M.Tech.(Computer Science and Information Technology)
Course Structure and Syllabus
w.e.f 2018

Proposed M.Tech. Computer Science & Information Technology w.e.f 2018 admitted batch

Programme Educational Objectives (PEOs)

After 3 to 4 years of graduation the graduate will be able to:

PEO-1: Develop efficient algorithms and evaluate feasible IT solutions for computational problems.

PEO-2: Demonstrate analytical and appropriate modern software tools and techniques to solve engineering problems within the limitations of financial and social aspects.

PEO-3: Solve multi-disciplinary issues by enhancing knowledge through lifelong learning with ethical practices for sustainable development of the society.

Programme Specific Outcomes (PSOs)

At the end of the programme the student shall be able to:

1. Analyze, design and develop hardware devices by applying fundamental concepts of Processors and Controllers.
2. Design and develop efficient Data Science techniques using statistical methods to extract knowledge from data.
3. Apply efficient security techniques to protect data from vulnerabilities.

Programme Outcomes (POs)

At the end of the programme the student shall be able to:

1. Acquire the knowledge of trends in computing technologies with analytical and statistical skills in wider and global perspectives.
2. Critically investigate complex problems by applying research based knowledge to provide valid solutions.
3. Apply in-depth knowledge to identify, formulate and analyze engineering problems and evaluate feasible solutions.
4. Apply research methodologies to solve challenging issues in the domain of Computer Science & Information Technology.
5. Adopt appropriate modern software tools & techniques including analytics, statistics and prediction to solve engineering problems.
6. Contribute to multidisciplinary research through collaborative thinking by demonstrating the skill set in the field of Computer Science & Information Technology.
7. Demonstrate engineering and management principles to manage software team along with financial aspects.
8. Communicate effectively with engineering community and society at large.
9. Uphold zeal for lifelong learning with self-determination.
10. Adopt ethical practices with social responsibilities to contribute in the development of the society.
11. Learn and develop critical thinking skills independently from their learning experience.

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

SEMESTER -I:

Code	Name of the subject	L	T	P	C
18IT2101	Advanced Data Structures	3	0	0	3
18IT2102	Information Security	3	0	0	3
18IT2103	Fundamentals of statistics for data science	3	0	0	3
18IT2104	Data Warehousing and Data Mining	3	0	0	3
18IT2105	Artificial Intelligence	3	0	0	3
18IT2106	Elective-I: Big Data and Analytics Computational Number Theory Mobile Communications	3	0	0	3
18IT2107	Advanced Data Structures LAB	0	0	3	2
18IT2108	Advanced Technical Communication Skills Lab	0	0	3	2
	Total				**22**

SEMESTER -II:

Code	Name of the subject	L	T	P	C
18IT2109	Cloud Computing	3	0	0	3
18IT2110	Object Oriented Modelling	3	0	0	3
18IT2111	Embedded Systems	3	0	0	3
18IT2112	Internet of Things	3	0	0	3
18IT2113	Machine Learning	3	0	0	3
18IT2114	Elective-II: Deep Learning Cyber Security Adhoc Networks	3	0	0	3
18IT2115	Machine Learning using Python Lab	0	0	3	2
	Total				**20**

SEMESTER –III:

Code	Name of the subject	Lectures	Tutorial	Practical	Credits
18IT21DW	Dissertation Work				-
18IT21PT /18IT21IT	Pedagogy Training/Industrial Training				2

SEMESTER- IV:

Code	Name of the subject	Credits
18IT21DW	Dissertation work (Contd.)	36

ADVANCED DATA STRUCTURES

Course Code: 18IT2101

L	T	P	C
3	0	0	3

Prerequisites: C, Data Structures.

Course Outcomes:

At the end of the course, a student will be able to

CO1: Apply concepts of Heaps.
CO2: Apply Hash functions in indexing.
CO3: Design applications using Red-Black and Splay trees.
CO4: Explain Digital Search Structures.
CO5: Apply various String Matching Techniques

UNIT-I **(10 Lectures)**

PRIORITY QUEUES:

Single and double ended Priority Queues, Leftist trees, Binomial Heaps, Fibonacci Heaps, Pairing Heaps. (Text book 1)

UNIT-II **(10 Lectures)**

HASHING:

Hash Functions, Collision Resolution, Deletion, Perfect Hash Functions, Hash Functions for Extendible files. (Text book 2)

UNIT-III **(10 Lectures)**

EFFICIENT BINARY SEARCH TREES:

Red-Black Trees: Definition, Representation of a Red-Black Tree, Searching, inserting into, deletion from a Red-Black tree. Splay trees: Bottom Up Splay trees, Top-Down Splay Trees.(Text book 1)

UNIT-IV **(10 Lectures)**

DIGITAL SEARCH STRUCTURES:

Digital search trees, Binary Tries and Patricia, Multiway Tries. (Text book 1)

UNIT-V **(10 Lectures)**

STRING MATCHING:

Exact String Matching-Straight forward Algorithms, The Knuth- Morris-Pratt Algorithm, The Boyer-Moore Algorithm, Multiple Searches, Bit-Oriented Approach. (Text book 2)

TEXTBOOKS:

1. Ellis Horowitz, Sartaj sahni, Dinesh Mehta, *Fundamentals of Data structures in C++*, 2nd edition, University Press (India) Pvt.Ltd.
2. Adam Drozdek, *Data structures and algorithms in C++*, 3rd Edition, Cengage Learning.2008

REFERENCES:

1. Langsam, Augenstein and Tanenbaum, *Data structures using C and C++*,2nd Edition, PHI.2009
2. W.Savitch, *Problem solving with C++, The Object of Programming*, 5th Edition, Pearson education.2004.
3. Mark Allen Weiss, *Data structures and Algorithm Analysis in C++*,2nd Edition, Pearson Education.2007

INFORMATION SECURITY

COURSE CODE: 18IT2102

L	T	P	C
3	0	0	3

COURSE OUTCOMES:

At the end of the course the student shall be able to

CO1: Demonstrate the concept and principle of security Attacks, Services, Mechanisms, Conventional encryption algorithms (DES, AES, Triple DES, RC4) and public key algorithms RSA.

CO2: Apply in Message authentication, Hash function and Public key encryption.

CO3: Apply Cryptographic algorithms to encrypt the given message.

CO4: Evaluate impact of the security attacks in real time applications and able to perform security vulnerability tests in real time applications

CO5: Describe the security vulnerabilities in existing Cryptograph algorithms

UNIT-I **(10 Lectures)**

INTRODUCTION: Computer Security Concepts, OSI security architecture, Security Attacks, Security Services, Security mechanisms, a model for network security.

BLOCK CIPHER AND DATA ENCRYPTION STANDARDS: Block Cipher Principles, Data Encryption Standards, the Strength of DES, Differential and Linear Cryptanalysis.

UNIT-II **(10 Lectures)**

ADVANCED ENCRYPTION STANDARDS: Triple DES, AES, block Cipher Modes of Operation, Stream Cipher, and RC4.

PUBLIC-KEY CRYPTOGRAPHY AND RSA: Principles Public key crypto Systems the RSA algorithm, Key Management, Diffie-Hellman Key Exchange.

UNIT-IIII **(10 Lectures)**

MESSAGE AUTHENTICATION AND HASH FUNCTIONS: Authentication Requirement, Authentication Function, Message Authentication Code, HMAC, Hash Function, SHA-512.

DIGITAL SIGNATURE: Digital Signature, Authentication Protocols, Digital Signature standard.

UNIT-IV **(10 Lectures)**

AUTHENTICATION APPLICATIONS: Kerberos, X.509 Authentication Service, Public Key Infrastructure.

EMAIL SECURITY: Pretty Good Privacy (PGP) and S/MIME.

IP SECURITY: Overview, IP Security Architecture and Services, Authentication Header, Encapsulating Security Payload.

UNIT-V **(10 Lectures)**

WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

FIREWALLS AND INTRUSION DETECTION: Firewall design Principles, Trusted Systems.

TEXT BOOKS:

1. William Stallings (2010), Cryptography and Network Security: Principles and Practice, 4th Edition, Pearson Education, India.
2. Charlie Kaufman (2011), Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall of India, New Delhi.

REFERENCES:

1. William Stallings (2013), Network Security Essentials (Applications and Standards), Pearson Education, 5th Edition, India.
2. AtulKahate (2014), Cryptography and Network Security, 2nd Edition, Tata McGrawhill, India.

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

FUNDAMENTALS OF STATISTICS FOR DATA SCIENCE

COURSE CODE: 18IT2103

L	T	P	C
3	0	0	3

COURSE OUTCOMES:

At the end of the course the student shall be able to

CO1: Analyze the data in order to determine values for the unknown parameters.
CO2: Apply statistical methods for Evaluation of Models.
CO3: Apply kernel regression for data modeling.
CO4: Apply linear methods for classification.
CO5: Explain piecewise-polynomials and splines for local polynomial representations.

UNIT-I **(10 Lectures)**

DATA ANALYSIS USING LEAST SQUARES: Method of Least Squares, Uncertainty in model parameters, Uncertainty in model predictions, Treatment of Prior Estimates, Applying Least Squares to Classification Problems.

UNIT-II **(10 Lectures)**

STATISTICAL METHODS FOR EVALUATION OF MODELS: Model Evaluation, Goodness-of-Fit, Selecting the Best Model, Variance Reduction, Linear Correlation, Outliers, Out-of-Sample Testing, Analyzing the Residuals.

UNIT-III **(10 Lectures)**

KERNEL REGRESSION: Introduction, Kernel Regression Order Zero, Kernel Regression Order One, Kernel Regression Order Two, Nearest Neighbor Searching, Kernel Regression Performance Studies, Application to classification.

UNIT-IV **(10 Lectures)**

LINEAR METHODS FOR CLASSIFICATION: Introduction, Linear Discriminant Analysis, Logistic Regression, Separating Hyper planes.

UNIT-V **(10 Lectures)**

BASIS EXPANSIONS AND REGULARIZATION: Introduction, Piecewise Polynomials and Splines, Filtering and Feature Extraction, Smoothing Splines, Automatic Selection of the Smoothing Parameters, Nonparametric Logistic Regression, Wavelet Smoothing.

TEXT BOOKS:

1. J. Wolberg (2006), *"Data Analysis Using the Method of Least Squares"*, 1st Edition, Springer 2006.
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman (2008), "*The Elements of Statistical Learning"* 2nd Edition, Springer 2008.

REFERENCES:

1. Norm Matlo (2013), *"From Algorithms to Z-Scores: Probabilistic and Statistical Modeling in Computer Science",* 1st Edition, University of California, Davis 2013.

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

DATA WAREHOUSING AND DATA MINING

COURSE CODE: 18IT2104 **L T P C**

3 0 0 3

Prerequisites: Database Management Systems.
Course Outcomes:

At the end of the course, a student will be able to
CO 1: Identify the needs of data warehouse and learn a step by step approach to design and build a data warehouse.
CO 2: Analyze real time datasets with basic summary statistics and apply different preprocessing methods, Similarity and Dissimilarity measures for any given raw data.
CO 3: Explore different classification techniques and resolve the problems in classification and characterize the kinds of patterns that can be discovered by association rule mining
CO 4: Identify suitable clustering algorithm (apply with open source tools), interpret and report the result
CO 5: Design and implement a data-mining application using sample, realistic data sets and modern tools

UNIT I: **(10 Lectures)**
Data Warehouse and OLAP Technology: An Overview: What Is a Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. **(Text Book 2)**

UNIT II: **(10 Lectures)**
Data Mining & Data Preprocessing: Introduction, What is Data Mining?, Motivating challenges, The origins of Data Mining, Data Mining Tasks, Types of Data, Data Quality, Exploring Data, The Iris Dataset, summary statistics, visualization
Data Preprocessing: Aggregation, Sampling, Dimensionality Reduction, Feature Subset Selection, Feature creation, Discretization and Binarization, Variable Transformation, Measures of Similarity and Dissimilarity. **(Text Book 1)**

UNIT III: **(10 Lectures)**
Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.
UNIT IV: **(10 Lectures)**
Association Analysis: Basic Concepts and Algorithms: Problem Definition, Frequent Item Set Generation, Rule Generation, Compact Representation of Frequent Itemsets, FP-Growth Algorithm. **(Text Book 1)**

UNIT V: **(10 Lectures)**

Cluster Analysis: Basic Concepts and Algorithms: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting K-means, K-means and Different Types of Clusters, Strengths and Weaknesses, K-means as an Optimization Problem, Agglomerative Hierarchical Clustering, Basic Agglomerative Hierarchical Clustering Algorithm, Specific Techniques, Strengths and Weaknesses, DBSCAN, Traditional Density: Center-Based Approach, The DBSCAN Algorithm, Strengths and Weaknesses. **(Text Book 1)**

Text Books:

1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

References:

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
3. NPTEL - https://onlinecourses.nptel.ac.in/noc17_mg24/preview
4. http://www.saedsayad.com/data_mining_map.htm

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

ARTIFICIAL INTELLIGENCE

Course Code: 18IT2105

L	T	P	C
3	0	0	3

Pre requisites: Logic for Computer Science, Algorithms

Course Outcomes:

At the end of the Course, the Student will be able to:

CO 1: Identify searching strategies for finding solutions.
CO 2: Understand knowledge representation methods for inference
CO 3: Plan solutions through state space search.
CO 4: Explain uncertainty.
CO 5: Analyze learning methods

UNIT-I **(10 Lectures)**

INTRODUCTION:

AI problems, foundation of AI and history of intelligent agents, Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

SEARCHING:

Searching for solutions, uninformed search strategies- Greedy best first search, A*search. Game Playing: Adversarial search, Games, minimax algorithm, optimal decisions in multiplayer games, Alpha Beta pruning, Evaluation functions, cutting of search.

UNIT-II **(10 Lectures)**

KNOWLEDGE REPRESENTATION:

Knowledge based agents, the Wumpus world, logic, propositional logic, Resolution patterns in propositional logic, Resolution, Forward and backward chaining.

FIRST ORDER LOGIC:

Inference in first order logic, propositional vs first order inference, unification and lifts, forward chaining, backward chaining, resolution.

UNIT-III **(10 Lectures)**

PLANNING:

Classical planning problem, Language of planning problems, Expressiveness and extension, planning with state-space search, Forward state space search, Backward state space search, Heuristics for state space search, Planning search, planning with state space search.

UNIT-IV **(10 Lectures)**

UNCERTAINTY:

Acting under uncertainty, Basic probability notation, axioms of probability, Inference using Full joint distributions, Baye's Rule and its use. Probabilistic Reasoning: Representing knowledge in an uncertain domain, the semantics of Bayesian Networks.

PROBABILISTIC REASONING OVER TIME:

Time and Uncertainty, Inference in Temporal models, Hidden Markov models, Kalman Filters, Dynamic Bayesian Networks, Speech Recognition

UNIT-V **(10 Lectures)**

LEARNING:

Forms of learning, Induction learning, Learning Decision trees, statistical learning methods, learning with complex data, learning with hidden variables-the EM algorithm, instance based learning.

TEXT BOOK:

1. Stuart Russel, Peter Norvig," Artificial Intelligence-A Modern Approach", 2nd Edition PHI/Pearson Education ,2003

REFERENCES:

1. Patrick Henry Winston,"Artificial Intelligence", 3rd Edition, Pearson Edition, 2001.
2. E.Rich and K.Knight ,"Artificial Intelligence", 3rd Edition, TMH, 2008.
3. Patterson, "Artificial Intelligence and Expert Systems", 2nd Edition, PHI, 2008.

WEB REFERENCE:

http://nptel.iitm.ac.in/video.php?subjectId=106105079

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

BIG DATA ANALYTICS

COURSE CODE: 18IT2106

L	T	P	C
3	0	0	3

Prerequisites: Data Mining

Course Outcomes:

At the end of the course, a student will be able to

CO1: Discuss the fundamentals of Big Data.
CO2: Explain the concepts of HADOOP.
CO3: Evaluate the data flow in HDFS.
CO4: Examine the Anatomy of HADOOP ECO SYSTEM and YARN Application.
CO5: Develop Applications using HIVE and HBASE

UNIT I: INTRODUCTION TO BIG DATA (10 Lectures)

Introduction – Distributed Platform, Cloud and big data Big Data and its importance, Characteristics of Big data- 4V's, Drivers for Big data, Challenges and Issues in handling Big data, Big data analytics, Big data applications: Social network analysis, Health sector. Bio informatics, Algorithms using map Reduce, Matrix-Vector Multiplication by Map Reduce.

UNIT II: INTRODUCTION TO HADOOP (10Lectures)

Big Data – Apache Hadoop & HadoopEcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization. Command line interface for Hadoop, Word count program in Hadoop Environment, Hadoop Streaming

UNIT- III HADOOP ARCHITECTURE (10 Lectures)

Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, HadoopMapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

UNIT-IV HADOOP ECOSYSTEM AND YARN (10 Lectures)

Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features, NameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

UNIT-V HIVE AND HIVEQL, HBASE (10 Lectures)

Hive Architecture and Installation, Comparison with Traditional Database, HiveQL–NoSQL, Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins &Subqueries, HBase concepts Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

TEXT BOOKS:

1. Tom White, "HADOOP: The definitive Guide", O Reilly 2012.
2. Chris Eaton, Dirk deroos et al., "Understanding Big data", McGraw Hill, 2012.
3. Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
4. ArvindSathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.

REFERENCES:

1. Boris lublinsky, Kevin T. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
2. Vignesh Prajapati, "Big Data Analytics with R and Hadoop", Packet Publishing 2013.
3. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.
4. http://www.bigdatauniversity.com/
5. JyLiebowitz, "Big Data and Business analytics", CRC press, 2013.

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTATIONAL NUMBER THEORY
(Elective-I)

Course Code: 18IT2106 **L T P C**

3 0 0 3

Prerequisites: Mathematics, DS

Course Outcomes:

At the end of the course, a student will be able to

CO 1: Develop the mathematical skills to solve number theory problems and to develop the mathematical skills of divisions, congruence's, and number functions.

CO 2: Learn the history of number theory and its solved and unsolved problems.

CO 3: Investigate applications of number theory and the use of computers in a Number theory.

CO 4: Estimate the time and space complexities of various Secure Algorithms.

CO 5: Learn various factorization and logarithmic methods.

UNIT-I **(10 Lectures)**

TOPICS IN ELEMENTARY NUMBER THEORY: O and Ω notations – time estimates for doing arithmetic – divisibility and the Euclidean algorithm – Congruence's: Definitions and properties –linear congruence's, residue classes, Euler's phi function

UNIT-II **(10Lectures)**

FERMAT'S LITTLE THEOREM – Chinese Remainder Theorem– Applications to factoring – finite fields – quadratic residues and reciprocity: Quadratic residues – Legendre symbol – Jacobi symbol. Enciphering Matrices – Encryption Schemes – Symmetric and Asymmetric Cryptosystems – Cryptanalysis – Block ciphers –Use of Block Ciphers

UNIT-III **(10Lectures)**

MULTIPLE ENCRYPTION – Stream Ciphers –Affine cipher –Vigenere, Hill, and Permutation Cipher – Secure Cryptosystem. Public Key Cryptosystems: The idea of public key cryptography – The Diffie–Hellman Key Agreement Protocol - RSA Cryptosystem – Bit security of RSA – ElGamal Encryption

UNIT-IV **(10 Lectures)**

DISCRETE LOGARITHM – Knapsack problem – Zero-Knowledge Protocols – From Cryptography to Communication Security - Oblivious Transfer. Primality and Factoring: Pseudo primes– the rho (γ) method – Format factorization and factor bases.

UNIT-V **(10 Lectures)**

THE CONTINUED FRACTION METHOD – the quadratic sieve method, Number Theory and Algebraic Geometry: Elliptic curves –basic facts – elliptic curve cryptosystems – elliptic curve primality test – elliptic curve factorization.

TEXTBOOKS:

1. Neal Koblitz: "A Course in Number Theory and Cryptography", 2nd Edition, Springer, 2002.
2. Johannes A. Buchman: "Introduction to Cryptography", 2nd Edition, Springer, 2004.

REFERENCES:

1. Serge Vaudenay, "Classical Introduction to Cryptography Applications for Communication Security", Springer, 2006.
2. Victor Shoup: "A Computational Introduction to Number Theory and Algebra", Cambridge University Press, 2005.

MOBILE COMMUNICATIONS
(Elective-I)

COURSE CODE: 18IT2106

L	T	P	C
3	0	0	3

Pre requisites: Computer Networks

COURSE OUTCOMES:

At the end of the course the student shall be able to

CO1: Explain system architecture of GSM.
CO2: Explain concepts of mobile transport layer.
CO3: Differentiate routing algorithms used in MANET's.
CO4: Discuss wireless application protocol architecture.
CO5: Discuss database issues

UNIT-I **(10 Lectures)**

INTRODUCTION TO MOBILE COMMUNICATIONS AND COMPUTING:
Introduction to MC, Novel applications, Limitations, and Architecture. (Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA. Wireless LAN (IEEE802.11): System architecture, Protocol architecture, Basic DFW MAC-DCF using CSMA/CA, DFWMAC with RTS/CTS extensions, DFWMAC-PCF with polling.
GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover security

UNIT-II **(10 Lectures)**

MOBILE NETWORK LAYER: Mobile IP (Goals, assumptions, Entities and Terminology, IP packet delivery, Agent advertisement and Discovery, Registration, Tunneling and Encapsulation, Optimizations), Dynamic Host Configuration Protocol (DHCP).
MOBILE TRANSPORT LAYER :Traditional TCP, Indirect TCP Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

UNIT-III **(10 Lectures)**

MOBILE AD HOC NETWORKS (MANETS): Overview, Properties of a MANET, Spectrum of MANET applications, Routing and various routing algorithms (DSR, DV/ DSDV, AODV, LSR/OLSR, FSR, CGSR, ZRP), Security issues in MANETs.

UNIT-IV **(10 Lectures)**

WIRELESS APPLICATION PROTOCOL-WAP: Introduction, Protocol Architecture, Treatment of protocols of all layers.
Bluetooth: User scenarios, Physical layer, MAC layer, Networking, Security, Link Management.
J2ME: Configurations, Profiles, Packages, Midlet life cycle, Display and Displayable Classes, Command Listener and Item State Listener interfaces.

UNIT-V **(10 Lectures)**

DATABASE ISSUES: Hoarding techniques, Caching invalidation mechanisms. Client server computing with adaptation, Location-aware and Context-aware computing. Transactional models in Mobile Communication Systems.

DATA DISSEMINATION: Communications Asymmetry, Classification of new data delivery mechanisms, Push-based mechanisms, Pull-based mechanisms, Hybrid mechanisms, Selective tuning (indexing) techniques.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", 2nd Edition, Addison-Wesley, 2004. (Chapters 1-4,7-11)
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", 1st Edition Wiley, 2002. (Chapters 11, 15,17, 26 and 27)

REFERENCES:

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", 1st Edition, Cambridge University Press, October 2004.
2. Frank Adelstein, Sandeep K.S. Gupta, Golden G. Richard III, Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing, 1st Edition, McGraw-Hill Professional, 2005.

ADVANCED DATA STRUCTURES LAB

Course Code: 18IT2107

L	T	P	C
0	0	3	2

Pre requisites:

1. Computer Programming through C.
2. Data Structures.

Course Outcomes:

At the end of the course, a student will be able to

CO1: Implement List ADTs and their operations.
CO2: Develop programs for sorting.
CO3: Develop programs for implementing trees and their traversal operations.
CO4: Implement graph traversal algorithms.
CO5: Apply algorithm design techniques.

Implement the following using C/C++/Java

1. Write a program to perform the following operations on singly linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program to perform the following operations on doubly linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways
3. Write a program that implements stack (its operations) using
   i) Arrays ii) linked list
4. Write programs that implements Queue (its operations) using
   i) Arrays ii) linked list
5. Write C program that implements the Quick sort method to sort a given list of integers in ascending order.
6. Write C program that implement the Merge sort method to sort a given list of integers in ascending order.
7. Write C program that implement the SHELL sort method to sort a given list of integers in ascending order.
8. Write a program to perform the following: i) creating a Binary Tree of integers
   ii) Traversing the above binary tree in preorder, inorder and postorder.
9. Write a C program to perform the following:
   i) Creating a AVL Tree of integers

ii) Traversing the above binary tree in preorder, inorder and postorder.

10. Write a C program that uses functions to perform the following:
    i) Creating a SplayTree of integers
    ii) Traversing the above binary tree in preorder, inorder and postorder.

11. Write a C program to perform the following:
    i) Creating a B-Tree of integers
    ii) Traversing the above binary tree in preorder, inorder and postorder.

12. Write a program that implements Kruskals` algorithm using a disjoint set data structure. The program takes as input a file (data.txt), in which each line either represents a vertex or an edge. For the edge lines, the first integer on that line representing the starting vertex, the second the ending vertex, and the third the weight of the edge. Use this file to construct, line by line, the graph upon which Kruskal's algorithm will be run (do NOT hardcode this graph!).

13. Write a program to simulate various graph traversing algorithms.

14. Write a program to find the minimal spanning tree of a graph using the Prim's algorithm. The program should be able to read in the weight matrix of a graph and produce the minimal spanning tree Generate weight matrices (using a random number generator) with a large number of nodes and estimate the time complexity of the algorithm.

15. Write a program to find the closest pair of points using a divide and conquer strategy. Use the random number generator to generate a large number of points in a unit square as input to the algorithm. Test the correctness of the algorithm by using a brute force method.

16. Use dynamic programming to find the optimal binary search tree for a given set of numbers together with their probabilities. Remember that the numbers may be generated in any order, so, a presorting step is also required.

TEXT BOOKS:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 3rd Edition, Pearson Education, 2007

REFERENCES:

1. Sartaj Sahni, Data Structures Algorithms and Applications in C++, 2nd Edition, Universities Press, 2007.
2. Ellis Horowitz, Sartaj Sahni, Rajasekharan, Fundamentals of Algorithms, 2nd Edition, Universities Press, 2009.
3. Aho V Alfred, Hapcroft E John, Ullman D Jeffry, Data Structures and Algorithms, 1st Edition, Pearson Education, 2002.
4. Adam Drozdek, Thomson, Data Structures and Algorithms in JAVA, 3rd Edition, Cengage Learning, 2008.
5. Horowitz, Sahni, Mehta, Fundamentals of Data Structures in C++, 2nd Edition, Universities Press, 2007.

WEB REFERENCES:

http://nptel.ac.in/courses/106102064/

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

ADVANCED TECHNICAL SKILLS AND COMMUNICATIONS LAB

COURSE CODE: 18IT2108

L	T	P	C
0	0	3	2

English Department

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

CLOUD COMPUTING

Course Code: 18IT2109 **L T P C**

3 0 0 3

Pre-requisites: Information Storage Systems, Big Data

Course Outcomes:

At the end of the Course, the Student will be able to:

CO 1 Describe the importance of cloud computing in real world.
CO 2 Identify applications that can be integrated using cloud services.
CO 3 Evaluate cloud based applications.
CO 4 Describe the security issues in cloud services.
CO 5 Identify the cloud services managing.

UNIT-I **(10 Lectures)**

INTRODUCTION:

Where Are We Today, What Is Cloud Computing, Cloud Deployment Models, Private vs. Public Clouds, Business Drivers for Cloud Computing, Introduction to Cloud Technologies

INFRASTRUCTURE AS A SERVICE:

Storage as a Service: Amazon Storage Services, Compute as a Service: Amazon Elastic Compute Cloud (EC2), HP CloudSystem Matrix, Cells-as-a-Service.

UNIT-II **(10 Lectures)**

PLATFORM AS A SERVICE:

Windows Azure, A "Hello World" Example, Example: Passing a Message, Azure Test and Deployment, Technical Details of the Azure Platform, Azure Programming Model, Using Azure Cloud Storage Services, Handling the Cloud Challenges, Designing Pustak Portal in Azure, Google App Engine, Platform as a Service: Storage Aspects, Apache Hadoop, Mashups.

SOFTWARE AS A SERVICE:

CRM as a Service, Salesforce.com, Social Computing Services, Document Services: Google Docs.

UNIT-III **(10 Lectures)**

PARADIGMS FOR DEVELOPING CLOUD APPLICATIONS:

Scalable Data Storage Techniques, MapReduce Revisited, Rich Internet Applications

ADDRESSING THE CLOUD CHALLENGES:

Scaling Computation, Scale Out versus Scale Up, Amdahl's Law, Scaling Cloud Applications with a Reverse Proxy, Hybrid Cloud and Cloud Bursting: OpenNebula, Scaling Storage, CAP Theorem, Implementing Weak Consistency, Consistency in NoSQL Systems, Multi-Tenancy, Multi-Tenancy Levels, Tenants and Users, Authentication, Implementing Multi-Tenancy: Resource Sharing, Case Study: Multi-Tenancy in Salesforce.com, Multi-Tenancy and Security in Hadoop.

UNIT-IV **(10 Lectures)**

DESIGNING CLOUD SECURITY:

Cloud Security Requirements and Best Practices, Physical Security, Virtual Security, Risk Management, Risk Management Concepts, Risk Management Process, Security Design Patterns,

Defense in Depth, Honeypots, Sandboxes, Network Patterns, Common Management Database, Example: Security Design for a PaaS System, Security Architecture Standards, SSE-CMM, Legal and Regulatory Issues, Selecting a Cloud Service Provider, Cloud Security Evaluation Frameworks.

UNIT-V **(10 Lectures)**

MANAGING THE CLOUD:

Managing IaaS, Managing PaaS, Managing SaaS, Other Cloud-Scale Management Systems,

RELATED TECHNOLOGIES:

Server Virtualization,Two Popular Hypervisors, Storage Virtualization, Grid Computing, Other Cloud-Related Technologies.

TEXT BOOK:

1. Dinkar Sitaram, Geetha Manjunath, "Moving to the Cloud: Developing Apps in the New World of Cloud Computing", 1st Edition, Elsevier,2012

REFERENCES:

1. Barrie Sosinsky, "Cloud Computing Bible", 1st Edition, Wiley India Pvt Ltd, 2011.
2. Robert Elsenpeter, Toby J. Velte, Anthony T. Velte, "Cloud Computing: A Practical Approach", 1st Edition, TataMcGraw Hill Education, 2011.

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

OBJECT ORIENTED MODELLING

COURSE CODE: 18IT2110 **L T P C**

3 0 0 3

Pre-requisites: Software Engineering
Course Outcomes:
At the end of the course the student will be able to
CO1: Design a system.
CO2: Distinguish behavioral modelling diagrams.
CO3: Explain unified process and the four Ps of the process.
CO4: Outline the generic iteration workflow.
CO5: Explain phases in modelling.

UNIT-I **(10 Lectures)**
Introduction to UML: The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modelling, principles of modelling, object oriented modelling, conceptual model of the UML, architecture.
Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams.
Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams.

UNIT-II **(10 Lectures)**
Collaboration Diagrams: Terms, Concepts, depicting a message, iterated messages, use of self in messages.
Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, callback mechanism, broadcast messages.
Basic Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams.
Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT-III **(10 Lectures)**
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.
The Unified process: use case driven, architecture centric, iterative, and incremental.
The Four Ps: people, project, product, and process.
Use case driven process: why use case, capturing use cases, analysis, design, and implementation to realize the use cases, testing the use cases.
Architecture-centric process: architecture in brief, why we need architecture, use cases and architecture, the steps to architecture, an architecture description.

UNIT-IV **(10 Lectures)**
Iterative incremental process: iterative incremental in brief, why iterative incremental development? The iterative approach is risk driven, the generic iteration.

The Generic Iteration workflow: phases are the first division workflow, planning proceeds doing, risks affect project planning, use case prioritization, resource needed, assess the iteration and phases.
Inception phase: early in the inception phase, the archetypal inception iteration workflow, execute the core workflows, requirements to test.

UNIT-V **(10 Lectures)**
Elaboration Phase: elaboration phase in brief, early in the elaboration phase, the architectural elaboration iteration workflow, execute the core workflows-Requirements to test.
Construction phase: early in the construction phase, the archetypal construction iteration workflow, execute the core workflow.
Transition phase: early in the transition phase, activities in transition phase.
Case Studies: Automation of a Library, Software Simulator application (2-floor elevator simulator).

TEXT BOOKS:
1. Grady Booch, James Rumbaugh, Ivar Jacobson, *"The Unified Modeling Language User Guide"*, 2nd Edition, Pearson Education, 2007
2. Ivar Jacobson, Grady Booch, James Rumbaugh, *"The Unified Software Development process"*, 1st Edition, Pearson Education, 2007

REFERENCES:
1. Meilir Page-Jones, *"Fundamentals of Object Oriented Design in UML"*, 1st Edition, Pearson Education, 2007.
2. Atul Kahate,"*Object Oriented Analysis & Design"*, 1st Edition, TMH, 2001.
3. Mark Priestley, *"Practical Object-Oriented Design with UML"*, 2nd Edition, TMH, 2005.
4. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: *"UML 2 Toolkit"*, 1st Edition, WILEY-dreamtech India Pvt. Ltd, 2003.

WEB REFERENCES:
1. http://modelica.org
2. http://openmodelica.org

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

EMBEDDED SYSTEMS

Course Code: 18IT2111 **L T P C**

3 0 0 3

Pre-requisites: Computer Organization, Digital Logic Design, Microprocessors and Microcontrollers

Course Outcomes:

At the end of the Course, a student will be able to

CO 1 Outline INTEL 8051 Architecture and its instruction set.
CO 2 Describe PIC architecture and its peripheral devices.
CO 3 Describe ATMEGA Architecture.
CO 4 Utilize ATMEGA instruction set in controlling peripheral systems.
CO 5 Explain serial communication buses with different processors.

UNIT-I **(12 Lectures)**

INTRODUCTION TO CLASSIC 8051 FAMILY ARCHITECTURE: Address and data bus with multiplexed I/O pins. Registers Examples with arithmetic and Boolean instruction set. Applications using, Timers, Counters and I/O programming for external logic sensing and control. Interrupts and their real time programming in all applications. This processor is based on the classic architecture the Von Neumann Architecture. Examples in Robotics, Motor control, Display control will be exposed.

UNIT-II **(15 Lectures)**

INTRODUCTION TO THE ADVANCED HARVARD ARCHITECTURE FOR FASTER INSTRUCTIONS: Introduction to PIC family Architecture and instruction set. Introduction to the shorter RISC instruction set and its usage with example programs. Interrupts using change of state on ports and its use in all application programming.

PERIPHERAL SYSTEMS IN PIC 16F877A PROCESSOR:

(a) Digital Input and Output Programming
(b) Timers and Counters
(c) Capture Control and PWM
(d) Analog to Digital Converters and their Programming
(e) Simple data acquisition systems and programming.

UNIT-III **(9 Lectures)**

Introduction to Atmega processor with a large register set. Family architecture exposes Accumulator free programming, with advanced addressing modes and faster Cache memory controlled I/O. Programming using the popular Atmega 8535 processor and instruction set. The versatile peripherals and their applications in 8535.Logical sequence of steps to design a program to suit an objective.

UNIT-IV **(12 Lectures)**

PERIPHERAL SYSTEMS IN ATMEGA 8535

(a) Digital Input and Output Programming
(b) Timers and Counters wave form generation.
(c) Capture Control and PWM

(d) Analog to Digital Converters and their Programming
(e) Simple data acquisition programming.

UNIT-V **(12 Lectures)**

SERIAL COMMUNICATION BUSES

(a) USART, with addressable communication feature
(b) SPI bus, ants speed and versatility
(c) 12c {inter integrated bus] the two wire communication bus .
(d) Introduction to USB bus and its features for fast synchronous communication.

TEXT BOOKS:

1. Bendapudy Kanta Rao: *"Embedded Systems"*, Prentice Hall India, 1st Edition, 2011.
2. Milan Verle: *"PIC microcontrollers, MikroElektronika"*, 1st Edition,2008
3. Muhammad Ali Mazidi, Sarmad Naimi, Sepehar Naimi: *"The AVR Microcontroller and Embedded systems using assembly & C"*, 1st Edition, Prentice Hall, Pearson education, 2009.

REFERENCES:

1. Ali Mazidi Mohammed Gillispie, Mazide Janice: *"The 8051Microcontroller and Embedded Systems using assembly & C"*, 2nd Edition, Pearson Education, 2009
2. Timothy D. Green: *"Embedded Systems Programming with the PIC16F877"*, 2nd Edition,2008
3. Kenneth J Ayala: "*The 8051 Micro Controller"*, 3rd Edition, Thomson Publishers, 2009.

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

INTERNET OF THINGS

Course Code: 18IT2112 **L T P C**

3 0 0 3

Pre-requisites: Application Development Tools, Microcontrollers
Course Outcomes: At the end of the Course, the Student will be able to:
CO 1: Describe the building blocks of Internet of Things and characteristics.
CO 2: Explain the application domains of IOT.
CO 3: Differentiate M2M and IOT.
CO 4: Develop Internet of Things & Logical Design using Python.
CO 5: Understand various IOT physical devices and Raspberry Pi.

UNIT-I **(10 Lectures)**

INTRODUCTION & CONCEPTS:
Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels and deployment templates.

UNIT-II **(08 Lectures)**

DOMAIN SPECIFICATIONS:
Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style

UNIT-III **(12 Lectures)**

M2M & SYSTEM MANAGEMENT WITH NETCONF-YANG:
M2M, Difference between IOT and M2M, SDN and NFV for IOT, Need for IOT Systems Management, Simple Network Management Protocol, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

UNIT-IV **(10 Lectures)**

DEVELOPING INTERNET OF THINGS & LOGICAL DESIGN USING PYTHON:
Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date / Time Operations, Classes, Python Packages of interest for IOT.

UNIT-V **(10 Lectures)**

IOT PHYSICAL DEVICES & ENDPOINTS:
What is an IOT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, and Programming Raspberry Pi with Python & other IOT Devices, Arduino.

TEXT BOOK:

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things, A Hands-On-Approach", 1st Edition, Vijay Madisetti publishers, 2014.

REFERENCE:

1. Adrian McEwen, "Designing the Internet of Things", 1stEdition, Wiley Publishers, 2014.

WEB REFERENCES:

1. https://www.coursera.org/specializations/internet-of-things
2. https://www.class-central.com/tag/internet%20of%20things

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

MACHINE LEARNING

Course Code: 18IT2113 **L T P C**
3 0 0 3

Pre-requisite: Artificial Intelligence

Course Outcomes:
At the end of the course, a student will be able to
CO 1: Describe the concepts of machine learning model.
CO 2: Develop Supervised Learning Model.
CO 3: Apply various Dimensionality Reduction methods.
CO 4: Estimate performance measures.
CO 5: Design Unsupervised Learning Model.

UNIT-I:
INTRODUCTION TO MACHINE LEARNING:
Machine Learning Fundamentals, Key Terminology, Types of Learning, Machine Learning Process, Parametric Models, Non-Parametric Models, Dimensionality, Model Selection, Probability Basics.

UNIT-II:
SUPERVISED LEARNING:
The brain and the neuron, The Perceptron, Linear Separability, Linear Regression, Multivariate Regression, Multi-Layer Perceptron, examples of using the MLP, Backpropagation with MLP, Logistic Regression.

UNIT-III:
DIMENSIONALITY REDUCTION:
Linear Discriminant Analysis, Principal Components Analysis, Independent Components Analysis.
SUPPORT VECTOR MACHINE:
Optimal Separation, Kernels,The Support Vector Machine Algorithm, Extensions to the SVM.

UNIT-IV:
REINFORCEMENT LEARNING:
Overview, Markov Decision Processes, Values, The Difference between SARSA and Q-Learning, uses of Reinforcement Learning.
LEARNING WITH TREES:
Constructing Decision Trees, Classification and Regression Trees.
EVALUATION MEASURES:
Bootstrapping & Cross Validation, Overfitting, Training, Testing, and Validation Sets, The Confusion Matrix, Accuracy Metrics, The ROC Curve.

UNIT-V:
ENSEMBLE LEARNING:
Boosting, Bagging, Random Forests.

UNSUPERVISED LEARNING:
The K-Means Algorithm, Clustering-BIRCH Algorithm, CURE Algorithm, Vector Quantisation, The Self-Organising Feature Map.

GRAPHICAL MODELS:
Bayesian Networks, Markov Random Fields, Hidden Markov Models.

TEXT BOOK:
1. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom Mitchell, "Machine Learning", Mc GrawHill publications, 1997.

REFERENCES:
1.Christopher.M.Bishop, "Pattern Recognition and Machine Learning", Springer publications,October-2007.
2. EthemAlpaydin, "Introduction to Machine Learning 3e (Adaptive Computation and MachineLearning Series)", Third Edition, MIT Press, 2014
3. Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals", FirstEdition, Wiley, 2014
4. Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data",First Edition, Cambridge University Press, 2012.
5. http://nptel.ac.in/courses/106105152/

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

DEEP LEARNING
(Elective-II)

Course Code: 18IT2114

L	T	P	C
3	0	0	3

Pre-requisites: Machine Learning (preferred but optional)
Statistics (preferred but optional)

Course Outcomes:

At the end of the course, a student will be able to

CO 1 Describe neural networks
CO 2 Explain training of feed-forward neural networks
CO 3 Explain optimization for training deep models
CO 4 Summarize convolutional networks
CO 5 Explain word embeddings and recurrent neural networks

UNIT-I **(10 Lectures)**

THE NEURAL NETWORK: Building Intelligent Machines, Limits of Traditional Computer Programs, Mechanics of Machine Learning, Neuron, Expressing Linear Perceptrons as Neurons, Feed-Forward Neural Networks, Linear Neurons and Their Limitations, Sigmoid, Tanh, and ReLU Neurons, Softmax Output Layers.

UNIT-II **(10 Lectures)**

TRAINING FEED-FORWARD NEURAL NETWORKS: The Fast-Food Problem, Gradient Descent, Delta Rule and Learning Rates, Gradient Descent with Sigmoidal Neurons, Backpropagation Algorithm, Stochastic and Minibatch Gradient Descent, Test Sets, Validation Sets, and Overftting, Preventing Overfitting in Deep Neural Networks.

UNIT-III **(10 Lectures)**

BEYOND GRADIENT DESCENT: The Challenges with Gradient Descent, Local Minima in the Error Surfaces of Deep Networks, Model Identifiability, How Pesky Are Spurious Local Minima in Deep Networks? Flat Regions in the Error Surface, When the Gradient Points in the Wrong Direction, Momentum-Based Optimization, A Brief View of Second-Order Methods, Learning Rate Adaptation, The Philosophy Behind Optimizer Selection.

UNIT-IV **(10 Lectures)**

CONVOLUTIONAL NEURAL NETWORKS: Neurons in Human Vision, Shortcomings of Feature Selection, Vanilla Deep Neural Networks Don't Scale, Filters and Feature Maps, Full Description of the Convolutional Layer, Max Pooling, Full Architectural Description of Convolution Networks.

GENERATIVE ADVERSIAL NETWORKS AND WAVENET: What is a GAN? Deep Convolutional Generative Adversarial Networks.

UNIT-V **(10 Lectures)**

WORD EMBEDDINGS: Word2Vec, GloVe, Pre-trained Embeddings.

RECURRENT NEURAL NETWORK: Simple RNN Cells, RNN Topologies, Vanishing and Exploding Gradients, Long Short Term Memory.

TEXT BOOKS:

1. Nikhil Buduma, Nicholas Locascio, *"Fundamentals of Deep Learning",* O`Reilly 1st edition, 2017.
2. Antonio Gulli, Sujit Pa, *"Deep Learning with Keras",* Packt, 1st edition, 2017.

REFERENCES:

1. Ian Goodfellow Yoshua Bengio Aaron Courville, *"Deep Learning",*MIT Press 1st edition, 2017

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

CYBER SECURITY
(Elective-II)

COURSE CODE: 18IT2114

L	T	P	C
3	0	0	3

Pre-requisites: Network Security and Cryptography, Information Security

COURSE OUTCOMES:

At the end of the course the student shall be able to

CO1: Analyze cyber attack on different online web applications
CO2: Apply different techniques to classify different types of cybercrimes
CO3: Discuss different government cyber laws and cyber forensics techniques.
CO4: Explain how to protect them self and ultimately society from cyber attacks.
CO5: Describe cybercrime investigating methods using previous case studies

UNIT-I **(10 Lectures)**

INTRODUCTION: Cyber Security, Cyber Security policy, Domain of Cyber Security Policy, Laws and Regulations, Enterprise Policy, Technology Operations, Technology Configuration, Strategy Versus Policy,

CYBER SECURITY EVOLUTION: Productivity, Internet, E-commerce, Counter Measures and Challenges.

UNIT-II **(12 Lectures)**

CYBER SECURITY OBJECTIVES AND GUIDANCE: Cyber Security Metrics, Security Management Goals, Counting Vulnerabilities, Security Frameworks, E-Commerce Systems, Industrial Control Systems, Personal Mobile Devices, Security Policy Objectives.

GUIDANCE FOR DECISION MAKERS: Tone at the Top, Policy as a Project, Cyber Security Management, Arriving at Goals, Cyber Security Documentation.

THE CATALOG APPROACH: Catalog Format, Cyber Security Policy Taxonomy.

UNIT-III **(12 Lectures)**

CYBER SECURITY POLICY CATALOG: Cyber Governance Issues, Net Neutrality, Internet Names and Numbers, Copyright and Trademarks, Email and Messaging, Cyber User Issues, Malvertising, Impersonation, Appropriate Use, Cyber Crime, Geolocation, Privacy, Cyber Conflict Issues, Intellectual property Theft, Cyber Espionage, Cyber Sabotage, Cyber Welfare.

UNIT-IV **(12 Lectures)**

CYBER MANGEMENT ISSUES: Fiduciary Responsibility, Risk Management, Professional Certification, Supply Chain, Security Principles, Research and Development, Cyber Infrastructure Issue, Banking and finance, Health care, Industrial Control systems.

UNIT-V **(4 Lectures)**

CASE STUDY: A Government's Approach to Cyber Security Policy

TEXT BOOKS:

1. Jennifer L. Bayuk , J. Healey , P. Rohmeyer , Marcus Sachs , Jeffrey Schmidt , Joseph Weiss " Cyber Security Policy Guidebook" John Wiley & Sons 2012.

REFERENCES:

1. Richard A. Clarke, Robert Knake“ Cyberwar: The Next Threat to National Security & What to Do About It” Ecco 2010
2. Dan Shoemaker Cyber security The Essential Body Of Knowledge, 1st Edition. Cengage Learning 2011

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF INFORMATION TECHNOLOGY

ADHOC NETWORKS
(Elective-II)

COURSE CODE: 18IT2114

L	T	P	C
3	0	0	3

Pre-requisites: Computer Networks, Mobile Communications

COURSE OUTCOMES: At the end of the course the student shall be able to

CO1: Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks

CO2: Analyze the protocol design issues of ad hoc and sensor networks

CO3: Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues

CO4: Evaluate the QoS related performance measurements of ad hoc and sensor networks

CO5: Discuss the different routing techniques.

UNIT-I **(10 Lectures)**

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs): concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT-II **(10 Lectures)**

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT-IIII **(10 Lectures)**

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT-IV **(10 Lectures)**

Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT-V **(10 Lectures)**

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues

TEXT BOOKS:

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.

REFERENCES:

1. Carlos De MoraisCordeiro, Dharma PrakashAgrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.
2. Feng Zhao and LeonidesGuibas, "Wireless Sensor Networks", Elsevier Publication - 2002.

MACHINE LEARNING USING PYTHON LAB

Course Code: 18IT2115

L	T	P	C
0	0	3	2

Pre-requisites: Python Lab

Course Outcomes:

At the end of the course, a student will be able to

CO 1: Demonstrate installing Anaconda 3 and numpy, pandas and sci-kit learn packages
CO 2: Apply Linear Regression and Accuracy of a Model.
CO 3: Demonstrate Supervised and Unsupervised Learning Programming
CO 4: Apply Data Preprocessing and Process Optimization
CO 5: Demonstrate Automation of Artificial Neural Networks

LIST OF PROGRAMMES:

1. Installation of Anaconda 3 and exposure to numpy, pandas and sci-kit learn packages

2. Linear Regression
    a. Predicting sum of two numbers with the help of a given data set
    b. Predicting the house prices with the help of Boston house data set
    c. Identifying Model Accuracy with the help of Boston house as well as insurance data sets
    d. Plotting the actual values and predicted values with the help of both Boston and insurance data sets
    e. Regularizing and Identifying the parameters that plays vital role in the prediction using lasso regression for different data sets
    f. Identifying the best data split using Cross Validation Scores for different data sets

3. Supervised Learning
    a. Program for accessing and studying iris data set
    b. Predicting the labels for samples in IRIS data set using K-Nearest Neighbor Classifier
    c. Predicting the labels for samples in IRIS data set using K-Nearest Neighbor Classifier of multiple labels with and without using dummies
    d. Identifying Model Accuracy with the help of various data sets
    e. Identifying the Model accuracy by changing the number of neighbors
    f. Implementing Logistic Regression and Grid Search Cross Validation

4. Unsupervised Learning
    a. Predicting the labels for samples in IRIS data set using K-Means Classifier
    b. Clustering the given samples using K Means also identifying the center of the clusters

c. Identifying Model Accuracy and quality using inertia of clusters with the help of various data sets
d. Implementing hierarchical clustering using euro vision data set
e. Principle Component Analysis

5. Data Preprocessing and Process Optimization
    a. Data preprocessing using dummies and data cleaning
    b. Pipelining
6. Automating Artificial Neural Networks
    a. Developing single and multi-layered neural networks
    b. Automation of Linear Regression using Neural Networks (forward and reverse propagation)
    c. Introduction to keras

REFERRENCES:

1. Sabastian Reschaka, *"*Python Machine Learning*"*, [PACKT] publications Birmingham-Mumbai, 1st Edition , 2015
2. Michael Bowles, *"*Machine Learning in Python: Essential Techniques for Predictive Analysis*"*, Wiley publications, 1st Edition, 2015.

   Andreas C. Miller& Sarah Guido, "Introduction to Machine Learning with Python: A guide for data scientists*"*, Orielly publications, 1st Edition, 2016.