ME4123OE	Energy Management and Conservation	Mechanical Engineering
CE4121OE	Environmental Impact Assessment	Civil Engineering
CE4122OE	Industrial Waste Water Treatment	Civil Engineering

IV YEAR II SEMESTER

S.No.	Course Code	Course Title	Periods Per weak			Credits	Scheme Of Examination Max.Marks		
			L	T	P		CIE	SEE	Total
THEORY									
1	SM4201MS	OrganizationalBehavior	3	0	0	3	25	75	100
2		Professional Elective- VI	3	0	0	3	25	75	100
3		Open Elective- III	3	0	0	3	25	75	100
4	DS4202PC	ProjectStage-II	0	0	14	7	25	75	100
		Total Credits	**9**	**0**	**14**	**16**	**200**	**300**	**400**

Professional Elective-VI

COURSE CODE	COURSE TITLE
DS4203PE	Computational Complexity
DS4204PE	Distributed Systems
DS4205PE	Neural Networks & Deep Learning
DS4206PE	Human Computer Interaction
DS4207PE	Cyber Forensics

Open Elective-III

COURSE CODE	COURSE TITLE	DEPARTMENT OFFERING COURSE
CS4231OE	Machine Learning	Computer Science and Engineering
CS4232OE	Cloud Computing	Computer Science and Engineering
CS4233OE	Natural Language Processing	Computer Science and Engineering
EE4231OE	Instrumentation and Control	Electrical and Electronics Engineering
EE4232OE	Energy Storage Systems	Electrical and Electronics Engineering
EC4231OE	Electronic Measuring Instruments	Electronics and Communication Engineering
ME4231OE	Reliability Engineering	Mechanical Engineering
ME4232OE	Industrial Management	Mechanical Engineering
ME4233OE	Renewable Energy Sources	Mechanical Engineering
CE4231OE	Remote Sensing and GIS	Civil Engineering
CE4232OE	Disaster Management	Civil Engineering

DS3101PC :R PROGRAMMING

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
DS3101PC	**Core**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- Understanding and being able to use basic programming concepts
- Automate data analysis
- Working collaboratively and openly on code
- Knowing how to generate dynamic documents
- Being able to use a continuous test-driven development approach

Course Outcomes:

- be able to use and program in the programming language R
- be able to use R to solve statistical problems
- be able to implement and describe Monte Carlo the technology
- be able to minimize and maximize functions using R

UNIT – I

Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

UNIT – II

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes

Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

UNIT – III

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATA FRAMES, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations

UNIT - IV

FACTORS AND TABLES: Factors and Levels, Common Functions Used with Factors,Working with Tables,Matrix/Array-Like Operations on Tables , Extracting a Subtable,
Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions

UNIT – V

OBJECT-ORIENTED PROGRAMMING: S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation

TEXT BOOKS:

1. R Programming for Data Science by Roger D. Peng
2. The Art of R Programming by Prashanth singh, Vivek Mourya, Cengage LearningIndia.

CS3102PC :DESIGN AND ANALYSIS OF ALGORITHMS

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
CS3102PC	**Core**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- Introduces the notations for analysis of the performance of algorithms.
- Introduces the data structure disjoint sets.
- Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
- Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
- Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

Course Outcomes:

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

UNIT - I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT - II

Disjoint Sets: Disjoint set operations, union and find algorithms

Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

UNIT - III

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT - IV

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT - V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem.

TEXT BOOK:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan,University Press.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R.Tamassia, John Wiley and sons.

DS3103PC: DATA MINING

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
DS3103PC	**Core**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites:	**None**							

Course Objectives:

- Learn data mining concepts understand association rules mining.
- Discuss classification algorithms learn how data is grouped using clusteringtechniques.
- To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for datamining
- To understand the strengths and limitations of various data mining models;

Course Outcomes:

- Ability to perform the preprocessing of data and apply mining techniques on it.
- Ability to identify the association rules, classification and clusters in large data sets.
- Ability to solve real world problems in business and scientific information using data mining
- Ability to classify web pages, extracting knowledge from the web

UNIT - I

Introduction to Data Mining: Introduction**,** What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data,Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

UNIT - II

Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-

Growth Algorithms, Compact Representation of Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set.

UNIT - III

Classification: Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

UNIT - IV

Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms**,** Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm;

Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

UNIT - V

Web and Text Mining: Introduction, web mining, web content mining, web structure mining, we usage mining, Text mining –unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

TEXT BOOKS:

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, MorganKaufmann Publishers, Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch,Pearson Education.
3. Data mining Techniques and Applications, Hongbo Du Cengage India Publishing

REFERENCE BOOKS:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Mining Principles & Applications – T.V Sveresh Kumar, B. Esware Reddy,Jagadish S Kalimani, Elsevier.
3. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press

DS3104PC :INTRODUCTION TO DATA SCIENCE

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3104PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		

Prerequisites: None

Course Objectives:

- Learn data science project concepts
- Learn to collect data and process
- Learn to visualize data

Course Outcomes:

- Able to collect data from various resources and process data
- Able to plot data using various methods
- Able to develop and evaluate models

Unit – I:

Introduction: Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

Unit – II:

Data Collection and Data Pre-Processing:Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.

Unit – III:

Exploratory Data Analytics:Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots –Pivot Table – Heat Map – Correlation Statistics – ANOVA.

Unit – IV:

Model Development:Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.

Unit – V:

Model Evaluation Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Over fitting Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing multiple Parameters by using Grid Search.

REFERENCES:

1. Jojo Moolayil, “Smarter Decisions : The Intersection of IoT and Data Science”,PACKT, 2016.
2. Cathy O ’Neil and Rachel Schutt, “Doing Data Science”, O'Reilly, 2015.
3. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”,EMC 2013
4. Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGI Global.

DS3108PE :INFORMATION THEORY & CODING

(Professional Elective - I)

III-I:CSE(DS)

Course Code	Category	Hours/Weak			Credits	Max Marks		
		L	T	P	C	CIE	SEE	Total
DS3108PE	Professional Elective - I	3	0	0	3	25	75	100
Contact Classes:45	Tutorial classes:15	Practical classes: Nill				Total Classes:60		

Prerequisites: None

Course Objectives:

- To acquire the knowledge in measurement of information and errors.
- Understand the importance of various codes for communication systems
- To design encoder and decoder of various codes.
- To known the applicability of source and channel codes

Course Outcomes:

- Upon completing this course, the student will be able to
- Learn measurement of information and errors.
- Obtain knowledge in designing various source codes and channel codes
- Design encoders and decoders for block and cyclic codes
- Understand the significance of codes in various applications

UNIT - I

Coding for Reliable Digital Transmission and storage: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.Source Codes: Shannon-fano coding, Huffman coding

UNIT - II

Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT - III

Cyclic Codes: Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding,

Cyclic Hamming Codes, shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT - IV

Convolutional Codes: Encoding of Convolutional Codes- Structural and Distance Properties, state, tree, trellis diagrams, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT - V

BCH Codes: Minimum distance and BCH bounds, Decoding procedure for BCH codes, Syndrome computation and iterative algorithms, Error locations polynomials for single and double error correction.

TEXT BOOKS

1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J.Costello,Jr, PrenticeHall, Inc 2014.
2. Error Correcting Coding Theory-Man Young Rhee, McGraw – Hill Publishing 1989

REFERENCE BOOKS

1. Digital Communications- John G. Proakis, 5th ed., , TMH 2008.
2. Introduction to Error Control Codes-Salvatore Gravano-oxford
3. Error Correction Coding – Mathematical Methods and Algorithms – Todd K.Moon, 2006, WileyIndia.
4. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Edition, 2009, TMH.

DS3109PE :ADVANCED COMPUTER ARCHITECTURE

(Professional Elective - I)

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
DS3109PE	**Professional Elective - I**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives

- To impart the concepts and principles of parallel and advanced computer architectures.
- To develop the design techniques of Scalable and multithreaded Architectures.
- To Apply the concepts and techniques of parallel and advanced computer architectures todesign modern computer systems

Course Outcomes:

- Gain knowledge of
- Computational models and Computer Architectures.
- Concepts of parallel computer models.
- Scalable Architectures, Pipelining, Superscalar processors, multiprocessors

UNIT - I

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architectural development tracks, Program and network properties, Conditions of parallelism, Program partitioning and Scheduling, Program flow Mechanisms, System interconnect Architectures.

UNIT - II

Principals of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.

UNIT - III

Bus Cache and Shared memory, Backplane bus systems, Cache Memory organizations, Shared- Memory Organizations, Sequential and

weak consistency models, Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, superscalar pipeline design.

UNIT - IV

Parallel and Scalable Architectures, Multiprocessors and Multicomputers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputers, Message-passing Mechanisms, Multivetor and SIMD computers, Vector Processing Principals, Multivector Multiprocessors, Compound Vector processing, SIMD computer Organizations, The connection machine CM-5,

UNIT - V

Scalable, Multithreaded and Dataflow Architectures, Latency-hiding techniques, Principals of Multithreading, Fine-Grain Multicomputers, Scalable and multithreaded Architectures, Dataflow and hybrid Architectures.

TEXT BOOK:

1. Advanced Computer Architecture Second Edition, Kai Hwang, Tata McGraw Hill Publishers.

REFERENCE BOOKS:

1. Computer Architecture, Fourth edition, J. L. Hennessy and D.A. Patterson. ELSEVIER.
2. Advanced Computer Architectures, S.G. Shiva, Special Indian edition, CRC, Taylor &Francis.
3. Introduction to High Performance Computing for Scientists and Engineers, G. Hager and G.Wellein, CRC Press, Taylor & Francis Group.
4. Advanced Computer Architecture, D. Sima, T. Fountain, P. Kacsuk, Pearson education.
5. Computer Architecture B. Parhami, Oxford Univ. Press.

DS3110PE :DATA ANALYTICS

(Professional Elective - I)

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
DS3110PE	**Professional Elective - I**	**3**	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To explore the fundamental concepts of data analytics.
- To learn the principles and methods of statistical analysis
- Discover interesting patterns, analyze supervised and unsupervised models and estimate theaccuracy of the algorithms.
- To understand the various search methods and visualization techniques.

Course Outcomes:

- After completion of this course students will be able to
- Understand the impact of data analytics for business decisions and strategy
- Carry out data analysis/statistical analysis
- To carry out standard data visualization and formal inference procedures
- Design Data Architecture
- Understand various Data Sources

UNIT - I

Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality(noise, outliers, missing values, duplicate data) and Data Processing & Processing.

UNIT - II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT - III

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization,and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT - IV

Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT - V

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXT BOOKS:

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan KaufmannPublishers.

REFERENCE BOOKS:

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway LabsJeffrey D Ullman Stanford Univ.

DS3111PE :IMAGE PROCESSING

(Professional Elective - I)

III-I:CSE(DS)

Course Code	Category	Hours/Weak			Credits	Max Marks		
		L	T	P	C	CIE	SEE	Total
DS3111PE	Professional Elective - I	3	0	0	3	25	75	100
Contact Classes:45	Tutorial classes:15	Practical classes: Nill				Total Classes:60		

Prerequisites: None

Course Objectives

- Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
- The topics include image acquisition; sampling and quantization; preprocessing; enhancement; restoration; segmentation; and compression.

Course Outcomes

- Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition,sampling, and quantization.
- Demonstrate the knowledge of filtering techniques.
- Demonstrate the knowledge of 2D transformation techniques.
- Demonstrate the knowledge of image enhancement, segmentation, restoration andcompression techniques.

UNIT - I

Digital Image Fundamentals: Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD.

UNIT - II

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering,Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

UNIT - III

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, LeastMean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT - IV

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding,Region Oriented Segmentation.

UNIT - V

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image CompressionModels, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXT BOOK:

1. Digital Image Processing: R.C. Gonzalez & R. E. Woods, Addison Wesley/ Pearson Education,2nd Ed, 2004.

REFERENCE BOOKS:

1. Fundamentals of Digital Image Processing: A. K. Jain, PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L.Eddins: Pearson Education India, 2004.
3. Digital Image Processing: William K. Pratt, John Wilely, 3rd Edition, 2004.

DS3112PE :PRINCIPLES OF PROGRAMMING LANGUAGES

(Professional Elective - I)

III-I:CSE(DS)

Course Code	Category	Hours/Weak			Credits	Max Marks		
		L	T	P	C	CIE	SEE	Total
DS3112PE	Professional Elective - I	3	0	0	3	25	75	100
Contact Classes:45	Tutorial classes:15	Practical classes: Nil				Total Classes:60		

Prerequisites: None

Course Objectives

- Introduce important paradigms of programming languages
- To provide conceptual understanding of high-level language design and implementation

Course Outcomes

- Acquire the skills for expressing syntax and semantics in formal notation
- Identify and apply a suitable programming paradigm for a given computing application
- Gain knowledge of and able to compare the features of various programming languages

UNIT - I

Preliminary Concepts: Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments

Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs

UNIT - II

Names, Bindings, and Scopes: Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants

Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence

Expressions and Statements: Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions,

Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment

Control Structures – Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT - III

Subprograms and Blocks: Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines

Implementing Subprograms: General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping

Abstract Data Types: The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations

UNIT - IV

Concurrency: Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency. Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++, Java, Introduction to Event Handling, Event Handling with Java and C#.

UNIT - V

Functional Programming Languages: Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages

Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements ofProlog, Applications of Logic Programming.

Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables,Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library. (Text Book 2)

TEXT BOOKS:

1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education.

2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech, 2007.

REFERENCE BOOKS:

1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003

DS3113PE :COMPUTER GRAPHICS

(Professional Elective - II)

III-I:CSE(DS)

Course Code	Category	Hours/Weak			Credits	Max Marks		
		L	T	P	C	CIE	SEE	Total
DS3113PE	Professional Elective - II	3	0	0	3	25	75	100
Contact Classes:45	Tutorial classes:15	Practical classes: Nill				Total Classes:60		

Prerequisites: None

Course Objectives

- The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
- Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;

Course Outcomes

- Acquire familiarity with the relevant mathematics of computer graphics.
- Be able to design basic graphics application programs, including animation
- Be able to design applications that display graphic images to given specifications

UNIT - I

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), mid- point circle and ellipse algorithms

Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT - II

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

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland –Hodgeman

polygon clipping algorithm.

UNIT - III

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT - IV

Geometric transformations: Translation, rotation, scaling, reflectionand shear transformations,composite transformations.

viewing: Viewing pipeline, viewing coordinates, view volume and general projection transformsand clipping.

UNIT - V

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

Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-treemethods and area sub-division methods

TEXT BOOKS:

1. "Computer Graphics *C version*", Donald Hearn and M. Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner andHughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

REFERENCE BOOKS:

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

DS3114PE :ADVANCED OPERATING SYSTEMS

(Professional Elective - II)

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3114PE	**Professional Elective - II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives

- To study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems)
- Hardware and software features that support these systems.

Course Outcomes

- Understand the design approaches of advanced operating systems
- Analyze the design issues of distributed operating systems.
- Evaluate design issues of multi processor operating systems.
- Identify the requirements Distributed File System and Distributed Shared Memory.
- Formulate the solutions to schedule the real time applications.

UNIT - I

Architectures of Distributed Systems: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives. **Theoretical Foundations:** Inherent Limitations of a Distributed System, Lamport's Logical Clocks, Vector Clocks, Causal Orderingof Messages, Termination Detection.

UNIT - II

Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms, **Non-Token – Based Algorithms:** Lamport's Algorithm, The Ricart-Agrawala Algorithm, Maekawa's Algorithm, **Token-Based Algorithms:** Suzuki-Kasami's Broadcast Algorithm, Singhal's Heurisric Algorithm, Raymond's Heuristic Algorithm.

UNIT - III

Distributed Deadlock Detection: Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Control Organizations for Distributed Deadlock Detection, Centralized- Deadlock – Detection Algorithms, Distributed Deadlock Detection Algorithms, HierarchicalDeadlock Detection Algorithms

UNIT – IV

Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures **Multi Processor Operating Systems**: Introduction, Structures ofMultiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling.
Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues

UNIT - V

Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration
Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

TEXT BOOK:

1. Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, TataMcGraw-Hill Edition 2001

REFERENCE BOOK:

1. Distributed Systems: Andrew S. Tanenbaum, Maarten Van Steen, Pearson Prentice Hall,Edition – 2, 2007

DS3115PE :INFORMATION RETRIEVAL SYSTEMS

(Professional Elective - II)

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3115PE	**Professional Elective - II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To learn the important concepts and algorithms in IRS
- To understand the data/file structures that are necessary to design, and implement informationretrieval (IR) systems.

Course Outcomes:

- Ability to apply IR principles to locate relevant information large collections of data
- Ability to design different document clustering algorithms
- Implement retrieval systems for web search tasks.
- Design an Information Retrieval System for web search tasks.

UNIT - I

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems,Digital Libraries and Data Warehouses

Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT - II

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction

Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

UNIT - III

Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages

Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

UNIT - IV

User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext

Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

UNIT - V

Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems

Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

TEXT BOOK:

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition,Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCE BOOKS:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms,Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

DS3116PE:DISTRIBUTED DATABASES

(Professional Elective - II)

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3116PE	**Professional Elective - II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- The purpose of the course is to enrich the previous knowledge of database systems and exposing the need for distributed database technology to confront with the deficiencies of the centralized database systems.
- Introduce basic principles and implementation techniques of distributed database systems.
- Equip students with principles and knowledge of parallel and object-oriented databases.
- Topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database management systems.

Course Outcomes:

- Understand theoretical and practical aspects of distributed database systems.
- Study and identify various issues related to the development of distributed database system.
- Understand the design aspects of object-oriented database system and related development.

UNIT - I

Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBSs,Problem areas.
Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.
Distributed Database Design:Alternative Design Strategies,Distribution Design issues,Fragmentation, Allocation.

UNIT - II

Query processing and decomposition: Query processing objectives, characterization of queryprocessors, layers of query processing, query decomposition, localization of distributed data.

Distributed query Optimization: Query optimization, centralized query optimization, distributed queryoptimization algorithms.

UNIT - III

Transaction Management: Definition, properties of transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

UNIT - IV

Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.

Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

UNIT - V

Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.

Object Oriented Data Model: Inheritance, object identity, persistent programming languages,persistence of objects, comparison OODBMS and ORDBMS

TEXT BOOKS:

1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, PearsonEdn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

REFERENCE BOOK:

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The CompleteBook", Second Edition, Pearson International Edition

DS3117PE :NATURAL LANGUAGE PROCESSING

(Professional Elective - II)

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3117PE	**Professional Elective - II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- Introduce to some of the problems and solutions of NLP and their relation to linguistics andstatistics.

Course Outcomes:

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluatingempirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, andestimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms
- Able to design different language modeling Techniques.

UNIT - I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT - II

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT - III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word SenseSystems, Software.

UNIT - IV

Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT - V

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure **Language Modeling:** Introduction, N-Gram Models, Language Model Evaluation, ParameterEstimation, Language Model Adaptation, Types of Language Models, Language-Specific ModelingProblems, Multilingual and Crosslingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice –Daniel M.Bikel and Imed Zitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, PearsonPublications

DS3105PC :R PROGRAMMING AND DATA MINING LAB

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3105PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		0	**0**	**3**	**1.5**	**25**	**75**	**100**
Contact Classes:Nill	**Tutorial classes:Nill**	**Practical classes: 36**				**Total Classes:36**		
Prerequisites: None								

LIST OF PROGRAMS:

1. Write an R-Program to print Hello World
2. Write an R-Program to take input from user.
3. Write an R-Program to demonstrate working with operators (Arithmetic, Relational,Logical, Assignment operators).
4. Write an R Program to Check if a Number is Odd or Even
5. Write an R Program to check if the given Number is a Prime Number
6. Write an R Program to Find the Factorial of a Number
7. Write an R Program to Find the Factors of a Number
8. Write an R Program to Find the Fibonacci sequence Using Recursive Function
9. Write an R Program to Make a Simple Calculator
10. Write an R Program to Find L.C.M of two numbers
11. Write an R Program to create a Vector and to access elements in a Vector
12. Write an R Program to create a Matrix and access rows and columns using functions
    colnames() and *rownames()* .
13. Write an R Program to create a Matrix using *cbind()* and *rbind()* functions.
14. Write an R Program to create a Matrix from a Vector using ***dim()*** function.
15. Write an R Program to create a List and modify its components.
16. Write an R Program to create a Data Frame.
17. Write an R Program to access a Data Frame like a List.
18. Write an R Program to access a Data Frame like a Matrix.
19. Write an R Program to create a Factor.

20. Write an R Program to Access and Modify Components of a Factor.
21. Write an R Program to create an S3 Class and S3 Objects.
22. Write an R Program to write a own generic function in S3 Class.
23. Write an R Program to create an S4 Class and S4 Objects.
24. Write an R Program to write a own generic function in S4 Class.
25. Write an R Program to create Reference Class and modify its Methods.

Data Mining Lab Programs:

List of Sample Problems:

Task 1: Credit Risk Assessment

Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient.

To do the assignment, you first and foremost need some knowledge about the world of credit.You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her andtry to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook onfinance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable ruleswhich can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctlyjudged when, and when not to, approve a loan application.

The German Credit Data:

Actual historical credit data is not always easy to come by because of

confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. Credit dataset(original) Excel spreadsheet version of the German credit data.

In spite of the fact that the data is German, you should probably make use of it for thisassignment. (Unless you really can consult a real loan officer!)

A few notes on the German dataset

1. DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian(but looks and acts like a quarter).
2. owns_telephone. German phone rates are much higher than in Canada so fewerpeople own telephones.
3. foreign_worker. There are millions of these in Germany (many from Turkey). It isvery hard to get German citizenship if you were not born of German parents.
4. There are 20 attributes used in judging a loan applicant. The goal is to classify theapplicant into one of two categories, good or bad.

DS3106PC :DESIGN AND ANALYSIS OF ALGORITHMS LAB

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3106PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		0	**0**	**3**	**1.5**	**25**	**75**	**100**
Contact Classes:Nill	**Tutorial classes:Nill**	**Practical classes: 36**				**Total Classes:36**		
Prerequisites: None								

Course Objectives:

- To write programs in java to solve problems using divide and conquer strategy.
- To write programs in java to solve problems using backtracking strategy.
- To write programs in java to solve problems using greedy and dynamic programmingtechniques.

Course Outcomes:

- Ability to write programs in java to solve problems using algorithm design techniques such as Divide and Conquer, Greedy, Dynamic programming, and Backtracking.

List of Programs:

1. Write a java program to implement Quick sort algorithm for sorting a list of integersin ascending order
2. Write a java program to implement Merge sort algorithm for sorting a list of integersin ascending order.

i) Write a java program to implement the dfs algorithm for a graph.

ii) Write a. java program to implement the bfs algorithm for a graph.

3. Write a java programs to implement backtracking algorithm for the N-queensproblem.
4. Write a java program to implement the backtracking algorithm for the sum of subsetsproblem.
5. Write a java program to implement the backtracking algorithm for the HamiltonianCircuits problem.
6. Write a java program to implement greedy algorithm for job sequencing withdeadlines.
7. Write a java program to implement Dijkstra's algorithm for the Single source shortestpath problem.
8. Write a java program that implements Prim's algorithm to generate minimum costspanning tree.

9. Write a java program that implements Kruskal's algorithm to generate minimum costspanning tree
10. Write a java program to implement Floyd's algorithm for the all pairs shortest pathproblem.
11. Write a java program to implement Dynamic Programming algorithm for the 0/1Knapsack problem.
12. Write a java program to implement Dynamic Programming algorithm for the OptimalBinary Search Tree Problem.

EN3107HS :ADVANCED COMMUNICATIONS SKILLS LAB

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
EN3107HS	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		0	**0**	**2**	**1**	**25**	**75**	**100**
Contact Classes:Nill	**Tutorial classes:Nill**	**Practical classes: 36**				**Total Classes:36**		
Prerequisites: None								

INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements

SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

- Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language

– Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

- Activities on Reading Comprehension –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effectivegoogling.
- Activities on Writing Skills – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/Technical report writing/* – planning for writing – improving one's writing.
- Activities on Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/e-mails/assignments etc.
- Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation-Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and MockInterviews.

MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd.2nd Edition

2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCE BOOKS:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar andHemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012.Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata McGraw-Hill 2009.

MC3002:ARTIFICIAL INTELLIGENCE

III-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
MC3002	**Mandatory**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**0**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To train the students to understand different types of AI agents, various AI search algorithms, fundamentals of knowledge representation, building of simple knowledge-based systems
- To apply knowledge representation, reasoning. Study of Markov Models enable the student readyto step into applied AI.

UNIT - I

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents

Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search,Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), ConstraintSatisfaction (Backtracking, Local Search)

UNIT - II

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation,Minimax Search, Alpha-Beta Pruning

Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, ForwardChaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

UNIT - III

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Non-monotonic Reasoning, Other Knowledge Representation Schemes

Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes' Rule,Representing Knowledge in an Uncertain Domain, Bayesian Networks

UNIT - IV

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving,Learning from Examples, Winston's Learning

Program, Decision Trees.

UNIT - V

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, KnowledgeAcquisition.

TEXT BOOK:

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice-Hall, 2010.

REFERENCE BOOKS:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hillpublications, Third Edition, 2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving,Pearson Education, 6th ed., 2009.

DS3201PC :BIG DATA ANALYTICS THORUGH HADOOP

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3201PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**1**	**0**	**4**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives

- This course explains sources and importance of big data.
- To understand Hadoop architecture and ecosystem
- To study Hive,H base .

Course Outcomes

- Understand the concepts of big data
- Ability to get the skill to apply hadoop
- Understand HiveQL

Unit – I: Introduction to Big Data

Big Data and its importance – Sources of Big Data – Characteristics of Big Data – Big DataAnalytics – Big Data Applications.

Unit – II: Introduction to Hadoop

Hadoop Distributed File System – Map Reduce Paradigm – Moving Data in and out ofHadoop – Understanding inputs and outputs of Map Reduce – Data Serialization.

Unit – III: Hadoop Architecture

Common Hadoop Shell Commands – Name Node, Secondary Name Node and Data Node –Job Tracker and Task Tracker – Cluster Setup – SSH and Hadoop Configuration.

Unit – IV: Hadoop Ecosystem

Hadoop Ecosystem Concepts – Schedulers – New Features of Hadoop 2.0 – Name NodeHigh Availability – HDFS Federation – Map Reduce Version 2 – YARN – Use Cases.

Unit – V: Hive, HiveQL and HBase

Hive Architecture and Installation – Comparison with Traditional Data Bases – Hive SQL –Querying Data – Sorting and Merging – Joins and Subqueries –

HBase Concepts – Schema Design – Advanced Indexing – Use cases.

REFERENCES:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Tom White " Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2011
3. Zikopoulos, P., Parasuraman, K., Deutsch, T., Giles, J., & Corrigan, D.v *Harness thePower of Big Data The IBM Big Data Platform*. McGraw Hill Professional, 2012
4. Prajapati, V. *Big data analytics with R and Hadoop*. Packt Publishing Ltd, 2013
5. Gates, A. *Programming Pig*. " O'Reilly Media, Inc.", 2011.
6. Capriolo, E., Wampler, D., & Rutherglen, J., *Programming hive*. " O'Reilly Media,Inc.", 2012.

DS3202PC :COMPILER DESIGN

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3202PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**1**	**0**	**4**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
- Topics include phases of compiler, parsing, syntax directd translation, type checking use of symbol tables, code optimization techniques, intermediate code generation, code generation and data flow analysis.

Course Outcomes:

- Demonstrate the ability to design a compiler given a set of language features.
- Demonstrate the the knowledge of patterns, tokens & regular expressions for lexical analysis.
- Acquire skills in using lex tool & yacc tool for devleoping a scanner and parser.
- Design and implement LL and LR parsers
- Design algorithms to do code optimization in order to improve the performance of a program interms of space and time complexity.
- Design algorithms to generate machine code.

UNIT - I

Introduction: The structure of a compiler, the science of building a compiler, programming language basics

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of aLexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT - II

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

UNIT - III

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.

Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT - IV

Run-Time Environments: Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

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

UNIT - V

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

TEXT BOOK:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam,Ravi Sethi,Jeffry D. Ullman.

REFERENCE BOOKS:

1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Louden, Thomson.

DS3203PC :COMPUTER NETWROKS

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3203PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**1**	**0**	**4**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives

- The objective of the course is to equip the students with a general overview of the conceptsand fundamentals of computer networks.
- Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

Course Outcomes

- Gain the knowledge of the basic computer network technology.
- Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
- Obtain the skills of subnetting and routing mechanisms.
- Familiarity with the essential protocols of computer networks, and how they can be applied innetwork design and implementation.

UNIT - I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET,Internet.

Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wirelesstransmission.

UNIT - II

Data link layer: Design issues, framing, Error detection and correction. Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.

Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.

Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCPand UDP protocols.

UNIT - V

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK:

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

DS3207PE :DATA VISUALIZATION

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3207PE	**Professional Elective**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

OBJECTIVES:

- To understand visualizing data methods
- To learn security issues in data visualization

OUTCOMES:

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

- Design and use various methodologies present in data visualization
- Discuss the process involved and security issues present in data visualization

UNIT I

INTRODUCTION: Context of data visualization – Definition, Methodology, Visualization design objectives. Key Factors – Purpose, visualization function and tone, visualization design options – Data representation, Data Presentation, Seven stages of data visualization, widgets, data visualization tools.

UNIT II

VISUALIZING DATA METHODS: Mapping - Time series - Connections and correlations – Scatter plot maps - Trees, Hierarchies and Recursion - Networks and Graphs, Info graphics

UNIT III

VISUALIZING DATA PROCESS: Acquiring data, - Where to Find Data, Tools for Acquiring Data from the Internet, Locating Files for Use with Processing, Loading Text Data, Dealing with Files and Folders, Listing Files in a Folder, Asynchronous Image Downloads, Advanced Web Techniques, Using a Database, Dealing with a Large Number of Files. Parsing data - Levels of Effort, Tools for Gathering Clues, Text Is Best, Text Markup Languages, Regular Expressions (reg exps), Grammars and BNF Notation, Compressed Data, Vectors and Geometry, Binary Data Formats, Advanced Detective Work.

UNIT IV

INTERACTIVE DATA VISUALIZATION: Drawing with data – Scales – Axes – Updates, Transition and Motion – Interactivity - Layouts – Geo mapping – Exporting, Framework – T3, .js, tablo.

UNIT V

SECURITY DATA VISUALIZATION: Port scan visualization - Vulnerability assessment and exploitation - Firewall log visualization - Intrusion detection log visualization -Attacking and defending visualization systems - Creating security visualization system.

REFERENCES:

1. Scott Murray, "Interactive data visualization for the web", O'Reilly Media, Inc., 2013.
2. Ben Fry, "Visualizing Data", O'Reilly Media, Inc., 2007.
3. Greg Conti, "Security Data Visualization: Graphical Techniques for Network Analysis", No Starch Press Inc, 2007.

DS3208PE :DATA INTENSIVE COMPUTING

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3208PE	**Professional Elective**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

OBJECTIVES

- To understand the basics of the various database systems including databases for Big data
- To learn about the architecture of data intensive computing
- To learn about parallel processing for data intensive computing
- To learn about the applications that involve Data intensive computing

OUT COMES

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

- Design applications that involve data intensive computing
- Decide on the appropriate techniques of Map Reduce, Mongo DB, for the different applications
- Decide on the various security techniques that are necessary for data intensive applications

UNIT I

INTRODUCTION: Introduction to Distributed systems – Databases Vs. File Systems - Distributed file systems (HDFS) – Distributed Machine-Learning System - Data Parallelism – Characteristics -Hadoop – Execution Engines -Map Reduce- Distributed Storage System for Structured Data – No SQL databases -Casandra, MongoDB-Developing a Distributed Application

UNIT II

ARCHITECTURES AND SYSTEMS: High performance Network Architectures for Data intensive Computing – Architecting Data Intensive Software systems – ECL/HPCC: A Unified approach to Big Data – Scalable storage for Data Intensive Computing - Computation and Storage of scientific data sets in cloud- Stream Data Model - Architecture for Data Stream Management-Stream Queries –Sampling Data in a Stream- Filtering Streams

UNIT III

TECHNOLOGIES AND TECHNIQUES: Load balancing techniques for Data Intensive computing – Resource Management for Data Intensive Clouds – SALT - Parallel Processing, Multiprocessors and Virtualization in Data- Intensive Computing - Challenges in Data Intensive Analysis and Visualization - Large-Scale Data Analytics Using Ensemble Clustering - Ensemble Feature Ranking Methods for Data Intensive Computing Application - Record Linkage Methodology and Applications - Semantic Wrapper

UNIT IV

SECURITY: Security in Data Intensive Computing Systems - Data Security and Privacy in Data- Intensive Supercomputing Clusters - Information Security in Large Scale Distributed Systems -Privacy and Security Requirements of Data Intensive Applications in Clouds

UNIT V

APPLICATIONS AND FUTURE TRENDS: Cloud and grid computing for data intensive applications -Scientific applications - Bioinformatics - Large science discoveries - Climate change - Environment - Energy - Commercial applications - Future trends in data intensive computing

REFERENCES:

1. Tom White , “Hadoop: The Definitive Guide”,. O'Reilly Media. October 2010.
2. Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom., “Database Systems: The Complete Book, Pearson, 2013
3. Handbook of Data Intensive Computing, byFurht, Borko, Escalante, Armando, Springer 2011.

DS3209PE :SOCIAL NETWORK ANALYSIS FOR BIG DATA

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3209PE	**Professional Elective**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

OBJECTIVES:

- To understand the graph essentials in the context of Social Network Analysis
- To understand the classification of social network behavior
- To identify social network communities and community structures
- To understand the recommendation systems
- To study few social networking sites

OUTCOMES:

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

- Design algorithms for processing social networking data by using graph based algorithms
- Design recommendation systems for the various data available in social networking sites
- Design algorithms for identifying the underlying communities and their structure in social networking sites
- Apply recommendation algorithms for arena that has a Big Data component.

UNIT I

INTRODUCTION: Introduction of Social Network Analysis –Graph Essentials –Graph Basics-Graph Representation- Types of Graphs-Connectivity in Graphs-Special Graphs-Graph Algorithms-Network Measures- Network Models: Properties of Real-World Networks-Random Graphs- Small-World Model- Preferential Attachment Model.

UNIT II

BIG DATA ANALYSIS AND PREDICTIVE ANALYTICS: Evolution of analytic scalability – parallel processing systems – map reduce – enterprise analytic sand box – analytic data sets – Analytic methods – analytic tools- Predictive Analytics – Supervised – Unsupervised learning – Neural networks – Kohonen models – Normal – Deviations from normal patterns – Normal behaviours – Expert options – Variable entry – Mining Frequent itemsets – Market based model – Apriori

Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data Visualizations – Visual data analysis techniques, interaction techniques

UNIT III

COMMUNITIES AND INTERACTIONS : Community Analysis-Community Detection-Community Evolution-Community Evaluation-Information Diffusion in Social Media-Herd Behavior-Information Cascades-Diffusion of Innovations-Epidemics.

UNIT IV

RECOMMENDATION IN SOCIAL MEDIA AND BEHAVIOR ANALYTICS: Challenges-Classical Recommendation Algorithms-Recommendation Using Social Context- Evaluating Recommendations-Behavior Analytics: Individual Behavior- Collective Behavior.

UNIT V

SOCIAL MEDIA INSITES: Introduction: Hacking on Twitter Data-Twitter: Friends, Followers, and Set wise Operations- Analyzing Tweets-Visualizing tons of tweets-LinkedIn: Motivation for clustering –Blogs: Natural Language Processing –Face book: Visualizing face book data.

REFERENCES:

1. Social Media Mining: An Introduction, R. Zafarani, M. Abbasi, and H. Liu, Cambridge University Press, 2014.
2. Matthew A. Russell, Mining the Social Web: Analyzing Data from Facebook, Twitter, LinkeeIn, and Other Social Media Sites, O‟Reilly Media, 2011.
3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, Wiley and SAS Business Series, 2012.
4. Colleen Mccue, “Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis”, Elsevier, 2007

DS3210PE :DATA PREPARATION AND ANALYSIS

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3210PE	**Professional Elective**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

OBJECTIVES:

- To learn to gather data
- To understand different cleaning methods of data

OUTCOMES:

- Student will able to prepare different data formats
- Able to analyze data

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, Geo located data, Correlations and connections, Hierarchies and networks, interactivity

Unit V Visualizations using R

Textbook:

1. Glenn J. Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, John Wiley Publishers, 2007.

DS3211PE :DATA STORAGE TECHNOLOGIES AND NETWORKS

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3211PE	**Professional Elective**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

OBJECTIVES:

- To learn to about data centre
- To understand different storage methods of data

OUTCOMES:

- Student will able to identify storage mechanism required
- Able to secure stored data

Unit I

DATA CENTRE: Introduction, Site Selection and Environmental Considerations, Hierarchical or Layered Architecture, Architect Roles, Goals and Skills, Architecture Precursors

Unit II

STORAGE MANAGEMENT: Introduction to Storage Technology, Storage Systems Architecture, Physical and logical components of a connectivity environment, Major physical components of a disk drive and their functions.

UNIT III

Concept of RAID and its components: Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Integrated and Modular storage systems, high-level architecture and working of an intelligent storage systems

Unit IV

NETWORKED STORAGE: Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN, Benefits of the

different networked storage options, Need for long-term archiving solutions and describe how CAS fulfill the need, Appropriateness of the different networked storage options for different application environments

Unit V

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

Text Books:

1. Mauricio Arregoces, Data Center Fundamentals, Cisco Press; 1st edition, 2003.
2. Robert Spalding, Storage Networks: The Complete Reference, Tata McGraw Hill, Osborne, 2003.
3. Marc Farley, Building Storage Networks, Tata McGraw Hill, Osborne. 2001.
4. Meeta Gupta, Storage Area Network Fundamentals, Pearson Education Limited, 2002

Reference Books:

1. G. Somasundaram, Alok Shrivastava, Information Storage and Management, EMC Education Series, Wiley, Publishing Inc., 2011.
2. Gustavo Santana, Data Center Virtualization Fundamentals: Understanding Techniques and Designs for Highly Efficient Data Centers with Cisco Nexus, UCS, MDS, and Beyond, Cisco Press; 1 edition, 2013

INTRODUCTION TO DATA SCIENCE
(Open Elective- I)

III-II:CSE(DS)

Course Code	Category	Hours/Weak			Credits	Max Marks		
		L	T	P	C	CIE	SEE	Total
CS3211OE	Open Elective- I	3	0	0	3	25	75	100
Contact Classes:45	Tutorial classes:15	Practical classes: Nill				Total Classes:60		

Prerequisites: None

Course Objectives:

- Learn data science project concepts
- Learn to collect data and process
- Learn to visualize data

Course Outcomes:

- Able to collect data from various resources and process data
- Able to plot data using various methods
- Able to develop and evaluate models

Unit – I: Introduction

Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.

Unit – II: Data Collection and Data Pre-Processing

Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – DataIntegration and Transformation – Data Reduction – Data Discretization.

Unit – III: Exploratory Data Analytics

Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots –Pivot Table – Heat Map – Correlation Statistics – ANOVA.

Unit – IV: Model Development

Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sampleEvaluation – Prediction and Decision Making.

Unit – V: Model Evaluation

Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Over fitting Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing multiple Parameters by using Grid Search.

REFERENCES:

1. Jojo Moolayil, "Smarter Decisions : The Intersection of IoT and Data Science",PACKT, 2016.

2. Cathy O'Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015.

3. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics",EMC 2013

4. Raj, Pethuru, "Handbook of Research on Cloud Infrastructures for Big DataAnalytics", IGI Global.

CS3212OE:DATA MINING
(Open Elective- I)

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS3212OE	**Open Elective- I**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- Learn data mining concepts understand association rules mining.
- Discuss classification algorithms learn how data is grouped using clustering techniques.
- To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining
- To understand the strengths and limitations of various data mining models

Course Outcomes:

- Ability to perform the preprocessing of data and apply mining techniques on it.
- Ability to identify the association rules, classification and cluster large datasets.
- Ability to solve real world problems in business and scientific information using data mining
- Ability to classify web pages, extracting knowledge from the web

UNIT-I

IntroductiontoDataMining:Introduction,WhatisDataMining,Definition,KDD,Challenges,DataMiningTasks,DataPreprocessing,DataCleaning,Missingdata,Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, DataTransformation;Measures of Similarity and Dissimilarity-Basics.

UNIT-II

AssociationRules:ProblemDefinition,FrequentItemSetGeneration,TheAPRIORIPrinciple,SupportandConfidenceMeasures,AssociationRuleGeneration;A

PRIOIRIAlgorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set.

UNIT-III

Classification: Problem Definition, General Approaches to solving a classification problem ,EvaluationofClassifiers,Classificationtechniques,DecisionTrees-DecisiontreeConstruction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian BeliefNetworks;K-Nearestneighborclassification-AlgorithmandCharacteristics.

UNIT-IV

Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms,Partitioning Clustering-K-MeansAlgorithm,K-MeansAdditionalissues,PAMAlgorithm;

Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, StrengthsandWeakness; OutlierDetection.

UNIT-V

WebandTextMining:Introduction,webmining,webcontentmining,webstructuremining, we usage mining, Text mining –unstructured text, episode rule discovery for texts ,hierarchy of categories ,text clustering.

TEXT BOOKS:

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber,Morgan Kaufmann Publishers,Elsevier,2Edition,2006.
2. IntroductiontoDataMining,Pang-NingTan, Vipin Kumar, Michael Stein banch,Pearson Education.
3. Datamining Techniques and Applications, Hongbo Du Cengage India Publishing

REFERENCE BOOKS:

1. Data Mining Techniques, Arun K Pujari, 3rdEdition, UniversitiesPress.
2. Data Mining Principles & Applications– T. V Sveresh Kumar, B.EswareReddy,JagadishSKalimani,Elsevier.
3. DataMining, Vikaram Pudi,P Radha Krishna,Oxford University Press

CS3213O:COMPUTER FORENSICS
(Open Elective- I)

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS3213OE	**Open Elective- I**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- **T**o understand the cyberspace.
- To understand the **forensics** fundamentals.
- To understand the evidence capturing process.
- To understand the preservation of **digital** evidence.

Course Outcomes:

- Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
- It gives an opportunity to students to continue their zeal in research in

UNIT-I

Computer Forensics Fundamentals: What is Computer Forensics? Forensicsin Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists Types of Computer Forensics Technology: Types of Military Computer Forensic Technology, Types of Law Enforcement — Computer Forensic Technology — Types of Business Computer Forensic Technology Computer Forensics Evidence and Capture: Data Recovery Defined — Data Back-up and Recovery — The Role of Back-up in Data Recovery — The Data-Recovery Solution.

UNIT-II

Evidence Collection and Data Seizure: Why Collect Evidence? Collection Options —Obstacles — Types of Evidence — The Rules of Evidence — Volatile Evidence — General Procedure — Collection and Archiving — Methods of Collection — Artifacts — Collection Steps — Controlling Contamination: The Chain of Custody Duplication and Preservation of Digital Evidence: Preserving the Digital Crime Scene — Computer Evidence Processing Steps — Legal Aspects of Collecting and Preserving Computer Forensic Evidence Computer Image Verification and Authentication: Special Needs of Evidential Authentication— Practical Consideration—Practical Implementation.

UNIT-III

Computer Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions

NetworkForensics: Networkforensicsoverview,performingliveacquisitions ,developingstandardproceduresfornetworkforensics,usingnetwork tools, examining the honeynet project.

Processing Crime and Incident Scenes: Identifying digital evidence, collecting evidence inprivate-sector incident scenes, processing law enforcement crime scenes, preparing for asearch, securing a computer incident or crime scene, seizing digital evidence at the scene,storingdigitalevidence,obtainingadigitalhash,reviewingacase

UNIT-IV

Current Computer Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring therolesoftheclientandserverine-mail,investigatinge-mailcrimesandviolations,understandinge-mailservers,usingspecializede-mailforensic tools.

Cellphoneandmobiledeviceforensics:Understandingmobiledeviceforens ics,understandingacquisitionproceduresforcellphones andmobile devices.

UNIT-V

WorkingwithWindowsandDOSSystems:understandingfilesystems,explo ringMicrosoft File Structures, Examining NTFS disks, Understanding whole disk encryption,windowsregistry,Microsoftstartuptasks,MS-DOSstartuptasks,virtualmachines.

TEXT BOOKS

1. Computer Forensics, Computer Crime Investigation by JohnR.Vacca, Firewall Media, NewDelhi.
2. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart,CENGAGE Learning

REFERENCE BOOKS

1. Real Digital Forensics by Keith J.Jones, Richard Bejtiich, Curtis W.Rose, Addison-Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson,Springer International edition.

3. Computer Evidence Collection & Presentation by Christopher L.T. Brown,Firewall Media.
4. Home land Security, Techniques & Technologies by Jesus Mena, Firewall Media.
5. Software Forensics Collecting Evidence from the Scene of a Digital Crime by Robert M.Slade, TMH 2005
6. Windows Forensics by ChadSteel,Wiley India Edition.

EE3211OE :ELECTRICAL INSTALLATION AND COSTING
(Open Elective- I)

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
EE3211OE	**Open Elective- I**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

To emphasize the estimation and costing aspects of all electrical equipment, installation and designs on the cost viability.

- To design and estimation of wiring
- To design overhead and underground distribution lines, substations and illumination

Course Outcomes:

After Completion of this course, student will be able to

- Understand the design considerations of electrical installations.
- Design electrical installation for buildings and small industries.
- Identify and design the various types of light sources for different applications.

UNIT-I

Design Considerations of Electrical Installations: Electric Supply System, Three phasefourwire distribution system, Protection of Electric Installation against over load, short circuit and Earth fault, Earthing, General requirements of electrical installations, testing of installations, Indian Electricity rules, Neutral and Earth wire, Types of loads, Systems ofwiring, Service connections , Service Mains, Sub-Circuits, Location of Outlets, Location of Control Switches, Location of Main Board and Distribution board,Guide lines for Installation of Fittings, Load Assessment, Permissible voltage drops and sizes of wires, estimating and costing of Electric installations.

UNIT-II

Electrical Installation for Different Types of Buildings and Small Industries: Electricalinstallationsforresidentialbuildings–estimating and costing of material,Electrical installations for commercial buildings,Electrical installations for small industries.

UNIT-III

Over head and Underground Transmission and Distribution Lines: Introduction, Supports for transmission lines, Distribution lines –

Materials used, Underground cables,Mechanical Design of over headlines, Design of underground cables.

UNIT-IV

Substations: Introduction, Types of substations, Outdoor substation – Pole mounted type,Indoorsubstations–Floormountedtype.

UNIT-V

DesignofIlluminationSchemes: Introduction,Terminology in illumination,laws of illumination,various types of light sources,Practical lighting schemes LED,CFLand OCFL differences.

TextBooks:

1. "K.B.Raina,S.K.Bhattacharya","Electrical Design Estimating and Costing",New Age International Publisher,2010.
2. "Er.V.K.Jain,Er.Amitabh Bajaj", "Design of Electrical Installations", University Science Press.

ReferenceBooks:

1. Code of practice for Electrical wiring installations, (System voltage not exceeding 650 volts),Indian Standard Institution,IS:732-1983.
2. Guide for Electrical layout in residential buildings, Indian Standard Institution, IS: 4648-1968.
3. Electrical Installation buildings Indian Standard Institution,IS:2032.
4. Code of Practice for selection, Installation of Maintenance off use (voltage not exceeding 650V),Indian Standard Institution,IS:3106-1966.
5. Code of Practice for earthling, Indian Standard Institution,IS:3043-1966.
6. Code of Practice for Installation and Maintenance of induction motors, Indian Standard Institution,IS:900-1965.
7. Code of Practice for electrical wiring, Installations (system voltage not exceeding 650 Volts),Indian Standard Institution,IS:2274-1963.
8. "GuptaJ.B.,Katson, Ludhiana","Electrical Installation, estimating and costing",S.K.Kataria and sons,2013.

EE3212OE :ELECTRICAL ENGINEERING MATERIALS
(Open Elective- I)

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
EE3212OE	**Open Elective- I**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To understand the importance of various materials used in electrical engineering and obtain a qualitative analysis of their behavior and applications.

Course Outcomes:

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

- Understand various types of dielectric materials, their properties in various conditions.
- Evaluate magnetic materials and their behavior.
- Evaluate semiconductor materials and technologies.
- Acquire Knowledge on Materials used in electrical engineering and applications.

UNIT-I

Dielectric Materials: Dielectric as Electric Field Medium, leakage currents, dielectric loss,dielectricstrength,breakdownvoltage,breakdowninsoliddielectrics,flashover,liquiddielectrics,electricconductivityinsolid,liquidandgaseousdielectrics,Ferromagnetic materials, properties of ferromagnetic materials in static fields, spontaneous, polarization,curie point, anti-ferromagnetic materials, piezoelectric materials, pyroelectric materials.

UNIT– II

Magnetic Materials: Classification of magnetic materials, spontaneous magnetization inferromagnetic materials, magnetic Anisotropy, Magnetostriction, diamagnetism, magneticallysoft and hard materials, special purpose materials, feebly magnetic materials, Ferrites, castand cermetpermanentmagnets,ageingofmagnets.Factors effectingpermeability andhysteresis

UNIT–III

SemiconductorMaterials: Properties of semi conductors, Silicon wafers, integration techniques,Large and very large scale integration

techniques(VLSI)

UNIT– IV

Materials for Electrical Applications: Materials used for Resistors, rheostats, heaters,transmission line structures, stranded conductors, bimetals fuses, soft and hard solders,electriccontact materials, electric carbon materials, thermocouple materials. Solid, Liquid and Gaseous insulating materials,Effect of moisture on insulation.

UNIT– V

SpecialPurposeMaterials: RefractoryMaterials,StructuralMaterials,Radioactive Materials,Galvanization and Impregnation of materials, Processing of electronic materials, Insulatingvarnishes and coolants, Properties and applications of mineral oils, Testing of Transformeroilas perISI.

Text Books:

1. "RKRajput","AcourseinElectricalEngineeringMaterials",LaxmiPublications,2009
2. "TKBasak","AcourseinElectricalEngineeringMaterials",NewAgeSciencePublications2009

Reference Books:

1. TTTIMadras,"ElectricalEngineeringMaterials",McGrawHillEducation,2004.
2. "AdrianusJ.Dekker",Electrical Engineering Materials,PHIPublication,2006.
3. S.P.Seth,P.V.Gupta"Acoursein Electrical Engineering Materials", Dhanpat Rai & Sons,2011.

EC3211OE :FUNDAMENTALS OF INTERNET OF THINGS
(Open Elective- I)

III-II:CSE(DS)								
Course Code	Category	Hours/Weak			Credits	Max Marks		
EC3211OE	Open Elective- I	L	T	P	C	CIE	SEE	Total
		3	0	0	3	25	75	100
Contact Classes:45	Tutorial classes:15	Practical classes: Nill				Total Classes:60		
Prerequisites: None								

Course Objectives:

1. Understand the concepts of Internet of Things and able to build IOT applications
2. Learn the programming and use of Arduino and Raspberry Pi boards.
3. Known about data handling and analytics in SDN.

Course Outcomes:

Upon completing this course, the student will be able to

1. Known basic protocols in sensor networks.
2. Program and configure Arduino boards for various designs.
3. Python programming and interfacing for Raspberry Pi.
4. Design IOT applications in different domains.

UNIT–I

Introduction to Internet of Things,Characteristics of IoT, Physical design of IOT,Functional blocks of IoT,Sensing,Actuation,BasicsofNetworking,Communication Protocols,SensorNetworks.

UNIT- II

Machine-to-Machine Communications,Difference between IoT and M2M,Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino

UNIT–III

Introduction toPython programming,Introduction to Raspberry Pi,Interfacing RaspberryPi with basic peripherals,Implementation of IoT with RaspberryPi

UNIT-IV

Implementation of IoTwith RaspberryPi,Introductionto Software defined Network(SDN), SDN for IoT, Data Handling and Analytics,

UNIT-V

Cloud Computing,Sensor-Cloud,SmartCitiesand SmartHomes,Connected Vehicles,SmartGrid, Industrial IoT,Case Study: Agriculture, Healthcare, Activity Monitoring

TEXT BOOKS:

1. "The Internet'ofThings:EnablingTechnologies,Platforms,and Use Cases", by PethuruRaj and AnupamaC. Raman (CRC Press)
2. “Make sensors”: Terokarvinen, kemo, karvinen and villey valtokari, 1stedition, maker media,2014.
3. "Interne to fThings:A Hands-on Approach",by Arshdeep Bahgaand Vijay Madisetti

REFERENCE BOOKS:

1. VijayMadisetti,ArshdeepBahga,“InternetofThings:AHands-On Approach”
2. WaltenegusDargie,ChristianPoellabauer,"FundamentalsofWirelessSensorNetworks: Theory and Practice"
3. Beginning Sensor networks with Arduino and RaspberryPi– Charles Bell, Apress, 2013

ME3211OE :OPERATIONS RESEARCH
(Open Elective- I)

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
ME3211OE	**Open Elective- I**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

Understanding the mathematical importance of development of model in a particular optimization model for the issue and solving it.

Course Outcome:

Understanding the problem,identifying variables & constants, Formulation of optimization model and applying appropriate optimization technique

UNIT.I

Development-definition-characteristics and phases –Types of models-Operations Research models-applications.

Allocation: Linear Programming Problem Formulation-Graphical solution- Simplex method-Artificialvariable techniques:Two-phase method,Big-M method.

UNIT.II

Transportation problem –Formulation-Optimalsolution,unbalanced transportation problem-Degeneracy.

Assignment problem-Formulation-Optimal solution,-Variants of Assignment problem-Travelling sales man problem.

UNIT.III

Sequencing.Introduction-Flow-Shop sequencing-njobsthroughtwo machines-n jobs through three machines-Job shop sequencing-two jobs through'm'machines–graphical model Replacement:Introduction-Replacement of items that deteriorate with time-when money value is not counted and counted-Replacemen to fit emsthat fail completely-Group Replacement.

UNIT.IV

Theory of Games: Introduction- Terminology- Solution of games with saddle points and withoutsaddlepoints.2x2games-dominanceprinciple-mx2&2xngames-Graphicalmethod.

Inventory: Introduction- Single item, Deterministic models- purchase inventory models with oneprice break and multiple pricebreaks- Stochasticmodels -Demand maybediscretevariable orcontinuousvariable-singleperiodmodelandnosetupcost.

UNIT.V

Waiting lines: Introduction- Terminology- Singlechannel- Poisson arrivals and Exponentialservicetimeswithinfinitepopulationandfinitepopulationmodels.

Dynamic Programming: Introduction- Terminology, Bellman'sprinciple of optimality ApplicationsofDynamicprogramming- shortestpathproblem-linearprogrammingproblem.

TEXTBOOK:

1. OperationsResearch/J.K.Sharma/MacMilan
2. IntroductiontoOR/Hillier&Libemann/TMH

REFERENCE BOOKS:

1. IntroductiontoOR/Taha/PHI
2. OperationsResearch/NVSRaju/SMSEducation/3rdRevisedEdition
3. OperationsResearch/A.M.Natarajan,P.Balasubramaniam,A.Tamilarasi/PearsonEducation.

ME3212OE :FUNDAMENTALS OF MECHANICAL ENGINEERING
(Open Elective- I)

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
ME3212OE	**Open Elective- I**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Objectives:

- To understand the fundamentals of mechanical systems.
- To understand and appreciate significance of mechanical engineering in different Fields of engineering.

UNIT-I

Introduction: Prime movers and its types, Concept of Force, Pressure, Energy, Work, Power,System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internalenergy, Enthalpy, Statements of Zeroth Law and First law.

Energy: Introduction and applications of Energy sources like Fossil fuels,Nuclear fuels, Hydel,Solar,wind,andbio-fuels, Environmental issues like Global warming and Ozonedepletion.

UNIT-II

Propertiesofgases:Gaslaws,Boyle'slaw,Charle'slaw,Combinedgaslaw,Gas constant,Relation between Cp and Cv, Various non-flow processes like constant volume process, constant pressure process,Is other malprocess,Adiabatic process,Poly-tropic process

Properties of Steam: Steam formation, Types of Steam,Enthalpy, Specific volume,Internal energy and dryness fraction of steam,use of Steam tables,steam calorimeters.

Steam Boilers:Introduction, Classification, Cochran, Lancashire and Babcock and Wilcoxboiler,functioning of different mountings and accessories.

UNIT-III

Heat Engines: Heat Engine cycle and Heat Engine, working substances, Classification of heatengines, Description and thermal efficiency of Carnot;Rankine; Ottocycle and Dieselcycles.

Internal Combustion Engines: Introduction, Classification, Engine details, four- stroke/ two-stroke cycle Petrol/ Diesel engines,Indicated power, BrakePower, Efficiencies.

UNIT-IV

Pumps:Types and operation of Reciprocating,Rotary and Centrifugal pumps,Priming

Air Compressors:Types and operationof Reciprocating and Rotary air compressors, significance of Multistage.

Refrigeration & Air Conditioning: Refrigerant, Vapor compression refrigeration system, vapor absorption refrigeration system,Domestic Refrigerator,Window and splitair conditioners.

UNIT-V

Couplings, Clutches and Brakes: Construction and applications of Couplings (Box; Flange; Pintype flexible; Universal and Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe;BandandDisc).

Transmission of Motion and Power: Shaft and axle, Belt drive, Chain drive, Friction drive, Geardrive.

Engineering Materials: Types and applications of Ferrous & Non ferrous metals,Timber,Abrasive material,silica,ceramics,glass,graphite,diamond,plastic and polymer.

TEXTBOOKS:

1. BasicMechanicalEngineering/PravinKumar/Pearson
2. IntroductiontoEngineeringMaterials/B.K.Agrawal/McGrawHill

REFERENCEBOOKS:

1. FundamentalofMechanicalEngineering/G.S.Sawhney/PHI
2. ThermalScienceandEngineering/Dr.D.S.Kumar/Kataria

ME3213OE :METALLURGY OF NON METALLURGISTS
(Open Elective- I)

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
ME3213OE	**Open Elective- I**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- Todescribethe basicprinciplesofmetallurgy and theimportanceofmetallurgy invariousdisciplineofengineering.
- Gain athorough knowledge about heat treatment of steels.
- Gain knowledge about properties and uses of cast irons and non-ferrous metals.
- Gaina workingknowledge of basic testing methods for metals.

CourseOutcomes:

At the end of the course Student would be able

- Touse and apply metallurgy in his own branch of engineering.
- Thestudent will be able to justify the various testing methods adopted for metals.

UNIT-I

Introduction:Crystal structure and defects,Crystal structure of metals,Classification of steels,Carbonsteels.

Engineering Materials:Types and applicationsoff errous &Nonferrous metals,Timber,Abrasive material, silica, ceramics, glass, graphite, diamond, plastic and polymer.

UNIT-II

Heat Treatment of Steels: The Iron carbon systems, Common phases in steels, Annealing,Normalizing, Hardening and tempering.

UNIT-III

Castirons:Properties and applicationsof Ductile irons, Malleableirons, Compacted graphiteiron.

UNIT-IV

Non FerrousMetals: Properties and applications of Light Metals (Al,Be,Mg,Ti), Superalloys.

UNIT-V

Testing of Metals: Hardness testing, Tensile Testing, Impact Testing, Fatigue Testing.

TEXTBOOKS:

1. MaterialsScienceandEngineering,An introduction.WDCallister,Jr.,AdaptedbyR.Balasubramaniam,JohnWiley&Sons,NY,Indianedition,2007
2. Introduction to PhysicalMetallurgy–SHAvner,TATAMcGRAWHILL,1997
3. MechanicalMetallurgy–G.E.Dieter

REFERENCEBOOKS:

1. EngineeringPhysicalMetallurgyandHeattreatment–YLakhtin
2. C.Suryanarayana,ExperimentalTechniquesinMechanicsand Materials,JohnWiley,JohnWiley,NJ,USA,2006
3. FoundationsofMaterialsScienceandEngineering–WFSmith

CE3211OE :BASICS OF CIVIL ENGINEERING
(OpenElective–I)

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CE3211OE	**Open Elective- I**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course objectives: The objectives of the course are:

- To explain the concepts of Civil Engineering.
- To Understand the Building Materials for construction
- To understand the concept of Transportation
- To explain the Soil Characteristics for best foundation
- To know the Drinking water Standards & Water Treatment Units.

Course Out comes: On successful completion of this course, students should be able to:

- Identify different types of building materials for construction.
- Discuss types of Traffic Flow Characteristics.
- To know the soil classification and its properties.
- Distinguish and understand Drinking water and Waste water properties.

UNIT-I:

Building Materials for Construction:Bricks & Cement: qualities of good bricks, types of brick, ingredients of cement,types of cement, Grade of cement. Concrete & Steel: Properties of cement concrete, types of concrete based on usage & properties and uses of various types of steel, Admixtures.
Building components: lintels, walls, staircases, types of floors, types of roofs, doors, windows-material-types, Finishers-Plastering, Painting, Tiles.

UNIT-II

Transportation Engineering:Highway: History and Importance of Highways, Classification of roads, highway cross section, types of Pavement.Traffic: Road safety-Traffic signals & its types.Road intersections &its types.Railway: Permanent way, Components parts its functions.Airway: Typical Airport layout, Factors for air ports iteselection.

UNIT–III

Geotechnical Engineering

Soil formation and its three phase diagram, I.S.Classification of soils.Permeability & its Factors affecting, capillary rise.Compaction–factors affecting compaction.

Geology- Different types & its properties of Rocks & Minerals.

UNIT-IV

Water Resources & Irrigation Engineering

Hydro logiccycle, Forms of precipitation, measurement of precipitation by Symons rain gauge.

Abstractions from precipitation: Infiltration, Evaporation & Run off & their Factors affecting.

Irrigation: Water requirement of crops, canal & its losses, Types of lining-Advantages and disadvantages.Types of dams, Factors affecting selection of adamsite.Tunneling- Purposes of tunneling.

UNIT–V

Environmental Engineering

Drinking Water: types of water demand–factors affecting water quality and testing–drinking water standards.Layout and general outline of water treatment units.Waste water: Waste water treatment plant Flow diagram.Waste water collection,man holes & house drainage.Air & Sound pollution– Effects & Controlling methods.

TEXT BOOKS

1. BuildingConstructionbyB.C.Punmia,Ashok Kumar Jainand Arun KumarJain–Laxmi Publications (P) ltd., NewDelhi.
2. Transportation EngineeringbyKhanna&Justo
3. GeotechnicalEngineeringbyArora
4. WaterResources&Irrigation EngineeringbySK Garg
5. EnvironmentalEngineeringbyDr.B.C.Punmia

CE3212OE :BUILDING MATERIALS AND CONSTRUCTION
(OpenElective–I)

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CE3212OE	**Open Elective- I**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes:15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives: The objectives of the course is to

- List the construction material.
- Explain different construction techniques
- Underst and the building bye-laws
- Highlight the smart building materials

Course Outcomes:

After the completion of the course student should be able to

- Define the Basic terminology that isused in the industry
- Categorize different building materials, properties and the iruses

Unit-I

Cement: Introduction, ingredients of cement, types of cement,cement mortar uses.Concrete: Properties of cement concrete, materials, standard concrete mix proportions, curing of concrete, methods-effects of improper curing.

Unit-II

Bricks & Bricks masonry: qualities of good bricks, types of bricks, brick masonry and types of brick masonry

Timber: Structure of a tree, defects intimber, seasoning of timber, qualities of good timber, important Indian timber trees.

Unit-III

Construction Materials: Stone-type of building stones, glass-types based on usage, plastics-advantages and disadvantages,uses, ceramics-types used in building industry.

Structuralsteel: properties and uses of various types of steel, types. Girders-types & uses

Unit-IV

Building components: lintels, walls,stair cases,types of floors,types of roofs,doors,windows-material-types.
Fire protection: hazards, classification of fire resistant materials and constructions.

Unit-V

Building planning: principles of building planning, classification of buildings and building by laws. Building Services: Plumbing-water distribution, sanitary-lines and fittings, ventilations: functional requirements, system of ventilations.

TEXTBOOKS:

1. BuildingMaterialsand Construction–Arora & Bindra, Dhanpat Roy Publications.
2. Building Materials and Construction by GCSahu, Joygopal Jena McGraw hill PvtLtd2015.
3. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications(P) ltd., New Delhi

REFERENCEBOOKS:

1. BuildingMaterialsbyDuggal, NewAge International.
2. BuildingMaterialsbyP.C.Varghese,PHI.
3. BuildingConstructionbyPCVarghesePHI.
4. ConstructionTechnology– Vol–I& IIbyR.Chubby,Longman UK.
5. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others; New Age Publications.

DS3204PC :BIG DATA ANALYTICS THROUGH HADOOP LAB

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3204PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		0	**0**	**2**	**1**	**25**	**75**	**100**
Contact Classes: Nill	**Tutorial classes: Nill**	**Practical classes: 36**				**Total Classes:36**		
Prerequisites: None								

Course Objectives:

- Optimize business decisions and create competitive advantage with Big data analytics
- Practice java concepts required for developing map reduce programs.
- Impart the architectural concepts of Hadoop and introducing map reduce paradigm.
- Practice programming tools PIG and HIVE in Hadoop eco system.
- Implement best practices for Hadoop development.

Course Outcomes:

- Implement the file management tasks in Hadoop.
- Understand Map Reduce Paradigm.
- Apply Map Reduce program that mines weather data
- PIG and HIVE commands

List of Experiments

1. Installation of Hadoop
2. Hadoop file management tasks
3. Word count program
4. Matrix multiplication
5. Weather data analysis
6. Hive data base operations
7. Pig commands

DS3205PC :COMPILER DESIGN LAB

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3205PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		0	**0**	**3**	**1.5**	**25**	**75**	**100**
Contact Classes: Nill	**Tutorial classes: Nill**	**Practical classes: 36**				**Total Classes:36**		
Prerequisites: None								

Course Objectives:

- To understand the various phases in the design of a compiler.
- To understand the design of top-down and bottom-up parsers.
- To understand syntax directed translation schemes.
- To introduce lex and yacc tools.

Course Outcomes:

- Ability to design, develop, and implement a compiler for any language.
- Able to use lex and yacc tools for developing a scanner and a parser.
- Able to design and implement LL and LR parsers.

List of Experiments

Compiler Design Experiments

1. Write a LEX Program to scan reserved word & Identifiers of C Language
2. Implement Predictive Parsing algorithm
3. Write a C program to generate three address code.
4. Implement SLR(1) Parsing algorithm
5. Design LALR bottom up parser for the given language

<program> ::= <block>

<block> ::= { <variabledefinition> <slist> }

| { <slist> }

<variabledefinition> ::= int <vardeflist> ;

<vardeflist> ::= <vardec> | <vardec> , <vardeflist>

<vardec> ::= <identifier> | <identifier> [<constant>]

<slist> ::= <statement> | <statement> ; <slist>

<statement> ::= <assignment> | <ifstatement> | <whilestatement>

| <block> | <printstatement> | <empty>

<assignment> ::= <identifier> = <expression>

| <identifier> [<expression>] = <expression>

<ifstatement> ::= if <bexpression> then

<slist> else <slist> endif

| if <bexpression> then <slist> endif

<whilestatement> ::= while <bexpression> do <slist> enddo
<printstatement> ::= print (<expression>)
<expression> ::= <expression> <addingop> <term> | <term> | <addingop> <term>
<bexpression> ::= <expression> <relop> <expression>

<relop> ::= < | <= | == | >= | > | !=
<addingop> ::= + | -
<term> ::= <term> <multop> <factor> | <factor>
<multop> ::= * | /
<factor> ::= <constant> | <identifier> | <identifier> [<expression>]
| (<expression>)
<constant> ::= <digit> | <digit> <constant>
<identifier> ::= <identifier> <letterordigit> | <letter>
<letterordigit> ::= <letter> | <digit>
<letter> ::= a|b|c|d|e|f|g|h|i|j|k|l|m|n|o|p|q|r|s|t|u|v|w|x|y|z
<digit> ::= 0|1|2|3|4|5|6|7|8|9
<empty> has the obvious meaning
Comments (zero or more characters enclosed between the standard C/Java-style comment brackets
/*...*/) can be inserted. The language has rudimentary support for 1-dimensional arrays. The declaration int a[3] declares an array of three elements, referenced as a[0], a[1] and a[2]. Notealso that you should worry about the scoping of names.

DS3206PC :COMPUTER NETWORKS LAB

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS3206PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		0	**0**	**3**	**1.5**	**30**	**70**	**100**
Contact Classes: Nill	**Tutorial classes: Nill**	**Practical classes: 36**				**Total Classes:36**		
Prerequisites: None								

Course Objectives

- To understand the working principle of various communication protocols.
- To understand the network simulator environment and visualize a network topology andobserve its performance
- To analyze the traffic flow and the contents of protocol frames

Course Outcomes

- Implement data link layer farming methods
- Analyze error detection and error correction codes.
- Implement and analyze routing and congestion issues in network design.
- Implement Encoding and Decoding techniques used in presentation layer
- To be able to work with different network tools

List of Experiments

- Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
- Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
- Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
- Implement Dijsktra's algorithm to compute the shortest path through a network
- Take an example subnet of hosts and obtain a broadcast tree for the subnet.
- Implement distance vector routing algorithm for obtaining routing tables at each node.
- Implement data encryption and data decryption

- Write a program for congestion control using Leaky bucket algorithm.
- Write a program for frame sorting technique used in buffers.
- Wireshark
- Packet Capture Using Wire shark
- Starting Wire shark
- Viewing Captured Traffic
- Analysis and Statistics & Filters.
- How to run Nmap scan
- Operating System Detection using Nmap
- Do the following using NS2 Simulator
- NS2 Simulator-Introduction
- Simulate to Find the Number of Packets Dropped
- Simulate to Find the Number of Packets Dropped by TCP/UDP
- Simulate to Find the Number of Packets Dropped due to Congestion
- Simulate to Compare Data Rate& Throughput.
- Simulate to Plot Congestion for Different Source/Destination
- Simulate to Determine the Performance with respect to Transmission of Packets

MC3002: CYBER SECURITY

III-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
MC3002	**Mandatory**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**0**	**25**	**75**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course objectives:

- To familiarize various types of cyber-attacks and cyber-crimes
- To give an overview of the cyber laws
- To study the defensive techniques against these attacks

Course Outcomes:

- The students will be able to understand cyber-attacks, types of cybercrimes, cyberlaws
- how to protect them self and ultimately the entire Internet community from such attacks.

UNIT - I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy.

Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT - III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of

Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT - V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains-medical, financial, etc.

Cybercrime: Examples and Mini-Cases

Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions ofRupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.

Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime,Financial Frauds in Cyber Domain.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, ComputerForensics and Legal Perspectives, Wiley

2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles,Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.

2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&F Group

DS4101PC:INFORMATION SECURITY

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4101PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- Explain the objectives of information security
- Explain the importance and application of each of confidentiality, integrity, authentication andavailability
- Understand various cryptographic algorithms.
- Understand the basic categories of threats to computers and networks
- Describe public-key cryptosystem.
- Describe the enhancements made to IPv4 by IPSec
- Understand Intrusions and intrusion detection
- Discuss the fundamental ideas of public-key cryptography.
- Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
- Discuss Web security and Firewalls

Course Outcomes:

- Student will be able to understand basic cryptographic algorithms, message and webauthentication and security issues.
- Ability to identify information system requirements for both of them such as client and server.
- Ability to understand the current legal issues towards information security.

UNIT - I

Security Concepts: 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, substitutiontechniques, 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, DES, AES, Blowfish, RC5, IDEA, Block cipheroperation, Stream ciphers, RC4.
Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, ElgamalCryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT - III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), **Message authentication codes:** Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

UNIT - IV

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)
Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN,IEEE 802.11i Wireless LAN Security

UNIT - V

E-Mail Security: Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange
Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, PearsonEducation, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, WileyIndia, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning

CS4102PC :MACHINE LEARNING

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4102PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		2	**0**	**0**	**2**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives

- This course explains machine learning techniques such as decision tree learning, Bayesianlearning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques.

Course Outcomes

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

UNIT - I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias.

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT - II

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT- IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, *Q*–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT - V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarkson explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2- Using prior knowledge to alter the search objective, using prior knowledge toaugment search operators.

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches tolearning using prior knowledge to initialize the hypothesis.

TEXT BOOK:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOK:

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

DS4107PE :GRAPH THEORY
(Professional Elective - IV)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4107PE	**Professional Elective - IV**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Outcomes:

- Know some important classes of graph theoretic problems;
- Be able to formulate and prove central theorems about trees, matching, connectivity, colouringand planar graphs;
- Be able to describe and apply some basic algorithms for graphs;
- Be able to use graph theory as a modelling tool.

UNIT - I

Introduction-Discovery of graphs, Definitions, Subgraphs, Isomorphic graphs, Matrix representations of graphs, Degree of a vertex, Directed walks, paths and cycles, Connectivity in digraphs, Eulerian and Hamilton digraphs, Eulerian digraphs, Hamilton digraphs, Special graphs, Complements, Larger graphs from smaller graphs, Union, Sum, Cartesian Product, Composition, Graphic sequences, Graph theoretic model of the LAN problem, Havel-Hakimi criterion, Realization of a graphic sequence.

UNIT - II

Connected graphs and shortest paths - Walks, trails, paths, cycles, Connected graphs, Distance, Cut-vertices and cut-edges, Blocks, Connectivity, Weighted graphs and shortest paths, Weighted graphs, Dijkstra‟s shortest path algorithm, Floyd-Warshall shortest path algorithm.

UNIT - III

Trees- Definitions and characterizations, Number of trees, Cayley‟s formula, Kirchoff-matrix-tree theorem, Minimum spanning trees, Kruskal‟s algorithm, Prim‟s algorithm, Special classes of graphs, Bipartite Graphs, Line Graphs, Chordal Graphs, Eulerian Graphs, Fleury‟s algorithm, Chinese Postman problem, Hamilton Graphs, Introduction, Necessary conditions and sufficient conditions.

UNIT - IV

Independent sets coverings and matchings– Introduction, Independent sets and coverings: basic equations, Matchings in bipartite graphs, Hall‟s Theorem, K¨onig‟s Theorem, Perfect matchings in graphs, Greedy and approximation algorithms.

UNIT - V

Vertex Colorings- Basic definitions, Cliques and chromatic number, Mycielski‟s theorem, Greedy coloring algorithm, Coloring of chordal graphs, Brooks theorem, Edge Colorings, Introduction and Basics, Gupta-Vizing theorem, Class-1 and Class-2 graphs, Edge-coloring of bipartite graphs, Class-2 graphs, Hajos union and Class-2 graphs, A scheduling problem and equitable edge-coloring.

TEXT BOOKS:

1. J. A. Bondy and U. S. R. Murty. Graph Theory, volume 244 of Graduate Texts in Mathematics.Springer, 1st edition, 2008.
2. J. A. Bondy and U. S. R. Murty. Graph Theory with Applications.

REFERENCE BOOKS:

1. Lecture Videos**:** http://nptel.ac.in/courses/111106050/13
2. Introduction to Graph Theory, Douglas B. West, Pearson.
3. Schaum's Outlines Graph Theory, Balakrishnan, TMH
4. Introduction to Graph Theory, Wilson Robin j, PHI
5. Graph Theory with Applications to Engineering And Computer Science, Narsing Deo, PHI
6. Graphs - An Introductory Approach, Wilson and Watkins

DS4108PE :INTRODUCTION TO EMBEDDED SYSTEMS

(Professional Elective - IV)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4108PE	**Professional Elective - IV**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To provide an overview of principles of Embedded System
- To provide a clear understanding of role of firmware, operating systems in correlation withhardware systems.

Course Outcomes:

- Expected to understand the selection procedure of processors in the embedded domain.
- Design procedure of embedded firm ware.
- Expected to visualize the role of realtime operating systems in embedded systems.
- Expected to evaluate the correlation between task synchronization and latency issues

UNIT - I

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Major application areas, Purpose of E bedded Systems, Characteristics and Quality attributes of Embedded Systems.

UNIT - II

The Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System components.

UNIT - III

Embedded Firmware Design and Development: Embedded Firmware Design, Embedded Firmware Development Languages, Programming in Embedded C.

UNIT - IV

RTOS Based Embedded System Design: Operating System basics, Types of Operating Systems, Tasks, Process, Threads, Multiprocessing and Multi-tasking, Task Scheduling, Threads-Processes- Scheduling putting them together, Task Communication, Task Synchronization, Device Drivers, How tochoose an RTOS

UNIT - V

Integration and Testing of Embedded Hardware and Firmware: Integration of Hardware andFirmware, Boards Bring up

The Embedded System Development Environment: The Integrated Development Environment (IDE), Types of files generated on Cross-Compilation, Disassembler/Decompiler, Simulators, Emulators and Debugging, Target Hardware Debugging, Boundary Scan.

TEXT BOOK:

1. Shibu K V, "Introduction to Embedded Systems", Second Edition, Mc Graw Hill

REFERENCE BOOKS:

1. Rajkamal, Embedded Systems Architecture, Programming and Design, Tata McGraw-Hill
2. Frank Vahid and Tony Givargis, "Embedded Systems Design" - A Unified Hardware/SoftwareIntroduction, John Wiley
3. Lyla, "Embedded Systems" –Pearson
4. David E. Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint2000.

DS4109PE :E-COMMERCE
(Professional Elective - IV)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4109PE	**Professional Elective - IV**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- Identify the major categories and trends of e-commerce applications.
- Identify the essential processes of an e-commerce system.
- Identify several factors and web store requirements needed to succeed in e-commerce.
- Discuss the benefits and trade-offs of various e-commerce clicks and bricksalternatives.
- Understand the main technologies behind e-commerce systems and how thesetechnologies interact.
- Discuss the various marketing strategies for an online business.
- Define various electronic payment types and associated security risks and the ways toprotect against them.

Course Outcomes:

- Ability to identify the business relationships between the organizations and theircustomers
- Ability to perform various transactions like payment, data transfer and etc.

UNIT - I

Electronic Commerce-Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications. Consumer Oriented Electronic commerce - Mercantile Process models.

UNIT - II

Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems. Inter Organizational Commerce - EDI, EDI Implementation, Value added networks. Intra

Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT - III

Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing - Information based marketing, Advertising on Internet, on-line marketing process, market research. Consumer Search and Resource Discovery - Information search and Retrieval, Commerce Catalogues, Information Filtering. Multimedia - key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing's, Desktop video conferencing

UNIT – IV

Web Marketing Strategies, Communicating with Different Market Segments, Beyond Market Segmentation: Customer Behavior and Relationship Intensity, Advertising on the Web, E- Mail Marketing, Search Engine Positioning and Domain Names, Selling to Businesses Online, Electronic Data Interchange, Supply Chain Management Using Internet Technologies, Electronic Marketplaces and Portals

UNIT - V

E-Business Revenue Models, Revenue Models for Online Business, Changing Strategies: Revenue Models in Transition, Revenue Strategy Issues for Online Businesses, Creating an Effective Business Presence Online, Web Site Usability, Virtual Communities, Mobile Commerce, Online Auctions

TEXT BOOK:

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson. (UNITS 1, 2, 3)
2. E-Business by Gary P. Schneider, - Cengage India Learning (UNITS 4, 5)

REFERENCES:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, TharamDillon, Elizabeth Chang, John Wiley.
2. E-Commerce, S. Jaiswal – Galgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H. Michael Chang.
4. Electronic Commerce – Gary P. Schneider – Thomson.
5. E-Commerce – Business, Technology, Society, Kenneth C. Taudon, Carol GuyericoTraver.

DS4110PE :CLOUD COMPUTING

(Professional Elective - IV)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4110PE	**Professional Elective - IV**	L	T	P	C	CIE	SEE	Total
		3	0	0	3	30	70	100
Contact Classes:45	**Tutorial classes: 15**	Practical classes: Nill				Total Classes:60		
Prerequisites:	**None**							

Course Objectives:

- This course provides an insight into cloud computing
- Topics covered include- distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.

Course Outcomes:

- Ability to understand various service delivery models of a cloud computing architecture.
- Ability to understand the ways in which the cloud can be programmed and deployed.
- Understanding cloud service providers.

UNIT - I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT - II

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT - III

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to

Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT - IV

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjrasoft, Aneka Platform

TEXT BOOK:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej
   M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier,2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather,Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

DS4111PE: AD-HOC & SENSOR NETWORKS

(Professional Elective - IV)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4111PE	**Professional Elective - IV**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To understand the concepts of sensor networks
- To understand the MAC and transport protocols for ad hoc networks
- To understand the security of sensor networks
- To understand the applications of adhoc and sensor networks

Course Outcomes:

- Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc andWireless Sensor Networks
- Ability to solve the issues in real-time application development based on ASN.
- Ability to conduct further research in the domain of ASN

UNIT - I

Introduction to Ad Hoc Networks - Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology- based routing algorithms-**Proactive**: DSDV; **Reactive**: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms-**Location Services**-DREAM, Quorum-based; **Forwarding Strategies:** Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

UNIT - II

Data Transmission - Broadcast Storm Problem, **Rebroadcasting Schemes**-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. **Multicasting: Tree-based:** AMRIS, MAODV; **Mesh-based:** ODMRP, CAMP; **Hybrid:** AMRoute**,** MCEDAR.

UNIT - III

Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR. TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT - IV

Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensornetworks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

UNIT - V

Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to theinherent dynamic nature of WSNs, Sensor Networks and mobile robots.

TEXT BOOKS:

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P. Aggarwal,World Scientific Publications, March 2006, ISBN – 981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, LeonidasGuibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman).

DS4112PE :ADVANCED ALGORITHMS

(Professional Elective - V)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4112PE	**Professional Elective - V**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

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

Course Outcomes:

- Ability to analyze the performance of algorithms
- Ability to choose appropriate data structures and algorithm design methods for a specifiedapplication
- Ability to understand how the choice of data structures and the algorithm design methodsimpact the performance of programs

UNIT - I

Introduction: Role of Algorithms in computing, Order Notation, Recurrences, Probabilistic Analysis and Randomized Algorithms. Sorting and Order Statistics: Heap sort, Quick sort and Sorting in Linear Time.
Advanced Design and Analysis Techniques: Dynamic Programming-Matrix chain Multiplication, Longest common Subsequence and optimal binary Search trees.

UNIT - II

Greedy Algorithms - Huffman Codes, Activity Selection Problem. Amortized Analysis.

Graph Algorithms: Topological Sorting, Minimum Spanning trees, Single Source Shortest Paths, Maximum Flow algorithms.

UNIT - III

Sorting Networks: Comparison Networks, Zero-one principle, bitonic Sorting Networks, Merging Network, Sorting Network.

Matrix Operations- Strassen's Matrix Multiplication, Inverting matrices, Solving system of linear Equations

UNIT - IV

String Matching: Naive String Matching, Rabin-Karp algorithm, matching with finite Automata, Knuth-Morris - Pratt algorithm.

UNIT- V

NP-Completeness and Approximation Algorithms: Polynomial time, polynomial time verification, NP-Completeness and reducibility, NP-Complete problems. Approximation Algorithms- Vertex cover Problem, Travelling Sales person problem

TEXT BOOK:

1. Introduction to Algorithms,'' T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein, ThirdEdition, PHI.

REFERENCE BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam,Galgotia publications pvt. Ltd.
2. Design and Analysis Algorithms **-** Parag Himanshu Dave, Himanshu Bhalchandra DavePublisher**:** Pearson
3. Algorithm Design: Foundations, Analysis and Internet examples, M.T. Goodrich and R.Tomassia, John Wiley and sons.
4. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearsoneducation.

DS4113PE: REAL TIME SYSTEMS

(Professional Elective - V)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4113PE	**Professional Elective - V**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To provide broad understanding of the requirements of Real Time Operating Systems.
- To make the student understand, applications of these Real Time features using casestudies.

Course Outcomes:

- Be able to explain real-time concepts such as preemptive multitasking, task priorities, priorityinversions, mutual exclusion, context switching, and synchronization, interrupt latency and response time, and semaphores.
- Able describe how a real-time operating system kernel is implemented.
- Able explain how tasks are managed.
- Explain how the real-time operating system implements time management.
- Discuss how tasks can communicate using semaphores, mailboxes, and queues.
- Be able to implement a real-time system on an embedded processor.
- Be able to work with real time operating systems like RT Linux, Vx Works, MicroC /OSII, TinyOs

UNIT – I

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O,(open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec).

UNIT - II

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States,

Content, Storage, Operations and Use

UNIT - III

Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT - IV

Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT - V

Case Studies of RTOS: RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, and Tiny OS.

TEXT BOOK:

1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

REFERENCE BOOKS:

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
2. Advanced UNIX Programming, Richard Stevens
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh

SOFT COMPUTING

(Professional Elective - V)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4114PE	**Professional Elective - V**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

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

Course Outcomes: On completion of this course, the students will be able to:

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

UNIT - I

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

UNIT-II

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

UNIT-III

Fuzzy Decision Making, Particle Swarm Optimization

UNIT-IV

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

UNIT-V

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

TEXT BOOK:

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

REFERENCE BOOKS:

1. S. N. Sivanandam & S. N. Deepa, "Principles of Soft Computing", 2nd edition, Wiley India, 2008.
2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning",Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PearsonEducation, 2004.
4. G.J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.
5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill Internationaleditions, 1995

DS4115PE :INTERNET OF THINGS

(Professional Elective - V)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4115PE	**Professional Elective - V**	L	T	P	C	CIE	SEE	Total
		3	0	0	3	30	70	100
Contact Classes:45	**Tutorial classes: 15**	Practical classes: Nill				Total Classes:60		
Prerequisites: None								

Course Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web based services on IoT devices

Course Outcomes:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect themto network.
- Appraise the role of IoT protocols for efficient network communication.
- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify theapplications of IoT in Industry.

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, UniversitiesPress, 2015, ISBN: 9788173719547

2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014,ISBN: 9789350239759

DS4116PE :SOFTWARE PROJECT MANAGEMENT

(Professional Elective - V)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4116PE	**Professional Elective - V**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To acquire knowledge on software process management
- To acquire managerial skills for software project development
- To understand software economics

Course Outcomes:

- Gain knowledge of software economics, phases in the life cycle of software development,project organization, project control and process instrumentation
- Analyze the major and minor milestones, artifacts and metrics from management and technicalperspective
- Design and develop software product using conventional and modern principles of softwareproject management

UNIT - I

Software Process Maturity

Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.

Process Reference Models

Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

UNIT - II

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

architectures.

UNIT - III

Workflows and Checkpoints of process
Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic statusassessments.
Process Planning
Work breakdown structures, Planning guidelines, cost and schedule estimating process, iterationplanning process, Pragmatic planning.

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
2. Process Improvement essentials, James R. Persse, O'Reilly, 2006
3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
5. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
6. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon,2nd edition, Wiley India, 2004.
7. Agile Project Management, Jim Highsmith, Pearson education, 2004.

CS4121OE :PYTHON PROGRAMMING
(Open Elective- II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4121OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To be able to introduce core programming basics and program design with functionsusingPythonprogramminglanguage.
- TounderstandarangeofObject-OrientedProgramming, aswellasin-depthdataandinformationprocessingtechniques.
- Tounderstandthehigh-performanceprogramsdesignedtostrengthenthepracticalexpertise.

COURSE OUTCOMES:

- Able to write programs using classes and objects
- Able to develop GUI

UNIT-I

Introduction to Python, Installing Python. How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with thePrintFunction, Comments, Variables, Reading Input from the Keyboard, Performing Calculations,Operators. Type conversions, Expressions, More about Data Output. Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings,Logical Operators,Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total,Input Validation Loops,Nested Loops.

Data types and Expressions: Strings, Assignment and Comments, Numeric Data Types and Character Sets,Expressions, Functions and Modules.

UNIT-II

Control Statements: Definite Iteration, Formatting Text for Output, Selection, ConditionalIteration.

File and Exceptions: Introduction to File Input and Output, Using Loops to Process Files,Processing Records,Exceptions.

Functions: Introduction, Defining and Calling a Void Function, Designing a Program to UseFunctions, Local Variables, Passing Arguments to Functions, Global Variables and GlobalConstants, Value-Returning Functions-Generating Random Numbers,The math Module,StoringFunctionsinModules.

UNIT-III

Strings and Text Files: Accessing Characters and Substrings in a String,Strings and Number System, String Methods, Basic String Operations, String Slicing, Testing, Searching,and Manipulating Strings. Text Files, Data Encryption,Lists, Introduction to Lists, List slicing, Finding Items in Lists with the in Operator,List Methods and Useful Built-in Functions,Copying Lists,Processing Lists,Two-Dimensional Lists,Tuples Sequences, Tuples.Dictionaries and Sets:Dictionaries,Sets,SerializingObjects.Recursion:Introduction,ProblemSolving withRecursion,Examples of RecursiveAlgorithms.

UNIT-IV

Design with Classes: Classes and Objects, Classes and Functions, Classes and Methods, Working with Instances, Inheritance and Polymorphism.Object-Oriented Programming:Procedural and Object-Oriented Programming,Classes,techniques for Designing Classes.

UNIT-V

Graphical User Interfaces: Behavior of terminal based programs and GUI-based programs,Coding simple GUI-based programs, other useful GUI resources.GUI Programming: Graphical User Interfaces, Using the tkinter Module,Display text with Label Widgets,Organizing Widgets with Frames, Button Widgets and Info Dialog Boxes, Getting Input withEntryWidget,UsingLabelsasOutputFields,RadioButtons,CheckButtons.

Simple Graphics and Image Processing: Overview of Turtle Graphics, Two dimensional Shapes,Colors and RBG System, Image Processing.

TEXTBOOKS:

1. KennethA.Lambert,TheFundamentalsofPython:FirstPrograms,2011,CengageLearning.
2. **ThinkPythonFirst Edition**, byAllenB. Downey, Oriellypublishing

REFERENCEBOOKS:

1. Introduction toComputation andProgrammingUsingPython.John V. Guttag, TheMITPress.
2. JamesPayne, BeginningPythonusingPython2.6andPython3,Wroxpublishing
3. PaulGries,PracticalProgramming:AnIntroductiontoComputerScienceusingPython3,ThePragmaticBookshelf,2ndedition(4Oct.2013)
4. CharlesDierach,Introdction to ComputerScienceusingPython

CS4122OE :R PROGRAMMING
(Open Elective- II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4122OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

CourseObjectives:

- Understandingandbeingabletousebasicprogrammingconcepts
- Automatedataanalysis
- Workingcollaborativelyand openlyoncode
- Knowinghowtogeneratedynamicdocuments
- Beingabletouseacontinuoustest-drivendevelopmentapproach

CourseOutcomes:

- beabletouseandprograminthe programminglanguageR
- beabletouseRtosolvestatisticalproblems
- beabletoimplementanddescribeMonteCarlothetechnology
- beabletominimizeandmaximizefunctionsusingR

UNIT–I

Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects,Essentials of the R Language,Installing R,Running R,Packages in R,Calculations, Complex numbers in R, Rounding,Arithmetic, Modulo and integer quotients,Variable names and assignment, Operators, Integers, Factors, Logical operations

UNIT– II

Controlstructures,functions, scoping rules,dates and times,Introduction to Functions,preview of Some Important R Data Structures, Vectors,

Character Strings, Matrices, Lists,Data Frames,Classes

Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector usingsubscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Addingand Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays asVectorsVector Arithmetic and Logical Operations,Vector Indexing, CommonVector Operations

UNIT–III

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATAFRAMES, Creating Data Frames, Accessing Data Frames,Other Matrix-Like Operations

UNIT-IV

FACTORSAND TABLES, Factors and Levels,Common Functions Used with Factors,Working with Tables,Matrix/Array-Like Operations on Tables,Extracting a Subtable,

Finding the Largest Cells in a Table,Math Functions, Calculating a Probability, Cumulative Sums and Products,Minima and Maxima, Calculus, Functions for Statistical Distributions

UNIT-V

OBJECT-ORIENTEDPROGRAMMING:S Classes, S Generic Functions,Writing S Classes, Using Inheritance, S Classes,Writing S Classes,Implementing a Generic Functionon an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation

TEXTBOOKS:

1. RProgrammingfor DataSciencebyRoger D.Peng
2. TheArtofRProgrammingbyPrashanthsingh,VivekMourya,Cengage LearningIndia.

CS4123OE :JAVA PROGRAMMING
(Open Elective- II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4123OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

CourseObjectives:

- To introduce the object-oriented programming concepts.
- To understand object-oriented programming concepts, and apply them in solving problems.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
- To introduce the implementation of packages and interfaces
- To introduce the concepts of exception handling and multithreading.
- To introduce the design of Graphical User Interface using applets and swing controls.

CourseOutcomes:

- Able to solve real world problems using OOP techniques.
- Able to understand the use of abstract classes.
- Able to solve problems using java collection frame work and I/o classes.
- Able to develop multithreaded applications with synchronization.
- Able to develop applets for web applications.
- Able to design GUI based applications

UNIT-I

Object-Oriented Thinking- Awayof viewing world – Agents and Communities, messages andmethods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding,Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Datatypes, Variables and Arrays, operators, expressions, control statements, Introducing classes,Methods and Classes,String handling.

Inheritance–Inheritance concept,Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, superuses, using final with inheritance,Polymorphism-adhocpolymorphism,purepolymorphism,

method overriding, abstract classes, Object class, forms of inheritance-specialization,specification,construction,extension,limitation,combinatio n,benefitsofinheritance,costsofinheritance.

UNIT-II

Packages-Defining a Package, CLASSPATH, Access protection, importing packages.Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces,variables in interfaces and extending interfaces.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations,The Console class, Serialization, Enumerations, autoboxing, generics.

UNIT-III

Exceptionhandling-Fundamentals of exception handling, Exception types,Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested trystatements, throw, throws and finally,built-inexceptions,creatingownexceptionsubclasses.

Multithreading-Differences between thread-based mult itasking and process-based multitasking, Java thread model,creating threads, thread priorities, synchronizing threads,inter thread communication.

UNIT-IV

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collectionclasses- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing aCollection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces-Dictionary, Hashtable, Properties, Stack,Vector

More Utility classes, String Tokenizer, BitSet, Date, Calendar, Random, Formatter, Scanner

UNIT-V

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

EventHandling-The Delegation event model-Events, Eventsources, Event Listeners, Eventclasses, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

ASimpleSwingApplication,Applets–Applets and HTML,Security

Issues,Applets and Applications,passing parameters to applets.Creating a Swing Applet, Painting inSwing,A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, **The Swing Buttons**-JButton, JToggle Button, **J** Check Box, **J** Radio Button, **J** Tabbed Pane, **J** Scroll Pane, **J** List, **J** Combo Box,Swing Menus, Dialogs.

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, Mc Graw Hill Education (India) Pvt.Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
2. Introduction to Java programming, Y.Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programmingin Java, S.Malhotra, S.Chudhary, 2nd edition, Oxford Univ.Press.
5. Java Programming and Object-oriented Application Development, R.A.Johnson, Cengage Learning.

EE4121OE :RENEWABLE ENERGY SOURCES

(Open Elective- II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
EE4121OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To recognize the awareness of energy conservation in students.
- To identify the useof renewable energy sources for electrical power generation.
- Tocollect different energy storage methods.
- To detect about environmental effects of energy conversion.

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

- Understand the principles of windpower and solarpho to voltaic power generation, fuel cells.
- Assess the cost of generation for conventional and renewable energy plants.
- Designsuitable power controller for wind and solara pplications.
- Analyze the issues involved in the integration of renewable energy sources to the grid.

UNIT-I

Introduction: Renewable Sources of Energy-Grid-Supplied Electricity-Distributed Generation-Renewable Energy Economics-Calculation of Electricity Generation Costs–Demand side Management Options –Supply side Management Options-Modern Electronic Controls of PowerSystems.

Wind PowerPlants: Appropriate Location-Evaluation of Wind Intensity-Topography -Purpose of the Energy Generated - General Classification of Wind Turbines-Rotor Turbines-Multiple-Blade Turbines Drag Turbines - Lifting Turbines-Generators and Speed Control used in Wind Power Energy Analysis of Small Generating Systems.

UNIT-II

Photovoltaic Power Plants: Solar Energy-Generation of Electricity by Photovoltaic Effect -Dependence of a PV Cell Characteristic on Temperature-Solar cell Output Characteristics-EquivalentModelsandParametersforPhotovoltaicPanels-PhotovoltaicSystems-ApplicationsofPhotovoltaic Solar Energy-EconomicalAnalysis of SolarEnergy.

FuelCells: The Fuel Cell – Low and High Temperature Fuel Cells-Commercial and Manufacturing Issues Constructional Features of Proton Exchange-Membrane Fuel Cells –Reformers-Electro-lyzer Systems and Related Precautions-Advantages and Disadvantagesof Fuel Cells-Fuel Cell Equivalent Circuit- Practical Determination of the Equivalent ModelParameters-AspectsofHydrogen asFuel.

UNIT-III

Induction Generators: Principles of Operation-Representation of Steady-State Operation-Power and Losses Generated- Self- Excited Induction Generator-Magnetizing Curves and Self- Excitati on Mathematical Description of the Self-Excitation Process-Interconnected and Stand-alone operation -Speed and Voltage Control –Economical Aspects.

UNIT-IV

StorageSystems: Energy Storage Parameters- Lead– Acid Batteries-UltraCapacitors-Flywheels–SuperconductingMagneticStorageSystem-Pumped Hydro electric Energy Storage - Compressed Air Energy Storage - Storage Heat -Energy Storage as an EconomicResource.

UNIT-V

Integration of Alternative Sources of Energy: Principles of Power Injection-InstantaneousActive and Reactive Power Control Approach Integration of Multiple Renewable Energy Sources-Is landing and Interconnection Control-DG Control and Power Injection.

Inter connection of Alternative Energy Sources with the Grid: Interconnection Technologies - Standards and Codes for Interconnection - Interconnection Considerations –Interconnection Examples for Alternative Energy Sources.

TEXTBOOKS:

1. FelixA.Farret,M.Godoy Simoes,"Integration of Alternative Sources of Energy",John Wiley & Sons,2006.
2. Solanki: Renewable Energy Technologies: Practical Guide for

Beginners, PHI Learning Pvt.Ltd., 2008.

REFERENCES:

1. D.Mukherjee:Fundamentals of Renewable Energy Systems,New Age International publishers,2007.
2. Remus Teodorescu, Marco Liserre,Pedro Rodríguez: GridConverters for Photo voltaic and Wind Power Systems,John Wiley & Sons,2011.
3. GilbertM.Masters:Renewable and Efficient Electric Power Systems, John Wiley & Sons, 2004.

EE4122OE :RELIABILITY ENGINEERING

(Open Elective- II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
EE4122OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: Mathematics-III (Laplace Transforms, Numerical Methods and Complex variables								

Course Objectives:

- To introduce the basic concepts of reliability, various models of reliability
- To analyze reliability of various systems
- To introduce techniques of frequency and duration for reliability evaluation of repairable systems

CourseOutcomes:

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

- Model various systems applying reliability networks
- Evaluate there liability of simple and complex systems
- Estimate the limiting state probabilities of repairable systems
- Apply various mathematical models for evaluating reliability of irreparable systems

UNIT-I

BasicProbabilityTheory: Elements of probability, probability distributions, Random variables, Densityand Distribution functions- Mathematical expected – variance and standard deviation

Binomial Distribution: Concepts, properties, engineering applications.

UNIT-II

Network Modeling and Evaluation of Simple Systems: Basic concepts-Evaluation of network Reliability / Unreliability-Series systems, Parallel systems-Series-Parallel systems-Partially redundant systems-Examples.

Network Modeling and Evaluation of Complex Systems

Conditional probability method- tie set, Cut-set approach- Event tree and reduced event tree methods-Relationships between tie and cut-sets-Examples.

UNIT-III

Probability Distributions In Reliability Evaluation: Distribution concepts, Terminology ofdistributions, General reliability functions, Evaluation of the reliability functions, shape of reliability functions–Poisson distribution–normal distribution, exponential distribution,Weibull distribution.

Network Reliability Evaluation Using Probability Distributions: Reliability Evaluation ofSeries systems, Parallel systems – Partially redundant systems-determination of reliability measure-MTTF for series and parallel systems–Examples.

UNIT-IV

Discrete Markov Chains: Basic concepts- Stochastic transitional probability matrix- timedependent probability evaluation- Limiting State Probability evaluation- Absorbing states –Application.

Continuous Markov Processes: Modeling concepts- State space diagrams-Unreliability evaluation of single and two component repairable systems

UNIT-V

Frequency and Duration Techniques: Frequency and duration concepts, application tomultistateproblems, Frequency balance approach.

Approximate System Reliability Evaluation: Series systems – Parallel systems- Networkr eduction techniques- Cut set approach- Common mode failures modeling and evaluation techniques-Examples.

TEXT BOOKS:

1. Roy Billinton and Ronald NAllan, Reliability Evaluation of Engineering Systems, Plenum Press.
2. E.Balagurusamy,Reliability Engineeringby Tata McGraw-Hill Publishing Company Limited

REFERENCES:

1. Reliability Engineering: Theory and Practice by Aless and roBirolini, Springer Publications.
2. An Introduction to Reliability and Maintainability Engineering by Charles Ebeling,TMH Publications.
3. Reliability Engineering by ElsayedA. Elsayed, Prentice Hall Publications.

EC4121OE :PRINCIPLES OF COMPUTER COMMUNICATIONS AND NETWORKS (Open Elective- II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
EC4121OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To understand the concept of computer communication.
- To learn about the networking concept layered protocols.
- To understand various communications concepts.
- Toget theknowledgeofvariousnetworkingequipment.

Course Outcomes:

- The student can get the knowledge of networking of computers, data transmission between computers.
- Will have the exposure about the various communication concepts.
- Will get awareness about the structure and equipment of computer network structures.

UNIT-I

Overview of Computer Communications and Networking: Introduction to Computer Communications and Networking, Introduction to Computer Network, Types of Computer Networks, Network Addressing, Routing, Reliability, Interoperability and Security,Network Standards, The Telephone System and Data Communications.

UNIT-II

Essential Terms and Concepts: Computer Applications and application protocols, Computer Communications and Networking models,Communication Service Methods and data transmission modes,analog and DigitalCommunications ,Speed and capacity of a Communication Channel, Multiplexing and switching, Networkarchitecture and the OSI reference model.

UNIT-III

Analog and Digital Communication Concepts: Representing data as analog signals,representing data as digital signals,data rate and band width reduction, Digital Carrier Systems.

UNIT-IV

Physical and data link layer Concepts:The Physical and Electrical Characteristics of wire, Copper media, fiber opticmedia, wireless Communications.Introduction to datalinkLayer,the logical linkc ontrol and medium access control sub-layers.

UNIT-V

Network Hardware Components: Introduction to Connectors, Transreceivers and media convertors, repeaters, network interference cards and PC cards, bridges, switches, switches Vs Routers.

TEXTBOOKS:

1. Computer Communicationsand Networking Technologies, MichelA. Gallo and WilliamH.Hancock,Thomson Brooks/Cole.
2. Data Communications and Networking–Behrouz A.Forouzan, Fourth Edition MC GRAW HILL EDUCATION,2006.

REFERENCEBOOKS:

1. Principles of Computer Networks and Communications, M.Barry Dumas,Morris Schwartz, Pearson.
2. Computer Networking: A Top-DownApproach Featuring the Internet, James F.Kurose,K.W.Ross, 3rd Edition,PearsonEducation

ME4121OE :FABRICATION PROCESSES

(Open Elective- II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
ME4121OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

To understand the philosophies of various Manufacturing process.

Course Outcomes:

At the end of the course, forgiven product, one should be able identify the manufacturing process.

UNIT-I

Casting: Steps in volved in making a casting–Advantage of casting and its applications;Patterns- Pattern making, Types, Materials used for patterns, pattern allowances and their construction;Properties of moulding sands.

Methods of Melting- Crucible melting and cupola a operation–Defects incastings;Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting,shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser–Function,types of Riser and Riser design.

UNIT-II

Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting.Arc welding, for gewelding, sub merge dark welding, Resistance welding, Thermite welding.

Inert Gas Welding - TIG Welding, MIG welding, explosive welding, LaserWelding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive andnon-destructive testingofwelds.

UNIT-III

Hotworking,cold working, strain hardening, recovery, re-crystallisation, and grain growth.Stamping, forming, andother cold working processes.Blankingand piercing– Bending andforming – Drawing and its types – wire drawing and Tube drawing – coining –

Hot and coldspinning.Types of presses and press tools.Forces and power requirement in the above operations.

UNIT-IV

Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion-Forward extrusion and backward extrusion–Impact extrusion–Extruding equipment Tube extrusion and pipemaking, Hydrostatic extrusion.Forces in extrusion.

UNIT-V

Forging Processes: Forging operations and principles–Tools – Forging methods–Smith forging, Drop Forging–Roll forging – Forging hammers:Rotary forging–forging defects–cold forging, swaging,Forces inforging operations.

TEXT BOOKS:

1. Manufacturing Technology/P.N.Rao/McGrawHill
2. Manufacturing Engineering and Technology / KalpakjinS / Pearson.

REFERENCE BOOKS:

1. Metal Casting/T.VRamanaRao/NewAge
2. Métal FabricationTechnology/Mukherjee/PHI

ME4122OE :TOTAL QUALITY MANAGEMENT
(Open Elective- II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
ME4122OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

UNIT-I

Introduction: The concept of TQM, Quality and Business performance, attitude, and involvementof top management, communication, culture and management systems. Management of Process Quality: Definition of quality, Quality Control, a brief history, Product Inspection vs. Process Control, Statistical Quality Control,Control Charts and Acceptance Sampling.

UNIT-II

Customer Focus and Satisfaction: Process vs. Customer, internal customer conflict, quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer–Supplier relationships.
Bench Marking: Evolution of Bench Marking, meaning of bench marking, benefits of bench marketing, the bench marking procedure, pitfalls of bench marketing.

UNIT-III

Organizing for TQM: The systems approach, organizing for quality implementation, making the transition from a traditional to a TQM organization, Quality Circles, seven Tools of TQM: Stratification, check sheet, Scatter diagram, lshikawa diagram, paneto diagram, Kepner &TregoeMethodology.

UNIT-IV

The Cost of Quality: Definition of the Cost of Quality,Quality Costs, Measuring Quality Costs, use of Quality Cost information, Accounting Systems and Quality Management.

UNIT-V

ISO9000: Universal Standards of Quality: ISO around the world, The ISO9000 ANSI/ASQCQ- 90. Series Standards, benefits of ISO 9000 certification, the third party audit, Documentation ISO 9000 and services, the cost of certification implementing the system.

TEXT BOOK:

1. Total Quality Management/ Joel E. Ross/ Taylor and Franscis Limited
2. Total QualityManagement/P.N.Mukherjee/PHI

REFERENCE BOOKS:

1. BeyondTQM/RobertL.Flood
2. Statistical Quality Control/E.L.Grant.
3. Total Quality Management:APractical Approach/H.Lal
4. Quality Management/KanishkaBedi/Oxford University Press/2011
5. Total Engineering Quality Management/ Sunil Sharma/ Macmillan

ME4123OE :ENERGY MANAGEMENT AND CONSERVATION
(Open Elective- II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
ME4123OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives: To acquaint the student with the conventional energy sources and their utilization. To understand the importance of heat recovery and energy conservation methods andenergyaudit.

Course Outcomes: Students would have a good knowledge about conventional energy sources and their audit. Ability to apply the fundamentals of energy conservation and management.

UNIT-I

Introduction: Global & Indian Energy Scenario-Classification of Energy sources-Energy needs of growing economy-Energy sector reform, Energy and Environment: Global Environmental Concerns, Basics of Energy and its various forms.

UNIT-II

Energy Audit: Types of energy audit, Energy management (audit) approach understanding energy costs, Bench marking,Energy performance,Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements,Fuel and energy substitution,Energy audit instruments.
Material and Energy balance: Facility as an energy system,
Methods for preparing processflow,Material and energy balance diagrams.

UNIT-III

EnergyAction Planning, Financial Management: Financial analysis techniques-Risk and sensitivity analysis- Financing options,Energy performance contracts and role of ESCOs-Energy Monitoring and Targeting: Elements of monitoring & targeting, Data and information-analysis,Techniques-energy consumption, Production, Cumulative sum of differences (CUSUM).

UNIT-IV

Building Envelope – principles of analysis – Envelope performance - Envelope analysis ofExisting and new buildings – Building standards for new and Existing constructions.HVAC Systems types – Energy conservation opportunities – cooling equipment – Domestic hot water Estimating HVAC Energy consumption.

UNIT-V

Principles of Electric EnergyManagement, Energy Management control systems – Energysystems maintenance. Energy management in water and waste water treatment – solidwaste treatment- air pollution control systems .Energy Management in Boilers and Firedsystems– Steam and condensate systems–cogeneration–Waste Heat recovery. Energy Management in Process Industries, Energy Security, Codes, Standards, Electricity Act,Energy ConservationAct.

TEXT BOOKS:

1. Energy Management by Murfy
2. GeneralAspectsofEnergyManagementandAudit,National Productivity Council ofIndia,Chennai(CourseMaterial-NationalCertificationExaminationfor EnergyManagement)

REFERENCE BOOKS:

1. Energy Management Handbook, W.C.Turner, 5th Edition, Marcel Dekker, Inc, NewYork,2005.
2. Guide to Energy Management, B.L.C apehart, W.C.Turner, W.J. Kennedy, CRC Press, New York, 2005.
3. Energy Management by O.P.Collagan

CE4121OE :ENVIRONMENTAL IMPACT ASSESSMENT
(OpenElective-II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CE4121OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

CourseObjectives: The objectives of the course are to

- Define and Classify Environmental Impacts and the terminology
- Understands the environmental Impact assessment procedure
- Explain the EIA methodology
- List and describe environmental audits

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

- Identify the environmental attributes to be considered for the EIA study
- Formulate objectives of the EIA studies
- Identify the methodology to prepare rapid EIA
- Prepare EIA reports and environmental management plans

UNIT-I

Introduction:The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report,Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA,Roles in the EIA Process.Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places,International agreements.

UNIT-II

EIA Methodologies: Environmental attributes-Criteria for the selection of EIA methodology,impact identification, impact measurement, impact interpretation & Evaluation,impact communication,Methods-Adhoc methods, Check lists methods, Matrices methods,Networks methods, Overlays methods. EIA review-Baseline Conditions -Construction Stage Impacts, post project impacts.

UNIT-III

Environmental Management Plan: EMP preparation, Monitoring Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring

Mitigation, Mitigation Plans and Relief & Rehabilitation, Stipulating the Conditions, Monitoring Methods,Pre-Appraisaland Appraisal.

UNIT-IV

Environmental Legislation and Life cycle Assessment: Environmental laws and protectionacts,Constitutional provisions-powers and functions of Central and State government,TheEnvironment (Protection) Act 1986, The Water Act 1974, The Air act 1981, Wild Life act 1972,Guidelines for control of noise, loss of biodiversity, solid and Hazardous waste managementrules. Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria case studies.

UNIT-V

CaseStudies: Preparation of EIA for developmental projects-Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, Nuclearfuel complex, Highway project, Sew agetreatment plant,Municipal Solid waste processing plant, Airports.

TEXTBOOKS:

1. Anjaneyulu.YandManickam.V.,Environmental Impact Assessment Methodologies,B.S.Publications, Hyderabad,2007
2. Barthwal,R.R.,Environmental Impact Assessment, New Age International Publishers,2002

REFERENCEBOOKS:

1. Jain,R.K.,Urban,L.V.,Stracy, G.S.,Environmental Impact Analysis, Van Nostrand Reinhold Co.,New York, 1991.
2. Rau,J.G.and Wooten,D.C.,Environmental Impact Assessment, McGraw Hill Pub.Co.,NewYork,1996.

CE4122OE :INDUSTRIAL WASTE WATER TREATMENT
(OpenElective-II)

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CE4122OE	**Open Elective- II**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: Environmental Engineering								

Course Objectives:

- To present the information of waste water generation from various industries
- To inform about the conventional treatment processes for specific industrial
  waste waters
- To explain about the new developments in industrial waste water treatment
  technologies

CourseOutcomes:

At the end ofthe course, thestudent shouldbe ableto:

- Identify the characteristics of industrial waste waters
- Describe pollution effects of disposal of industrial effluent
- Identify and design treatment options for industrial waste water
- Formulate environmental management plan

UNIT-I

Introduction:Waste water Characteristics, Standards of Disposal, Treatment Objective and Strategies, Layouts of Primary,Secondary and Advanced Treatment Units.

UNIT-II

Design of Preliminary and Primary Treatment Operations: Screens, Grit Chambers, SkimmingTank, Primaryand SecondarySedimentation Tanks.

UNIT-III

Biological Treatment Processes: Types, Kinetics of Plug Flow and Completely Mixed Systems.Attached Growth Processes: Trickling Filters (Standard Rate, High Rate), Biofilters, Practices, Features and Design, Operational Difficulties and Remedial Measures, Rotating Biological Contactors.Suspended Growth

Processes:

UNIT-IV

Activated Sludge Process, Modifications and Design Equations, Process Design Criteria, Oxygen and Nutrient Requirements –Classification and Design of Oxidation Ponds, Lagoons.

UNIT-V

Sludge Treatment and Disposal: Sludge Thickening, Aerobic and Anaerobic Sludge Digestion Processes, Design of Digester Tank, Sludge Dewatering, Ultimate Disposal, Sludge Drying Beds, Other Methods of Sludge Treatment.

TEXT BOOKS:

1. Waste water Treatment–Concepts and Design Approach,by GLK aria and RA Christian, Prentice Hall of India, 2006
2. Environmental Engineering by Gerard Kiely,Mc Graw Hill Education(India) Pvt Ltd,2013
3. Environmental Engineering–A Design Approach by A.P. Sincero and GA Sincero, Prentice Hall ofIndia, 2014

REFERENCES:

1. Waste water Engineering-Collection, Treatment, Disposal and Reuse by Metcal fand Eddy,,McGraw Hill Education (India)PvtLtd,2013
2. Industrial Waste Treatment by Nelson Leonard Nemerow, Butterworth-Heinemann,2007.
3. Biological Process Designs for Wastewater Treatment by Benefield L.D.and Randall C.D.Prentice Hall Pub. Co., 1980.

DS4103PC :MACHINE LEARNING LAB

IV-I:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
DS4103PC	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		0	**0**	**2**	**1**	**30**	**70**	**100**
Contact Classes:Nill	**Tutorial classes: Nill**	**Practical classes: 36**				**Total Classes:36**		
Prerequisites:	**None**							

Course Objective: The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate them using python.

Course Outcomes: After the completion of the course thestudent can able to:

- Understand complexity of Machine Learning algorithms and their limitations;
- Understand modernnotionsin dat aanalysis-oriented computing;
- Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
- Be capable of performing experiments in Machine Learning using real-world data.

List of Experiments

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 schooldays in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result.(Ans:15%)

2. Extract the data from data base using python

3. Implement k-nearest neighbours classification using python

4. Given the following data, which specify classifications fornine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k-means clustering with 3 means (i.e.,3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1

0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.medium skiing design single twenties no-> highRiskhigh golf trading married fortiesyes -> low Risk low speed way transport married thirties yes->med Risk medium foot ball banking single thirties yes -> low Risk high flying media married fifties yes->highRisk
   Low foot ball security single twenties no -> med Risk medium go lf media single thirties yes -> med Risk medium go lftransport married forties yes -> low Risk high skiing banking single thirties yes -> high Risk low golfun employed married forties yes->highRisk
   Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find theunconditional probability of `golf' and the conditional probability of `single' given `medRisk' in thedataset?

6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

SM4201MS :ORGANIZATIONAL BEHAVIOUR

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
SM4201MS	**Core**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites:	**None**							

Course Objectives:

The objective ofthe course is to provide the students with the conceptual framework and the theories underlying Organizational Behaviour.

UNIT-I:

Introduction to OB- Definition, Nature and Scope–Environmental and organizational context–Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behaviour.Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization–Social perception– Attribution Theories – Locus of control – Attribution Errors– Impression Management.

UNIT-II:

Cognitive Processes-II: Personality and Attitudes–Personality as a continuum–Meaning of personality- Johari Window and Transactional Analysis-Nature and Dimension of Attitudes–Job satisfaction and organizational commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence– Self-Efficacy.

UNIT-III:

Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers tocommunication and strategies to improve the follow of communication - Decision Making: Participativedecision-making techniques – creativity and group decision making. Dynamics of OB –II Stress andConflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra-individualconflict-strategiestocope with stressand conflict.

UNIT-IV:

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs.Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teamsinmodern workplace.

UNIT-V:

Leading High performance: Job design and Goal setting for High performance- Quality of Work Life- Socio technical Design and High-performance work practices-Behavioural performance management :reinforcement and punishmentas principles of Learning–Process of Behavioural modification-Leadership theories-Styles ,Activities and skills of Great leaders.

REFERENCE BOOKS:

1. Luthans,Fred:Organizational Behaviour10/e,McGraw-Hill,2009
2. McShane: Organizational Behaviour,3e,TMH,2008
3. Nelson: Organizational Behaviour,3/e,Thomson,2008.
4. NewstromW.John&DavisKeith, Organisational Behaviour—Human Behaviour atWork, 12/e, TMH, NewDelhi,2009.
5. PierceandGardner: Management and Organisational Behaviour: An Integrated perspective, Thomson, 2009.
6. Robbins,P.Stephen,TimothyA.Judge:OrganisationalBehaviour,12/e,PHI/Pearson,New Delhi,2009.
7. PareekUdai: Behavioural Process at Work: Oxford & IBH, New Delhi, 2009.
8. Schermerhorn: Organizational Behaviour9/e,Wiley,2008.
9. Hitt:Organizational Behaviour,Wiley,2008
10. Aswathappa: Organisational Behaviour,7/e,Himalaya,2009
11. Mullins: Management and Organisational Behaviour, Pearson,2008.
12. McShane, Glinow: Organisational Behaviour--Essentials, TMH,2009.
13. Ivancevich: Organisational Behaviour and Management, 7/e, TMH, 2008.

CS4203PE: COMPUTATIONAL COMPLEXITY

(Professional Elective-VI)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4203PE	**Professional Elective-VI**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites:	**None**							

Prerequisites:

1. Acourseon"Computer Programmingand DataStructures"
2. A courseon "Discrete Structures and Graph Theory"

Course Objectives:

- Introduces to theory of computational complexity classes
- Discuss about algorithmic techniques and application of these techniques to problems.
- Introduce to randomized algorithms and discuss how effective they are in reducing time and space complexity.
- Discuss about Graph based algorithms and approximation algorithms
- Discuss about search trees

Course Outcomes:

- Ability to classify decision problems into appropriate complexity classes
- Ability to specify what it means to reduce one problem to another,and construct reductions for simple examples.
- Ability to classify optimization problems into appropriate approximation complexity classes
- Ability to choose appropriate data structure for the given problem
- Ability to choose and apply appropriate design method for the given problem

UNIT-I

Computational Complexity: Polynomial time and its justification, Non trivial examples of polynomial-timealgorithms, the concept of reduction (reducibility), Class P Class NP and NP- Completeness, The Pversus NP problemand whyit'shard

UNIT-II

Algorithmic paradigms: Dynamic Programming–Longest common subsequence, matrix chain multiplication, knapsack problem, Greedy – 0-1 knapsack, fractional knapsack, scheduling problem, Huffman coding, MST, Branch-and-bound – travelling sales person problem, 0/1 knapsack problem,Divide and Conquer– Mergesort, binary search, quicksort.

UNIT-III

Randomized Algorithms: FingerPrinting, Pattern Matching, Graph Problems, Algebraic Methods, Probabilistic Primality Testing,De-Randomization Advanced Algorithms.

UNIT-IV

Graph Algorithms: Shortest paths, Flow networks, Spanning Trees; Approximation algorithms, Randomized algorithms. Approximation algorithms: Polynomial Time Approximation Schemes.

UNIT-V

Advanced Data Structures and applications: Decision Trees and Circuits,B-Trees, AVLTrees, Redand Black trees, Dictionaries and tries, Maps, Binomial Heaps, Fibonacci Heaps, Disjoint sets, Union by Rank and Path Compression

TEXT BOOKS:

1. T.Cormen, C.Leiserson, R.Rivest and C.Stein, Introduction to Algorithms, Third Edition,Mc Graw-Hill,2009.
2. R.Motwani and P.Raghavan, Randomized Algorithms, Cambridge University Press, 1995.
3. J.J.McConnell, Analysis of Algorithms: An Active Learning Approach, Jones & Bartlett Publishers,2001.
4. D.E.Knuth, Art of Computer Programming, Volume3, Sorting and Searching, Second Edition, Addison-Wesley Professional,1998.
5. S.Dasgupta, C. H. Papadimitriouand U.V.Vazirani, Algorithms, Mc Graw-Hill, 2008.

CS4204PE :DISTRIBUTED SYSTEMS

(ProfessionalElective- VI)

:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**		**Max Marks**	
CS4204PE	**Professional Elective-VI**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		

Prerequisites: Acourseon"OperatingSystems"
~~A course on"ComputerOrganization&Architecture"~~

Course Objectives

- This course provides an insight into Distributed systems.
- To pics include-Peer to Peer Systems,Transactions and Concurrency control,Security and Distributed shared memory

Course Outcomes

- Ability to understand Transactions and Concurrency control.
- Ability to understand Security issues.
- Understanding Distributed shared memory.
- Ability to design distributed systems for basic level applications.

UNIT-I

Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models -Introduction, Architectural and Fundamental models,Networking and Internet working, Interprocess Communication, Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Casestudy-Java RMI.

UNIT-II

Operating System Support-Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems-Introduction, File Service architecture.

UNIT-III

Peer to Peer Systems–Introduction,Napsteranditslegacy, Peer to Peer middle ware, Routing overlays,Overlay casestudies-Pastry,Tapestry,Application case studies-Squirrel,Ocean Store.

Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.

Coordination and Agreement-Introduction, Distributed mutual exclusion, Elections, Multicast communication,consensus and related problems.

UNIT-IV

Transactions and Concurrency Control-Introduction, Transactions, Nested Transactions, Locks,Optimistic concurrency control, Timestamp ordering. Distributed Transactions- Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

UNIT-V

Replication-Introduction, System model and group communication,Fault tolerant services, Transactions with replicated data. Distributed shared memory,Design and Implementation issues, Consistency models.

TEXTBOOKS:

1. Distributed Systems Concepts and Design, G Coulouris, **J** Dollimoreand T Kindberg, Fourth Edition,Pearson Education.
2. Distributed Systems, S.Ghosh, Chapman & Hall / CRC, Taylor & Francis Group, 2010.

REFERENCEBOOKS:

1. Distributed Systems–Principles and Paradigms, A.S.Tanenbaum and M.V.Steen, Pearson Education.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D.Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.

CS4205PE :NEURAL NETWORKS & DEEPLEARNING

(ProfessionalElective- VI)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4205PE	**Professional Elective-VI**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To introduce the foundations of Artificial Neural Networks
- To acquire the knowledge on Deep Learning Concepts
- To learn various types of Artificial Neural Networks
- To gain knowledge to apply optimization strategies

CourseOutcomes:

- Ability to understand the concepts of Neural Networks
- Ability to select the Learning Networks in modeling real world systems
- Ability to use an efficient algorithm for Deep Models
- Ability to apply optimization strategies for large scale applications

UNIT-I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-II

Un supervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, HammingNetwork, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter PropagationNetworks, Adaptive Resonance Theory Networks. Special Networks- Introduction to various networks.

UNIT-III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks,Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT-IV

Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Data set Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier

UNIT-V

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXT BOOKS:

1. Deep Learning: An MIT Press Book By Ian Good fellow and Yoshua Bengio and Aaron Courville
2. Neural Networks and Learning Machines,Simon Haykin,3rd Edition,Pearson Prentice Hall.

CS4206PE :HUMAN COMPUTER INTERACTION

(ProfessionalElective- VI)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4206PE	**Professional Elective-VI**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives: To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional "keyboard and mouse" computing;become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans;be able to apply models fromcognitive psychologyto predicting user performance in various human-computer interaction tasks and recognize the limits of human performace as they apply to computer operation; appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user; be familiar with a variety of bothconventional and non-traditional user interface paradigms, the latter including virtual and augmented reality,mobile and wearable computing,and ubiquitous computing;and understand the social implications of technology and their ethical responsibilities as engineers in the design of technologicalsystems. Finally, working in small groups on a product design from start to finish will provide you within valuable team-worke xperience.

CourseOutcomes:

- Ability to apply HCI and principles to interaction design.
- Abilityto design certain tools for blind or PH people.

UNIT-I

Introduction: Importance of user Interface – definition, importance of good design. Benefits of gooddesign.A brief history of Screen design.
The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics,Web user–Interface popularity,characteristics-Principlesof user interface.

UNIT-II

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction

speeds, and understanding business junctions.
Screen Designing: Design goals–Screen planning and purpose,organizing screen elements,orderingof screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web– statistical graphics– Technological consideration in interface design.

UNIT-III

Windows– New and Navigation schemes selection of window, selection of devices based and screen-based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT-IV

HCI in the software process,The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method.Universal design,Universal design principles Multi-modal interaction

UNIT-V

Cognitive models Goal and task hierarchies Design Focus:GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus:Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization Design Focus:Getting the size right.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech.Units1,2,3
2. Human–Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, RussellBealg,Pearson Education Units4,5

REFERENCE BOOKS:

1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Prece,Rogers,Sharps.Wiley Dreamtech.
3. User Interface Design, Soren Lauesen,Pearson Education.
4. Human–Computer Interaction,D.R.Olsen,CengageLearning.
5. Human–Computer Interaction,Smith- Atakan,CengageLearning.

CS4207PE :CYBER FORENSICS

(Professional Elective-VI)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4207PE	**Professional Elective-VI**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: NetworkSecurity								

Course Objectives:

- A brief explanation of the objective is to provide digital evidences which are obtained from digital media.
- Inorder to understand the objectives of computer forensics,firs to fall,people have to recognize the different roles computer plays in a certain crime.
- According to a snippet from the United States Security Service, the functions computer has in different kinds of crimes.

Course Outcomes:

- Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
- It gives an opportunity to students to continue their zeal in research in computer forensics

UNIT-I

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

UNIT-II

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

UNIT-III

Forensics analysis and validation: Determining what data to collect and analyze, validating forensicdata, addressing data-hiding techniques,performing remote acquisitions

Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics,using network tools,examining the honey net project.

UNIT-IV

Current Forensic tools: evaluating computer forensic tool needs, computer forensics software tools,computer forensics hardware tools, validating and testing forensics software E-Mail Investigations:Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail,investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mailforensictools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cellphones and mobile devices.

UNIT-V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks,MS-DOS start up tasks,virtual machines.

TEXT BOOKS:

1. KevinMandia,ChrisProsise,"Incident Response and computer forensics", Tata Mc Graw Hill,2006.

CS4231OE :MACHINE LEARNING
(Open Elective- III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4231OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To be able to formulate machine learning problems corresponding to different applications.
- To understand arrange of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

CourseOutcomes:

- Student should be able to understand the basic concepts such as decision trees and neural networks.
- Ability to formulate machine learning techniques to respective eproblems.
- Apply machine learning algorithms to solve problems of moderate complexity

UNIT–I

Introduction: An illustrative learning task, and a few approaches to it. What is known fromalgorithms? Theory,Experiment.Biology. Psychology. Overview of Machine learning, related areas and applications.Linear Regression, Multiple Regression, Logistic Regression,logistic functions. **Concept Learning**: Version spaces. Inductive Bias. Active queries. Mistake bound/ PAC model. basic results. Overview of issues regarding data sources, success criteria.

UNIT– II

Decision Tree Learning: - Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and Over fitting. **Neural Network Learning**: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

UNIT–III

Sample Complexity and Over fitting: Errors in estimating means. Cross Validation and jack knifing VC dimension.Ir relevant features: Multiplicative rules for weight tuning.

Support Vector Machines: functional and geometric margins, optimum margin classifier, constrained optimization, Lagrange multipliers, primal/dual problems, KKT conditions, dual of the optimum margin classifier,soft margins,and kernels.

Bayesian Approaches: The basics Expectation Maximization. Bayes theorem, Naïve BayesClassifier,Markov models, Hidden Markov Models

UNIT-IV

Instance-based Techniques: Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. **Clustering and Unsupervised Learning:** K-means clustering, Gaussian mixture density estimation, model selection

UNIT-V

Genetic Algorithms:Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity.

Dimensionality reduction: feature selection, principal component analysis, linear discriminant analysis, factor analysis, independent component analysis, multi dimensional scaling, manifold learning

TEXTBOOKS:

1. TomMichel, MachineLearning, McGrawHill,1997
2. TrevorHastie, Robert Tibshirani & Jerome Friedman.The Elements of Statically Learning, SpringerVerlag,2001

REFERENCE BOOKS:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, WilliamW Hsieh, Cambridge Univ Press.
2. Richardo.Duda,PeterE.Hart and DavidG.Stork,pattern classification, John Wiley & Sons Inc.,2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995

CS4232OE :CLOUD COMPUTING
(Open Elective- III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4232OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To explain the evolving computer model called cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.

Course Outcomes:

- Ability to underst and the virtualization and cloud computing concepts.

UNIT-I

Systems Modeling, Clustering and Virtualization: Distributed System Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing,Virtual Machines and Virtualization of Clusters and Data centers.

UNIT-II

Foundations: Introduction to Cloud Computing, Migrating into a Cloud, Enriching the'Integration as a Service' Paradigm for the Cloud Era, The Enterprise Cloud Computing Paradigm.

UNIT-III

Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS /SAAS): Virtual machines provisioning and Migration services, On the Management of Virtual machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a cluster as a Service,Secure Distributed Data Storage in Cloud Computing.Aneka, Comet Cloud, T-Systems', Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments.

UNIT-IV

Monitoring, Management and Applications: An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds, Best Practices in Architecting Cloud Applications in the AWScloud, Building Content Delivery networks using Clouds,Resource Cloud Mashups.

UNIT-V

Governance and Case Studies: Organizational Readiness and Change management in the Cloudage, Data Security in the Cloud, Legal Issues in Cloud computing, Achieving Production Readiness for Cloud Services.

TEXT BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M.Goscinski,Wiley,2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, Elsevier,2012.

REFERENCEBOOKS:

1. Cloud Computing: A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata Mc Graw Hill, rp 2011.
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
3. Cloud Computing: Implementation, Management and Security, JohnW. Rittinghouse, JamesF.Ransome,CRC Press,rp2012.
4. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud,George Reese,O'Reilly,SPD, rp2011.
5. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, TimMather,Subra Kumaraswamy, Shahed Latif,O' Reilly,SPD, rp2011.

CS4233OE :NATURAL LANGUAGE PROCESSING
(Open Elective- III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CS4233OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities,construct statistical models over strings and trees,and estimate parameter using supervised and unsupervised training methods.
- Able to design,implement,and analyze NLP algorithms
- Able to design different language modeling Techniques.

UNIT-I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT-II

Syntax Analysis: Parsing Natural Language,Tree banks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolutionin Parsing,Multi lingual Issues

UNIT-III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT-IV

Predicate-Argument Structure,Meaning Representation Systems,Software.

UNIT-V

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure**Language Modeling:** Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation,Types of Language Models,Language-Specific Modeling Problems,Multi lingual and Cross lingual Language Modeling

TEXT BOOKS:

1. Multi lingual natural Language Processing Applications:FromTheory to Practice–Daniel M.Bikeland Imed Zitouni,Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary

REFERENCE BOOK:

1.Speech and Natural Language Processing-Daniel Juraf sky & James H Martin,Pearson Publications

EE4231OE :INSTRUMENTATION AND CONTROL
(Open Elective- III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
EE4231OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: BasicElectricalEngineering,AnalogElectronics,Mathematics								

Courseo bjectives:

- To introduce the basic principles of all measuring instruments
- To deal with the measurement of voltage, current, Power factor, power, energy and magnetic measurements.
- To understand the basic concepts of Control Engineering

Course Outcomes: After completion of this course,the student able to

- Understand different types of measuring instruments, their construction, operation and characteristics
- Identify the instruments suitable for typical measurements
- Apply the knowledge about transducers and instrument transformers to use them effectively.
- Apply the knowledge of basic control engineering.

UNIT–I

Characteristics of Signals: Measuring Systems,Performance Characteristics-Static characteristics, Dynamic Characteristics; Errors in Measurement-Gross Errors, Systematic Errors,Statistical Analysis of RandomErrors.

UNIT–II

Oscilloscope: Cathode ray oscilloscope-Cathode ray tube-time base generator-horizontal and vertical amplifiers-CROprobes-applications of CRO-Measurement of phase and frequency-lissajous patterns-Sampling oscillo scope-analog and digital type.

UNIT–III

Transducers: Definition of transducers, Classification of transducers, Advantages of electrical transducers, Characteristics and choice of

transducers; Principle of operation of resistor, inductor, LVDT and capacitor transducers.

UNIT–IV

Measurement of Non-Electrical Quantities: Measurement of strain, Gauge sensitivity,Displacement, Force Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature,Pressure,Vacuum,Flow

UNIT–V

Introduction to Control System: Concepts of Control Systems- Open Loop and closed loop control systems and their differences-Different examples of control systems- Classification of control systems,Feed-Back Characteristics, Effects of feedback. Mathematical models– Differential equations - Impulse Response and transfer functions –Translational and Rotational mechanical systems.

TEXT BOOKS:

1. G.K.Banerjee,"Electrical and Electronic Measurements", PHI Learning Pvt.Ltd.,2nd Edition,2016
2. S.C.Bhargava,"Electrical Measuring Instruments and Measurements ", BS Publications,2012.
3. B.C.Kuo,"AutomaticControlSystem",PrenticeHall,1995

REFERENCES:

1. A. K. Sawhney, "Electrical & Electronic Measurement & Instr uments",Dhanpat Rai & Co.Publications,2005.
2. R.K.Rajput,"Electrical & Electronic Measurement & Instrumentation", S.Chand and CompanyLtd.,2007.
3. Buckingham and Price,"Electrical Measurements",Prentice–Hall,1988.
4. Reissland,M.U,"Electrical Measurements: Fundamentals, Concepts, Applications", New Age International(P)Limited Publishers, 1st Edition2010.
5. E.W.GoldingandF.C.Widdis,"ElectricalMeasurements and measuring Instruments",fifth Edition,Wheeler Publishing,2011.

EE4232OE :ENERGY STORAGE SYSTEMS
(Open Elective- III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
EE4232OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites:	**Electro chemistry**							

Course Objective:

- To enable the student to understand the need for energy storage,devices and technologies available and their applications.

Course Outcomes: After completion of this course,the student will be able to

- Analyze the characteristics of energy from various sources and need for storage.
- Classify various types of energy storage and various devices used for the purpose.
- Identify various realtime applications.

UNIT-I

Electrical Energy Storage Technologies: Characteristics of electricity, Electricity and theroles of EES, High generation cost during peak-demand periods, Need for continuous andflexible supply, Long distance between generation and consumption, Congestion in powergrids,Transmission bycable.

UNIT-II

Needs for Electrical Energy Storage: Emerging needs for EES, More renewable energy, less fossil fuel, Smart Griduses, The roles of electrical energy storage technologies,The roles from the view point of a utility, The roles from the viewpoint of consumers, The roles from the view point of generators of renewable energy.

UNIT-III

Features of Energy Storage Systems: Classification of EES systems , Mechanical storagesystems, Pumped hydro storage (PHS), Compressed air

energy storage (CAES), Flywheelenergy storage (FES),Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen(H2),Synthetic naturalgas(SNG).

UNIT-IV

Types of Electrical Energy Storage systems: Electrical storage systems, Double-layercapacitors (DLC), Super conducting magnetic energy storage(SMES), Thermal storage systems, Standards for EES, Technical comparison of EES technologies.

UNIT-V

Applications: Present status of applications, Utility use(conventional power generation, grid operation & service), Consumer use(uninterruptable power supply for large consumers),New trends in applications ,Renewable energy generation, Smart Grid, Smart Micro grid,Smart House, Electric vehicles, Management and control hierarchy of storage systems,Internal configuration of battery storage systems, External connection of EES systems ,Aggregatin EES systems and distributed generation (Virtual Power Plant), Battery SCADA–aggregation of many dispersed batteries.

Text Books:

1. "JamesM. Eyer, Joseph J. Iannucciand Garth P.Corey", "Energy Storage Benefits and Market Analysis",Sandia National Laboratories, 2004.
2. The Electrical EnergyS to rage by IEC Market Strategy Board.

Reference Book:

1. "Jim Eyer, Garth Corey", Energy Storage for th Electricity Grid: Benefits and Market PotentialAssessment Guide, Reports, in a National Laboratories, Feb201

EC4231OE :ELECTRONIC MEASURING INSTRUMENTS
(Open Elective- III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
EC4231OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

1. It provides an understanding of various measuring systems functioning and metrics for performance analysis.
2. Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers ,recorders and measuring equipment.
3. Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes: On completion of this course student can be able to

1. Identify the various selectronic instruments based on their specifications for carrying out a particular task of measurement.
2. Measure various physical parameters by appropriately selecting the transducers.
3. Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.

UNIT-I

Block Schematics of Measuring Systems and Performance Metrics: Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag.

UNIT-II

Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, and Specifications.

UNIT-III

Measuring Instruments: DC Voltmeters, D'Arsonval Movement, DC Current Meters, AC Volt meters and Current Meters, Oh mmeters, Multimeters, Meter Protection, Extension of Range,True RMS Responding Voltmeters, Specifications of Instruments. CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes.

UNIT-IV

Recorders:X-Y Plotter, Curve tracer,Galvano metric Recorders,Servo transducers, pen driving mechanisms,Magnetic Recording,Magnetic recording techniques.

UNIT-V

Transducers: Classification,Strain Gauges, Bounded, unbounded; orceand Displacement Transducers, Resistance Thermometers, Hotwire Anemo meters, LVDT, Thermo couples, Synchros, Special Resistance Thermo meters,Digital Temperature sensing system, Piezo electric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers.

TEXTBOOKS:

1. Electronic Measurements and Instrumentation: B.M.Oliver, J.M.Cage TMH Reprint 2009.
2. Electronic Instrumentation: H.S.Kalsi–TMH,2nd Edition2004.

REFERENCES:

1. Electronic Instrumentation and Measurements–David A.Bell ,Oxford Univ.Press, 1997.
2. Modern Electronic Instrumentation and Measurement Techniques :A.D. Helbincs, W.D. Cooper: PHI5th Edition2003.
3. Electronic Measurements and Instrumentation–K.LalKishore, Pearson Education2010.
4. Industrial Instrumentation: T.R.Padmanabham Springer2009.

ME4231OE :RELIABILITY ENGINEERING
(Open Elective- III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
ME4231OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nil**				**Total Classes:60**		
Prerequisites: Mathematics III								

CourseObjectives:

- To introduce the basic concepts of reliability, various models of reliability
- To analyze reliability of various systems
- To introduce techniques of frequency and duration for reliability evaluation of repairable systems.

Course Outcomes: After completion of this course, the student will be able to

- model various systems applying reliability networks
- evaluate the reliability of simple and complex systems
- estimate the limiting state probabilities of repairable systems
- applyvarious mathematical models for evaluating reliability of irreparable systems

UNIT-I

Basic Probability Theory: Elements of probability, probability distributions, Random variables, Density and Distribution functions- Binomial distribution-Expected value and standard deviation-Binomial distribution, Poisson distribution, normal distribution, exponential distribution, Weibulldistribution.

Definition of Reliability: Definition of terms used in reliability, Component reliability, Hazardrate, derivation of the reliability function in terms of the hazard rate. Hazard models - Bath tubcurve, Effect of preventive maintenance. Measures of reliability:Mean Time to Failure and MeanTimebetweenFailures.

UNIT–II

Network Modeling and Evaluation of Simple Systems: Basic concepts- Evaluation of networkReliability / Unreliability - Series systems, Parallel systems- Series-Parallel systems partiallyredundantsystems-Examples.

Network Modeling and Evaluation of Complex systems: Conditional probability method tieset,Cutset approach- Event tree and reduced event tree methods-Relationships between tie and cutsets-Examples.

UNIT–III

Time Dependent Probability: Basic concepts-Reliability functionf(t). F(t), R(t) and h(t)-Relationship between these functions.

Network Reliability Evaluation Using Probability Distributions: Reliability Evaluation of Seriessystems,Parallel systems – Partially redundant systems- determination of reliability measure- MTTF for series and parallel systems–Examples.

UNIT–IV

Discrete Markov Chains: Basic concepts-Stochastic transitional probability matrix- time dependent probability evaluation-Limiting State Probability evaluation-Absorbing states–Examples.

Continuous Markov Processes: Modeling concepts- State space diagrams- Unreliability evaluation of single and two component repairable systems

UNIT–V

Frequency and Duration Techniques: Frequency and duration concepts, application to multi state problems,Frequency balance approach.

Approximate System Reliability Evaluation: Series systems–Parallel systems- Network reduction techniques-Cut set

approach-Common mode failures modeling and evaluation techniques-Examples.

TEXTBOOKS:

1. Roy Billinton and Ronald NAllan, Reliability Evaluation of Engineering Systems,PlenumPress,1983.
2. E.Balagurusamy, Reliability Engineering by Tata Mc Graw-Hill Publishing Company Limited,2002.

REFERENCE BOOK:

1. K.K.Agarwal,Reliability Engineering-KluwerAcademic Publishers,1993.

ME4232OE :INDUSTRIAL MANAGEMENT
(Open Elective- III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
ME4232OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course objectives:

- Understand the philosophies of management gurus
- Understand the various types of organization structures and their features, and their advantages and disadvantages.
- Learning various Industrial Engineering Practices like Operations Management techniques, work study, statistical quality control techniques, Job evaluation techniques and network analysis techniques.

Course outcomes:

- Able to apply principles of management
- Able to design the organization structure
- Able to apply techniques for plant location,design plant layout and value analysis
- Able to carry out work study to find the best method for doing the work and establish standard time for a given method
- Abletoapplyvarious quality control techniques and sampling plans
- Able to do job evaluation and network analysis.

UNIT.I

Introduction to Management: Entrepreneurship and organization-Nature and Importance of Management, Functions of Management, Taylor's Scientific Management Theory, Fayol's

Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and TheoryY,Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management

UNIT.II

Designing Organizational Structures: Departmentalization and Decentralization,Types of Organization structures- Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organization, Cellular Organization, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure and their merits, demerits and suitability.

UNIT.III

Operations Management: Objectives-productde sign process-Process selection-Types of production system (Job,batch and Mass Production), Plant location-factors-Urban-Ruralsites comparison- Types of Plant Layouts- Design of product layout- Line balancing (RPW method) Value analysis-Definition- types of values- Objectives-Phases of value analysis- Fast diagram

UNIT.IV:

Work Study: Introduction- definition- objectives- steps in work study- Method study- definition, objectives-steps of method study.Work Measurement- purpose- types of study-
Stop watch methods- steps- key rating- allowances- standard time calculations- work sampling.Statistical Quality Control: variables-attributes, Shewart control charts for variables- chart, Rchart, - Attributes- Defective-Defect- Charts for attributes-p-chart -c chart (simple Problems), Acceptance Sampling-Single sampling-Double sampling plans-OCcurves.

UNIT.V

Job Evaluation: Methods of job evaluation - simple routing objective systems - classificationmethod factor comparison method, point method, benefits of job evaluation and limitations.ProjectManagement(PERT/CPM):NetworkAnalysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of

Completing the project within given time,Project Cost Analysis, Project Crashing. (Simple problems)

TEXT BOOKS:

1. Industrial Engineering and Management /O.P. Khanna/ Khanna Publishers.
2. Industrial Engineering and Management Science/T.R. Banga and S.C.Sarma/Khanna Publishers.

REFERENCE BOOKS:

1. Motion and Time Study by Ralph MBarnes! John Willey & Sons Work Study by lLO.
2. Human factors in Engineering & Design / Ernest JMc Cormick/ TMH.
3. Production&OperationManagement/PaneerSelvam/PHI.
4. Industrial Engineering Management/ NVS Raju/ Cengage Learning.
5. Industrial Engineering Hand Book/Maynard.
6. Industrial Engineering ManagementI Ravi Shankar/Galgotia.

ME4233OE :RENEWABLE ENERGYSOURCES
(Open Elective- III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
ME4233OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites: None								

Course Objectives:

- To explain the concepts of Non-renewable and renewable energy systems
- To outline utilization of renewable energy sourcesfor both domestic and industrial applications
- To analyse the environmental and cost economics of renewable energy sources in comparison with fossil fuels.

Course Outcomes:

- Understanding of renewable energy sources
- Knowledge of working principle of various energy systems
- Capability to carryout basic designof renewable energy systems

UNIT.I

Global and National Energy Scenario: Over view of conventional & renewable energy sources,need & development of renewable energy sources, types of renewable energy systems, Future ofEnergyUse, Global and IndianEnergy scenario,Renewable and Non-renewableEnergy sources,Energy for sustainable development, Potential of renewable energy sources, renewable electricityand key elements, Global climate change, CO2 reduction potential of renewable energy-concept of Hybrid systems.

UNIT.II

Solar Energy: Solar energy system, Solar Radiation, Availability, Measurement and Estimation,Solar Thermal Conversion Devices and Storage, Applications Solar Photovoltaic Conversion solar photo voltaic, solar thermal, applications of solar energy systems.

UNIT.III

Wind Energy: Wind Energy Conversion, Potential, Wind energy potential measurement, Site selection, Types of wind turbines, Wind farms, wind Generation and Control. Nature of the wind,power in the wind,factors influencing wind, wind data and energy estimation, wind speed monitoring, classification of wind, characteristics, applications of wind turbines, offshore wind energy-Hybrid systems, wind resource assessment,Betzlimit,siteselection,wind energy conversion devices. Safety and environmental aspects,wind energy potential and installation in India.

UNIT.IV

Biogas: Properties of biogas (Calorific valueand composition), biogasplant technology and status,Bio energysystem,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, Bio mass energy programme in India.

UNIT.V

Ocean Energy: Ocean wave energy conversion, principle of Ocean Thermal Energy Conversion(OTEC), ocean thermal power plants, tidal energy conversion, Tidal and wave energy its scope and development, Scheme of development of tidal energy.

Small hydro Power Plant: Importance of small hydro power plants and their Elements, types of turbines forsmallhydro,estimation of primary and secondary power.

Geothermal Energy: Geothermal powerplants,types of Geothermal resources, hot springs and steam ejection.

TEX TBOOKS:

1. RenewableEnergySources/Twidell,J.W.andWeir,A./EFNSpon Ltd.,1986.
2. Non-Conventional EnergySources/G.DRai/KhannaPublishers

REFERENCE BOOKS:

1. Kishore VVN, Renewable Energy Engineering and Technology, Teri Press,NewDelhi,2012
2. Godfrey Boyle, Renewable Energy, Power for a Sustainable Future,Oxford University Press,U.K,1996.
3. Non-Conventional Energy Resources by EHKhan

CE4231OE :REMOTE SENSING AND GIS
(OpenElective-III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CE4231OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites Surveying								

Course Objectives: This course will make the student to understand about the principles of GIS, Remote Sensing, Spatial Systems, and its applications to Engineering Problems.

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

- Retrieve the information content of remotely sensed data
- Analyze the energy interactions in the atmosphere and earth surface features
- Interpret the images fo rpreparation of the matic maps
- Apply problem specific remote sensing data for engineering applications
- Analyze spatial and attribute data for solving spatial problems
- Create GIS and cartographic outputs for presentation

UNIT– I

Introduction to Photo grammetry: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement,Fundamentals of stereoscopy,fiducial points, parallax measurement using fiducial line.

UNIT– II

Remote Sensing: Basic concept of remote sensing, Data and Information, Remote sensing data Collection,Remote sensing advantages & Limitations, Remote Sensing process.Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil,water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT– III

Geographic Information Systems: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data-Attribute data – Joining Spatial and Attribute data; GIS Operations: Spatial DataInput-Attribute data Management–Data display-Data Exploration-Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections-Map projection parameters- Commonly used Map Projections -Projected coordinate Systems

UNIT– IV

Vector Data Model: Representation of simple features- Topology and its importance; coverageand its data structure, Shape file; Data models for composite features Object BasedVector DataModel; Classes and their Relationship; The geobase data model; Geometric representation ofSpatialFeatureand datastructure, Topologyrules

UNIT– V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster DataStructure, Data Conversion,Integration of Rasterand Vectordata.

Data Input: Metadata, Conversion of Existing data, creating new data; Remote Sensing data, Field data, Text data, Digitizing, Scanning, on screen digitizing, importance of source map, DataEditing

TEXTBOOKS:

1. Remote Sensing and GIS Lilles and Kiefer, JohnWilley2008.
2. Remote Sensing and GISB.Bhatta by Oxford Publishers2015.
3. Introduction to Geographic Information System–Kang-Tsung Chang, Mc Graw-Hill 2015

REFERENCES:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W.Yonng, Prentice Hall (India) Publications.
2. Principals of Geophysical Information Systems–Peter A Burraghand RachaelA.Mc Donnell, Oxford Publishers 2004.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.

CE4232OE :DISASTER MANAGEMENT
(OpenElective-III)

IV-II:CSE(DS)								
Course Code	**Category**	**Hours/Weak**			**Credits**	**Max Marks**		
CE4232OE	**Open Elective- III**	**L**	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
		3	**0**	**0**	**3**	**30**	**70**	**100**
Contact Classes:45	**Tutorial classes: 15**	**Practical classes: Nill**				**Total Classes:60**		
Prerequisites None								

Course Objectives: The subject provides different disasters, tools and methods for disaster management.

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

- Understanding Disasters, man-made Hazards and Vulnerabilities
- Understanding disaster management mechanism
- Understanding capacity building concepts and planning of disaster managements

UNIT-I

Understanding Disaster: Concept of Disaster - Different approaches- Concept of Risk – Levels of Disasters –Disaster Phenomena and Events (Global, national and regional)

Hazards and Vulnerabilities: Natural and man-made hazards; response time, frequency and fore warning levels of different hazards - Characteristics and damage potential or natural hazards;hazard assessment - Dimensions of vulnerability factors; vulnerability assessment – Vulnerability and disaster risk - Vulnerabilities to flood and earth quake hazards

UNIT-II

Disaster Management Mechanism: Concepts of risk management and crisis managements -Disaster Management Cycle- Response and Recovery - Development,Prevention, Mitigation and Preparedness- Planning for Relief

UNIT-III

Capacity Building: Capacity Building:Concept-Structural and Non structural Measures Capacity Assessment; Strengthening Capacity for Reducing Risk - Counter-Disaster Resources and their utility in Disaster Management-Legislative Support a tthe state and national levels

UNIT-IV

Coping with Disaster: Coping Strategies;alternative adjustment processes– Changing Concepts of disaster management - Industrial Safety Plan; Safety norms and survival kits – Mass media and disaster management

UNIT-V

Planning for disaster management: Strategies for disaster management planning - Steps for formulating a disaster risk reduction plan - Disaster management Act and Policy in India -Organizational structure for disaster management in India- Preparation of state and district disaster management plans

TEXTBOOKS:

1. Manual on Disaster Management,National Disaster Management, Agency Govt of India.

2. Disaster Management by Mrinalini Pandey Wiley 2014.

3. Disaster Science and Management by T.Bhattacharya, Mc Graw Hill Education (India) Pvt Ltd Wiley 2015

REFERENCES:

1. Earth and Atmospheric Disasters Management,N. Pandharinath,CKRajan, BS Publications 2009.

2. National Disaster Management Plan, Ministry of Home affairs, Government of India (http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)