GLOBAL INSTITUTE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)
COURSE CATALOGUE
REGULATIONS B.TECH – GR - 24
COMPUTER SCIENCE AND ENGINEERING (AI & ML)
III YEAR I SEMESTER

Course Code	Course Name	Subject Area	Category	Periods Per Week			Credits	Scheme of Examination Max Marks		
				L	T	P		CIA	SEE	Total
THEORY										
AM501PC	Design and Analysis of Algorithms	PCC	Core	3	1	0	4	40	60	100
AM502PC	Cryptography and Network Security	PCC	Core	3	0	0	3	40	60	100
AM503PC	Machine Learning	PCC	Core	3	0	0	3	40	60	100
SM504MS	Business Economics & Financial Analysis	HSMC	Foundation	3	0	0	3	40	60	100
	Professional Elective -I	PEC	Elective	3	0	0	3	40	60	100
PRACTICAL										
AM505PC	Cryptography and Network Security Lab	PCC	Core	0	0	2	1	40	60	100
EN506HS	Advanced English Communication Skills Lab	HSMC	Foundation	0	0	2	1	40	60	100
AM507PC	UI design- Flutter	PCC	Core	0	0	2	1	40	60	100
AM508PC	Machine Learning Lab	PCC	Core	0	0	2	1	40	60	100
			Total Credits	**15**	**1**	**8**	**20**			

Professional Elective – I

AM511PE	Graph Theory
AM512PE	Introduction to Data Science
AM513PE	Web Programming
AM514PE	Image Processing
AM515PE	Computer Graphics

COURSE CONTENT

DESIGN AND ANALYSIS OF ALGORITHMS								
III Year - I Semester: CSE (AI &ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM501PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**1**	**-**	**4**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: 16	Practical Classes: Nil				**Total Classes: 64**		
Prerequisite: 1. A course on "Computer Programming and Data Structures". 2. A course on "Advanced Data Structures".								

1. COURSE OVERVIEW

The Design and Analysis of Algorithms course focuses on the fundamental principles of algorithm design and performance evaluation. It introduces students to mathematical techniques for analyzing algorithms and explores various algorithmic paradigms such as divide and conquer, greedy methods, dynamic programming, backtracking, and branch and bound. The course also provides insights into computational complexity, including tractable and intractable problems, and introduces NP-Hard and NP-Complete problems. By the end of the course, students will be equipped to design efficient algorithms and analyze their performance for real-world applications.

2. COURSE OBJECTIVE

The students will try to Learn:

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

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Analyze algorithmic problems using divide-and-conquer techniques and evaluate their time and space complexities using asymptotic notations.
CO 2	Apply data structures and backtracking techniques to solve combinatorial and graph-related problems such as disjoint sets, priority queues, N-Queens, and graph coloring.
CO 3	Formulate and solve optimization problems using dynamic programming techniques for applications such as shortest paths, knapsack, traveling salesperson, and reliability design.
CO 4	Apply greedy strategies and traversal techniques to design efficient algorithms for scheduling, spanning trees, shortest paths, and graph connectivity problems.
CO 5	Analyze complex optimization problems using branch and bound techniques and classify computational problems based on NP-Hard and NP-Complete complexity classes.

4. COURSE CONTENT

UNIT – I **(12L)**

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 **(14L)**

Disjoint Sets: Disjoint set operations, union and find algorithms, Priority Queue- Heaps, Heapsort

Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph Coloring, hamitonian cycles.

UNIT - III **(14L)**

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

UNIT - IV **(12L)**

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

Basic Traversal and Search Techniques: Techniques for Binary Trees, Techniques for Graphs, Connected components, Biconnected components.

UNIT - V **(12L)**

Branch and Bound: General method, applications - Traveling salesperson 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.

5. TEXT BOOKS

1) Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University press, 1998.

6. 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.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**2**	**2**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**	**–**
CO 2	**3**	**3**	**3**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**	**–**
CO 3	**3**	**3**	**3**	**3**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**	**–**
CO 4	**3**	**3**	**3**	**2**	**2**	**1**	**–**	**–**	**–**	**–**	**–**	**2**	**3**	**1**
CO 5	**3**	**3**	**2**	**3**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**3**	**3**	**–**

COURSE CONTENT

CRYPTOGRAPHY AND NETWORK SECURITY								
III Year - I Semester: CSE (AI &ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM502PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

The *Cryptography and Network Security* course provides a comprehensive understanding of the principles and practices used to secure computer systems and networks. It introduces fundamental security concepts such as confidentiality, integrity, authentication, and availability, along with cryptographic techniques for secure communication. The course covers symmetric and asymmetric encryption algorithms, message authentication, digital signatures, key management, network security protocols, and real-world security case studies. By the end of the course, students will be equipped to analyze security threats and apply cryptographic mechanisms to protect information systems.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To understand the fundamental concepts and principles of information and network security.
2) To study symmetric and asymmetric cryptographic algorithms and their applications.
3) To analyze security threats, attacks, and vulnerabilities in computer networks.
4) To understand authentication mechanisms, digital signatures, and key management techniques.
5) To learn security protocols and technologies for secure communication and data protection.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Explain the principles of confidentiality, integrity, authentication, and availability in secure systems.
CO 2	Apply symmetric and asymmetric cryptographic algorithms for secure data communication.
CO 3	Implement message authentication, cryptographic hash functions, and digital signatures.
CO 4	Analyze network security mechanisms including IPSec, SSL/TLS, and wireless security protocols.
CO 5	Identify security threats, intrusion techniques, and legal and ethical issues related to information security.

4. COURSE CONTENT

UNIT – I **(10L)**

Security Concepts: Introduction, need for security, security approaches, principles of security, types of security attacks, security services, security mechanisms, model for network security.

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

UNIT – II **(10L)**

Symmetric Key Ciphers: Block cipher principles, DES, AES, Blowfish, RC5, IDEA, block cipher modes of operation, stream ciphers, RC4.

Asymmetric Key Ciphers: Principles of public-key cryptosystems, RSA algorithm, ElGamal cryptography, Diffie–Hellman key exchange, Knapsack algorithm.

UNIT – III **(10L)**

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 and asymmetric encryption, public key distribution, Kerberos, X.509 authentication service, Public Key Infrastructure (PKI).

UNIT – IV **(9L)**

Transport-Level Security: Web security considerations, Secure Socket Layer (SSL), Transport Layer Security (TLS), HTTPS, Secure Shell (SSH).

Wireless Network Security: Wireless security issues, mobile device security, IEEE 802.11 WLAN, IEEE 802.11i WLAN security.

UNIT – V **(9L)**

E-Mail Security: Pretty Good Privacy (PGP), S/MIME.

IP Security: IPSec overview, IPSec architecture, Authentication Header (AH), Encapsulating Security Payload (ESP), security associations, Internet Key Exchange (IKE).

Case Studies: Secure multiparty computation, virtual elections, single sign-on, secure inter-branch payment transactions, cross-site scripting (XSS) vulnerability.

5. TEXT BOOKS

1) William Stallings, *Cryptography and Network Security: Principles and Practice*, 6th Edition, Pearson Education.
2) Atul Kahate, *Cryptography and Network Security*, 3rd Edition, McGraw Hill.

6. REFERENCE BOOKS

1) C. K. Shyamala, N. Harini, T. R. Padmanabhan, *Cryptography and Network Security*, Wiley India.
2) Forouzan and Mukhopadhyay, *Cryptography and Network Security*, McGraw Hill.
3) Mark Stamp, *Information Security: Principles and Practice*, Wiley India.
4) W. Arthur Conklin, Greg White, *Principles of Computer Security*, TMH.
5) Neal Krawetz, *Introduction to Network Security*, Cengage Learning.
6) Bernard Menezes, *Network Security and Cryptography*, Cengage Learning.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**1**
CO 2	**3**	**3**	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**1**
CO 3	**3**	**3**	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**1**
CO 4	**3**	**3**	**3**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**1**
CO 5	**3**	**3**	**3**	**3**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**1**

COURSE CONTENT

MACHINE LEARNING								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM503PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course introduces the fundamental concepts and techniques of Machine Learning, including supervised, unsupervised, and reinforcement learning. It covers a range of learning models such as neural networks, support vector machines, decision trees, ensemble methods, clustering, dimensionality reduction, evolutionary algorithms, and probabilistic learning techniques. The course equips students with the ability to analyze learning problems and design effective machine learning solutions for real-world applications.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To introduce students to the basic concepts and techniques of Machine Learning.
2) To have a thorough understanding of the Supervised and Unsupervised learning techniques.
3) To study the various probability-based learning techniques.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Distinguish between supervised, unsupervised, and semi-supervised learning.
CO 2	Understand algorithms for building classifiers applied on datasets of non-linearly separable classes.
CO 3	Understand the principles of evolutionary computing algorithms.
CO 4	Design an ensembler to increase the classification accuracy.
CO 5	Apply dimensionality reduction and probabilistic learning techniques to analyze high-dimensional data and make decisions under uncertainty.

4. COURSE CONTENT

UNIT – I **(10L)**

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants: – Perceptron – Linear Separability – Linear Regression.

UNIT - II **(10L)**

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT - III **(10L)**

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms

UNIT - IV **(9L)**

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms

UNIT - V **(9L)**

Reinforcement Learning – Overview – Getting Lost Example Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

5. TEXT BOOKS

1) Stephen Marsland, ―Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

6. REFERENCE BOOKS

1) Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.
2) Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
3) Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014.
4) Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	–	–	–	–	–	–	–	–	–	**2**	**3**	**1**
CO 2	**3**	**3**	**2**	**2**	**2**	–	–	–	–	–	–	**2**	**3**	**1**
CO 3	**3**	**2**	**2**	**2**	–	–	–	–	–	–	–	**2**	**3**	**1**
CO 4	**3**	**3**	**3**	**2**	**2**	–	–	–	–	–	–	**2**	**3**	**1**
CO 5	**3**	**3**	**2**	**3**	**2**	–	–	–	–	–	–	**3**	**2**	**1**

COURSE CONTENT

BUSINESS ECONOMICS & FINANCIAL ANALYSIS								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
SM504MS	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course introduces the fundamentals of **business, economics, and financial accounting**, focusing on business structures, demand and supply analysis, production and cost functions, market structures, and pricing strategies. It also covers accounting principles, preparation of financial statements, and ratio analysis, enabling students to apply economic and accounting tools for effective business decision-making.

2. COURSE OBJECTIVE

The students will try to Learn:

1) To learn the basic business types, impact of the economy on Business and Firms specifically.
2) To analyze the Business from the Financial Perspective.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Understand the structure of business firms and apply economic concepts such as national income, inflation, and business cycles in analyzing business decisions.
CO 2	Apply the concepts of demand, elasticity, and supply in business decision making and forecasting.
CO 3	Analyze production and cost functions, and evaluate pricing strategies under different market structures.
CO 4	Prepare and interpret basic financial statements using accounting principles, conventions, and the double-entry system.
CO 5	Evaluate financial performance of a business through ratio analysis and interpretation.

4. COURSE CONTENT

UNIT – I (10L)

Introduction to Business and Economics Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance. Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply and Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT – II (10L)

Demand and Supply Analysis Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting. Supply Analysis: Determinants of Supply, Supply Function and Law of Supply.

UNIT – III (10L)

Production, Cost, Market Structures & Pricing Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions. Cost analysis: Types of Costs, Short run and Long run Cost Functions. Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT – IV (9L)

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts (Simple Problems).

UNIT – V (9L)

Financial Ratios Analysis: Concept of Ratio Analysis, Importance and Types of Ratios, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios – Analysis and Interpretation (simple problems).

5. TEXT BOOKS

1) D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2) Dhanesh K Khatri, Financial Accounting, Tata Mc –Graw Hill, 2011.
3) Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata Mc Graw Hill Education Pvt. Ltd. 2012

6. REFERENCE BOOKS

1) Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2) S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**2**	**1**	**1**	**2**	**1**	**1**						
CO 2	**3**	**3**	**3**	**1**	**1**	**1**	**2**	**1**						
CO 3	**3**	**3**	**3**	**2**	**1**	**2**	**1**	**1**						
CO 4	**3**	**3**	**2**	**2**	**2**	**1**	**1**	**2**						
CO 5	**3**	**3**	**3**	**2**	**2**	**1**	**1**	**2**						

COURSE CONTENT

GRAPH THEORY (Professional Elective – I)								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM511PE	**Elective**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course provides an introduction to the fundamental concepts and techniques of graph theory, a branch of discrete mathematics concerned with the study of graphs and networks. Topics include graph terminology and representations, paths and cycles, connectivity, trees, spanning trees, planarity, graph coloring, matchings, and network flows.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Understanding graphs, trees, connected paths, applications of trees and graphs.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Understand basic graph concepts, representations, and models.
CO 2	Analyze connectivity and find shortest paths in graphs.
CO 3	Apply tree properties and algorithms on trees.
CO 4	Demonstrate about matchings, coverings, and independent sets.
CO 5	Apply vertex and edge coloring techniques.

4. COURSE CONTENT

UNIT – I **(10L)**

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 **(10L)**

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 **(10L)**

Trees- Definitions and characterizations, Number of trees, Cayley‟s formula, Kircho↵-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 **(9L)**

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 **(9L)**

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.

5. 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.

6. REFERENCE BOOKS

1) Lecture Videos: http://nptel.ac.in/courses/111106050/13
2) Introduction to Graph Theory, Douglas B. West, Pearson.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**2**	**2**	**1**							**2**	**3**	**–**
CO 2	**3**	**3**	**3**	**2**	**2**							**2**	**3**	**–**
CO 3	**3**	**3**	**3**	**3**	**2**							**2**	**3**	**–**
CO 4	**3**	**3**	**3**	**2**	**2**							**2**	**3**	**1**
CO 5	**3**	**3**	**2**	**3**	**1**							**3**	**3**	**–**

COURSE CONTENT

INTRODUCTION TO DATA SCIENCE (Professional Elective – I)								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM512PE	**Elective**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course provides an introduction to **Data Science** and its role in analyzing and interpreting data. Students will learn **R programming** for handling data, performing statistical analysis, and visualizing results effectively. The syllabus covers **data types, data structures, control flow, functions, and exploratory data analysis** using various charts and graphs. It also introduces **linear and multiple regression techniques** for building basic predictive models.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Learn concepts, techniques and tools they need to deal with various facets of data science
2) practice, including data collection and integration
3) Understand the basic types of data and basic statistics
4) Identify the importance of data reduction and data visualization techniques.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Understand the fundamentals of Data Science, statistical modeling, and probability, and set up the R programming environment for data analysis.
CO 2	Classify and describe different types of data using attributes, measures of central tendency, dispersion, and visualize them using basic statistical summaries.
CO 3	Manipulate and analyze vectors, matrices, arrays, lists, factors, and data frames in R to organize and process complex datasets.
CO 4	Apply conditional statements, loops, and user-defined functions to implement iterative and modular data processing in R programs.
CO 5	Perform data visualization using various charts and plots, and build linear and multiple regression models to derive insights and make predictions.

4. COURSE CONTENT

UNIT – I **(10L)**

Introduction: Definition of Data Science- Big Data and Data Science hype – and getting past the hype - Datafication - Current landscape of perspectives - Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model – Over fitting. Basics of R: Introduction, R-Environment Setup, Programming with R, Basic Data Types.

UNIT – II **(10L)**

Data Types & Statistical Description

Types of Data: Attributes and Measurement, Attribute, The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes. Basic Statistical Descriptions of Data: Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Interquartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

UNIT – III **(10L)**

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting,

Matrices: Creating and Naming Matrices, Matrix Sub setting, Arrays, Class.

Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, subsetting of Data Frames, Extending Data Frames, Sorting Data Frames. Lists: Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors

UNIT – IV **(10L)**

Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements.

Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List. Functions in R: Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R.

UNIT – V **(8L)**

Charts and Graphs: Introduction, Pie Chart: Chart Legend, Bar Chart, Box Plot, Histogram, Line Graph: Multiple Lines in Line Graph, Scatter Plot.

Regression: Linear Regression Analysis, Multiple Linear regression

5. TEXT BOOKS

1) Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014.
2) K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

6. REFERENCE BOOKS

1) Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed. The Morgan Kaufmann Series in Data Management Systems.
2) Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
3) Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
4) Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
5) Paul Teetor, "R Cookbook", O'Reilly, 2011. CO–PO Mapping

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**2**	**2**	**3**							**2**	**3**	**1**
CO 2	**3**	**3**	**2**	**2**	**2**				**1**	**1**		**2**	**3**	**1**
CO 3	**3**	**3**	**3**	**2**	**3**				**1**	**1**		**2**	**3**	**1**
CO 4	**3**	**3**	**3**	**2**	**3**				**2**	**1**		**2**	**3**	**1**
CO 5	**3**	**3**	**3**	**2**	**3**				**2**	**1**		**2**	**3**	**2**

COURSE CONTENT

WEB PROGRAMMING (Professional Elective – I)								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM513PE	**Elective**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course provides comprehensive knowledge of **web technologies and Java programming**, focusing on client-side and server-side development. Students will learn to design interactive web pages using **HTML, CSS, JavaScript, HTML5, and CSS3,** and develop robust applications using **Java and object-oriented principles**. The course also introduces **database connectivity using JDBC, network programming, applets, servlets, JSP,** and **XML-based web services,** enabling students to build dynamic, data-driven, and distributed web applications.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Understand the technologies used in Web Programming.
2) Know the importance of object-oriented aspects of Scripting.
3) Understand creating database connectivity using JDBC.
4) Learn the concepts of web-based application using sockets.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Apply **HTML, CSS, JavaScript, and HTML5 features** to design and validate interactive client-side web pages.
CO 2	Demonstrate **object-oriented programming concepts in Java** to develop modular, reusable, and secure applications.
CO 3	Develop **database-driven and network-based applications** using JDBC, Java networking, and distributed technologies.
CO 4	Build **event-driven web components** using Java Applets, AWT, Servlets, and JSP for dynamic web applications.
CO 5	Design and implement **XML-based web services** using XML, XSLT, WSDL, UDDI, and Java web service technologies.

4. COURSE CONTENT

UNIT – I **(10L)**

Client side Programming

HTML- Basic Tags- List, Tables, Images, Forms, Frames, CSS

JAVA Script - Web page Designing using HTML, Scripting basics- Client side and server side scripting. Java ScriptObject, names, literals, operators and expressions- statements and features- events - windows - documents - frames - data types - built-in functions- Browser object model - Verifying forms.-HTML5- CSS3- HTML 5 canvas - Web site creation using tools.

UNIT – II **(10L)**

JAVA

Introduction to object-oriented programming-Features of Java – Data types, variables and arrays – Operators – Control statements – Classes and Methods – Inheritance. Packages and Interfaces – Exception Handling – Multithreaded Programming – Input/Output – Files – Utility Classes – String Handling.

UNIT – III **(10L)**

JDBC

JDBC Overview – JDBC implementation – Connection class – Statements - Catching Database Results, handling database Queries. Networking– InetAddress class – URL class- TCP sockets – UDP sockets, Java Beans –RMI.

UNIT – IV **(10L)**

APPLETS

Java applets-

Life cycle of an applet – Adding images to an applet – Adding sound to an applet. Passing parameters to an applet. Event Handling. Introducing AWT: Working with Windows Graphics and Text. Using AWT Controls, Layout Managers and Menus. Servlet – life cycle of a servlet. The Servlet API, Handling HTTP Request and Response, using Cookies, Session Tracking. Introduction to JSP.

UNIT – V **(8L)**

XML AND WEB SERVICES

Xml – Introduction-Form Navigation-XML Documents- XSL – XSLT- Web services-UDDI-WSDL-Java web services – Web resources.

5. TEXT BOOKS

1) Harvey Deitel, Abbey Deitel, Internet and World Wide Web: How To Program 5th Edition.
2) Herbert Schildt, Java - The Complete Reference, 7th Edition. Tata McGraw- Hill Edition.
3) Michael Morrison XML Unleashed Tech media SAMS.

6. REFERENCE BOOKS

1) John Pollock, Javascript - A Beginners Guide, 3rd Edition –- Tata McGraw-Hill Edition.
2) Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**2**	**1**	**3**		**3**							**1**	**3**	**2**
CO 2	**3**	**2**	**3**		**2**				**1**			**2**	**2**	**1**
CO 3	**3**	**3**	**3**	**2**	**3**				**2**			**2**	**2**	**1**
CO 4	**2**	**2**	**3**		**3**				**2**			**1**	**2**	**1**
CO 5	**2**	**2**	**3**	**2**	**3**				**1**			**2**	**2**	**1**

COURSE CONTENT

IMAGE PROCESSING (Professional Elective – I)								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM514PE	**Elective**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		

Prerequisite:

1. Students are expected to have knowledge in linear signals and systems, Fourier Transform, basic linear algebra, basic probability theory and basic programming techniques; knowledge of digital signal processing is desirable.
2. A course on "Computational Mathematics"
3. A course on "Computer Oriented Statistical Methods"

1. COURSE OVERVIEW

The **Image Processing** course provides a strong theoretical and mathematical foundation for understanding and manipulating digital images. The course covers the complete image processing pipeline starting from image acquisition to advanced techniques such as image enhancement, restoration, segmentation, transformation, and compression. Emphasis is placed on two-dimensional signal processing concepts and practical techniques used in engineering, medical imaging, remote sensing, and computer vision applications.

2. COURSE OBJECTIVE

The students will try to Learn:

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

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Explain the fundamentals of digital images, including sampling, quantization, pixel relationships, imaging geometry, and 2D transformations such as DFT, DCT, KLT, and SVD.
CO 2	Apply spatial and frequency domain techniques for image enhancement, including point processing, histogram processing, and filtering methods for smoothing and sharpening.
CO 3	Analyze and implement image restoration techniques using degradation models, inverse filtering, least mean square filters, and constrained least squares approaches.
CO 4	Apply image segmentation methods including edge detection, edge linking, thresholding, and region-based segmentation for effective object extraction.
CO 5	Explain image compression concepts, including redundancy removal, fidelity criteria, source coding models, error-free and lossy compression techniques.

4. COURSE CONTENT

UNIT – I **(10L)**

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 **(9L)**

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

UNIT - III **(10L)**

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

UNIT - IV **(10L)**

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

UNIT - V **(9L)**

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

5. TEXT BOOKS

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

6. 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 Wiley, 3rd Edition, 2004.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**3**	**2**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**	**–**
CO 2	**3**	**3**	**3**	**2**	**3**	**–**	**–**	**–**	**2**	**–**	**–**	**2**	**3**	**–**
CO 3	**3**	**3**	**3**	**3**	**2**	**–**	**–**	**–**	**2**	**–**	**–**	**2**	**3**	**1**
CO 4	**3**	**3**	**3**	**3**	**2**	**1**	**–**	**–**	**2**	**–**	**–**	**2**	**3**	**1**
CO 5	**3**	**3**	**3**	**2**	**3**	**1**	**–**	**1**	**2**	**2**	**–**	**2**	**3**	**1**

COURSE CONTENT

COMPUTER GRAPHICS (Professional Elective – I)								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM515PE	**Elective**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	**-**	**-**	**3**	**40**	**60**	**100**
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil				**Total Classes: 48**		
Prerequisite: Programming for problem solving and Data Structures								

1. **COURSE OVERVIEW**

This course introduces the fundamental concepts and techniques of Computer Graphics, focusing on both theoretical foundations and practical algorithms used in graphical systems. It covers graphics hardware, output primitives, polygon filling, 2-D and 3-D transformations, viewing pipelines, object representations, animation techniques, and visible surface detection methods. The course equips students with the ability to design, analyze, and implement graphics algorithms used in modern visualization, animation, CAD/CAM, gaming, and multimedia applications.

2. **COURSE OBJECTIVE**

The students will try to Learn:

1) The basics of graphics systems including Points and lines, line drawing algorithms, 2D, 3D objective transformations.

3. **COURSE OUTCOMES**

After successful completion of the course, students should be able to:

CO 1	Understand the basic components of computer graphics systems, display devices, input devices, and implement fundamental output primitives and polygon filling algorithms.
CO 2	Apply 2-D geometric transformations, viewing transformations, and clipping algorithms to manipulate and display graphical objects effectively.
CO 3	Analyze and represent 3-D objects using polygonal and curved surface representations, and apply rendering techniques and color models.
CO 4	Implement 3-D geometric transformations and viewing pipelines including projections, view volumes, and clipping operations.
CO 5	Design computer animation sequences and evaluate visible surface detection algorithms for realistic scene generation.

4. **COURSE CONTENT**

UNIT - I **(10L)**

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 (DDA and Bresenham's Algorithm) circle- generating algorithms and ellipse - generating algorithms

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

UNIT - II **(10L)**

2-D geometric transformations: 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, clipping operations, point clipping, Line clipping-Cohen Sutherland algorithms, Polygon clipping-Sutherland Hodgeman polygon clipping algorithm.

UNIT - III **(10L)**

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

UNIT - IV **(9L)**

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing: Viewing pipeline, viewing coordinates, projections, view volume and general projection transforms and clipping.

UNIT - V **(9L)**

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

Visible surface detection methods: Classification, back-face detection, depth-buffer method, BSP-tree method, area sub-division method and octree method.

5. TEXT BOOKS

1) "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education.

6. 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.
4) "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
5) Computer Graphics, Steven Harrington, TMH.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**2**		**1**							**1**	**2**	**1**
CO 2	**3**	**3**	**2**	**1**	**2**							**1**	**2**	**1**
CO 3	**3**	**2**	**3**	**2**	**2**							**1**	**1**	**1**
CO 4	**3**	**3**	**2**	**2**	**2**							**1**	**2**	**1**
CO 5	**2**	**3**	**2**	**2**	**2**							**2**	**1**	**1**

COURSE CONTENT

CRYPTOGRAPHY AND NETWORK SECURITY LAB								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM505PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Nil								

1. COURSE OVERVIEW

The Cryptography and Network Security Laboratory provides practical exposure to the fundamental techniques used to secure data and communication networks. The course focuses on implementing classical and modern cryptographic algorithms, secure key management techniques, authentication mechanisms, and network security protocols. Through hands-on experiments, students learn to analyze security threats, implement encryption and decryption methods, and evaluate the effectiveness of security mechanisms in protecting information systems and networked applications.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Explain the objectives of information security
2) Explain the importance and application of each of confidentiality, integrity, authentication and availability
3) Understand various cryptographic algorithms.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Understand basic cryptographic algorithms, message authentication, web authentication mechanisms, and common security issues.
CO 2	Identify information system security requirements for both client-side and server-side environments.
CO 3	Understand current legal, ethical, and regulatory issues related to information and network security.
CO 4	Implement symmetric and asymmetric cryptographic algorithms using programming languages such as C and Java.
CO 5	Apply cryptographic hash functions and key exchange mechanisms to ensure data integrity, confidentiality, and secure communication.

4. COURSE CONTENT

LIST OF EXPERIMENTS

1. Write a C program that contains a string (char pointer) with a value ‘Hello world’. The program should XOR each character in this string with 0 and display the result.
2. Write a C program that contains a string (char pointer) with a value ‘Hello world’. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms
   a. Ceaser cipher b. Substitution cipher c. Hill Cipher

4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.
8. Write a Java program to implement the RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

5. TEXT BOOK

1) Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2) Cryptography and Network Security: Atul Kahate, McGraw Hill, 3rd Edition

6. REFERENCE BOOKS

1) Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2) Cryptography and Network Security: Forouzan Mukhopadhyay, McGraw 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
6) Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	–	–	**2**	–	–	**2**	–	–	–	**2**	**3**	**1**
CO 2	**3**	**3**	**2**	**2**	**2**	–	–	–	–	–	–	**2**	**3**	**1**
CO 3	**2**	**2**	–	–	–	**2**	–	**3**	–	–	–	**2**	**2**	**1**
CO 4	**3**	**3**	**3**	**2**	**3**	–	–	–	–	–	–	**2**	**3**	**2**
CO 5	**3**	**3**	**2**	**3**	**3**	–	–	–	–	–	–	**3**	**3**	**2**

COURSE CONTENT

ADVANCED ENGLISH COMMUNICATION SKILLS LAB								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
EN506HS	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Computer with Headphones, OALD & Interactive Communication Skills Lab								

1. COURSE OVERVIEW

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

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

1. Gathering ideas and information to organise ideas relevantly and coherently.
2. Making oral presentations.
3. Writing formal letters.
4. Transferring information from non-verbal to verbal texts and vice-versa.
5. Writing project/research reports/technical reports.
6. Participating in group discussions.
7. Engaging in debates.
8. Facing interviews.
9. Taking part in social and professional communication.

2. COURSE OBJECTIVE

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

1. To improve the students' fluency in English, with a focus on vocabulary
2. To enable them to listen to English spoken at normal conversational speed by educated English speakers
3. To respond appropriately in different socio-cultural and professional contexts
4. To communicate their ideas relevantly and coherently in writing
5. To prepare the students for placements.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Demonstrate the fundamentals of writing, Grammar & Vocabulary.
CO 2	Develop different types of writing.
CO 3	Analyse writing tasks and adapt style, tone, and format
CO 4	Produce academic & Professional documents like Letters, Reports, emails etc.
CO 5	Use the language in real life situations

Syllabus:

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

1. **Activities on Listening and Reading Comprehension**

2. **For Practice:** Active Listening – Development of Listening Skills Through Audio clips – Benefits of Reading – Methods and Techniques of Reading.

   Basic steps to Effective Reading – Common Obstacles – Discourse Markers or Linkers – Sub- skills of reading - Reading for facts, negative facts and Specific Details – Guessing Meanings from Context, inferring meaning – Critical Reading – Reading Comprehension – Exercises.

3. **Activities on Writing Skills:** Vocabulary for Competitive Examinations – Planning for Writing – Improving Writing Skills- Structure and presentation of different types of writing – Structured writing – Letter writing – Writing a letter of Application – Resume vs. Curriculum Vitae – Writing a Resume – Styles of Resume – e-Correspondence – Emails – Blog Writing –(N) etiquette – Report Writing – Importance of Reports – Types of Reports – Technical Report Writing – Exercises for practice.

4. **Activities on Presentation Skills:** Starting a conversation – responding appropriately and relevantly – Using the right language and body language – Role Play in different situations including Seeking Clarifications, Making a Request, Asking for and Refusing Permission, Participating in a Small Talk – Oral Presentations (individual and group) through JAM sessions – PPT's – Importance of Presentation Skills – Planning, Preparing, Rehearsing and Making a Presentation – Dealing with Glossophobia or Stage Fear – Understanding Nuances of Delivery – Presentations through Posters/Projects/ Reports – Checklist for making a Presentation and Rubrics of Evaluation.

5. **Activities on Group Discussion (GD):** Types of GD and GD as a part of a Selection Procedure – Dynamics of Group Discussion – Myths of GD – Intervention, Summarizing – Modulation of voice, Body Language, Relevance, Fluency and Organization of ideas – Do's and Don'ts – GD Strategies – Exercises for Practice.

6. **Interview Skills:** Concept and Process – Interview Preparation Techniques – Types of Interview Questions – Pre-interview Planning, Opening Strategies, Answering Strategies – Interview Through Tele -conference & Video-conference – Mock Interviews.

5. 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
- One PC with latest configuration for the teacher
- T.V. a digital stereo & Camcorder
- Headphones of High quality

6. SUGGESTED SOFTWARE:

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

- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- Oxford Advanced Learner's Dictionary, 10th Edition.
- Cambridge Advanced Learner's Dictionary
- DELTA'S key to the next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech

7. BOOKS RECOMMENDED:

1. Rizvi, M. Ashraf (2018). Effective Technical Communication. (2nd ed) McGraw Hill Education (India) Pvt. Ltd.
2. Suresh Kumar, E. (2015). Engineering English. Orient Black Swan Pvt. Ltd.
3. Bailey, Stephen. (2018) Academic Writing: A Handbook for International Students. (5th ed). Routledge.
4. Koneru, Aruna. (2016). Professional Communication. McGraw Hill Education (India) Pvt. Ltd.
5. Raman, Meenakshi & Sharma, Sangeeta. (2022). Technical Communication, Principles and Practice. (4th ed) Oxford University Press.
6. Anderson, Paul V. (2007) Technical Communication. Cengage Learning Pvt. Ltd. New Delhi.
7. Mc Carthy, Michael; O'Dell, Felicity & Redman, Stuart. (2017). English Vocabulary in use series. Cambridge University Press.
8. Sen, Leela. (2009). Communication Skills. PHI Learning Pvt. Ltd., New Delhi.
9. Elbow, Peter. (1998). Writing with Power. Oxford University Press.
10. Goleman, Daniel. (2013). Emotional Intelligence: Why it can matter more than IQ. Bloomsbury Publishing.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1									**2**	**3**		**3**		**2**
CO 2									**2**	**3**		**3**		**2**
CO 3									**2**	**3**		**3**		**2**
CO 4									**2**	**3**		**3**		**2**
CO 5									**2**	**3**		**3**		**2**

COURSE CONTENT

UI DESIGN-FLUTTER								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM507PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Nil								

1. COURSE OVERVIEW

This course introduces Flutter and Dart for cross-platform mobile application development. It covers Dart language fundamentals, Flutter widgets, layouts, and responsive UI design. Students learn navigation, state management, form handling, animations, and REST API integration. The course also emphasizes testing, debugging, and best practices for building robust and scalable Flutter applications.

2. COURSE OBJECTIVE

The students will try to Learn:

1) Learns to Implement Flutter Widgets and Layouts
2) Understands Responsive UI Design and with Navigation in Flutter
3) Knowledge on Widges and customize widgets for specific UI elements, Themes
4) Understand to include animation apart from fetching data

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Understand and apply Dart programming fundamentals and set up the Flutter development environment for building mobile applications.
CO 2	Design and implement user interfaces using Flutter widgets, layouts, custom widgets, and theming to create interactive applications.
CO 3	Develop responsive and adaptive Flutter applications that work seamlessly across different screen sizes using media queries and layout techniques.
CO 4	Implement navigation, state management, and form handling in Flutter applications using Navigator, routes, stateful/stateless widgets, and validation techniques.
CO 5	Integrate advanced features such as animations, REST API data fetching, debugging, and testing to create robust and user-friendly Flutter applications.

4. LIST OF EXPERIMENTS

1. a) Install Flutter and Dart SDK.

b) Write a simple Dart program to understand the language basics.

2. a) Explore various Flutter widgets (Text, Image, Container, etc.).

b) Implement different layout structures using Row, Column, and Stack widgets.

3. a) Design a responsive UI that adapts to different screen sizes.

b) Implement media queries and breakpoints for responsiveness.

4. a) Set up navigation between different screens using Navigator.

b) Implement navigation with named routes.

5. a) Learn about stateful and stateless widgets.

b) Implement state management using set State and Provider.

6. a) Create custom widgets for specific UI elements.

b) Apply styling using themes and custom styles.

7. a) Design a form with various input fields.

b) Implement form validation and error handling.

8. a) Add animations to UI elements using Flutter's animation framework.

b) Experiment with different types of animations (fade, slide, etc.).

9. a) Fetch data from a REST API.

b) Display the fetched data in a meaningful way in the UI.

10. a) Write unit tests for UI components.

b) Use Flutter's debugging tools to identify and fix issues.

5. TEXT BOOKS

1) Marco L. Napoli, Beginning Flutter: A Hands-on Guide to App Development.

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**2**		**3**							**2**	**3**	**2**
CO 2	**3**	**2**	**3**		**3**				**1**			**2**	**3**	**2**
CO 3	**3**	**2**	**3**	**1**	**3**				**1**			**2**	**3**	**2**
CO 4	**2**	**3**	**3**		**3**				**1**			**2**	**2**	**3**
CO 5	**3**	**3**	**3**		**3**				**1**			**2**	**3**	**3**

COURSE CONTENT

MACHINE LEARNING LAB								
III Year - I Semester: CSE (AI & ML)								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
AM508PC	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	**-**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32				**Total Classes: 32**		
Prerequisite: Nil								

1. COURSE OVERVIEW

The Machine Learning Laboratory provides hands-on experience in implementing and evaluating machine learning algorithms using real-world datasets. The course focuses on practical aspects of supervised, unsupervised, ensemble, evolutionary, and probabilistic learning techniques. Students will gain proficiency in using programming tools and libraries to build, train, and test machine learning models, analyze their performance, and apply appropriate techniques for solving real-world data-driven problems.

2. COURSE OBJECTIVE

The students will try to Learn:

1) The objective of this lab is to get an overview of the various machine learning techniques and can demonstrate them using python.

3. COURSE OUTCOMES

After successful completion of the course, students should be able to:

CO 1	Understand modern notions in predictive data analysis.
CO 2	Select appropriate data and machine learning models by analyzing model selection, model complexity, and data trends.
CO 3	Understand a range of machine learning algorithms along with their strengths and weaknesses.
CO 4	Build predictive models from data and analyze their performance using suitable evaluation metrics.
CO 5	Implement and compare multiple machine learning algorithms on real-world datasets through hands-on experimentation or mini-projects.

4. LIST OF EXPERIMENTS

1. Write a python program to compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for ML application such as Pandas and Matplotlib
4. Write a Python program to implement Simple Linear Regression
5. Implementation of Multiple Linear Regression for House Price Prediction using sklearn
6. Implementation of Decision tree using sklearn and its parameter tuning
7. Implementation of KNN using sklearn
8. Implementation of Logistic Regression using sklearn
9. Implementation of K-Means Clustering
10. Performance analysis of Classification Algorithms on a specific dataset (Mini Project)

5. TEXT BOOKS

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

6. REFERENCE BOOKS

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

CO-PO-PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	**3**	**2**	**–**	**–**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**	**2**
CO 2	**3**	**3**	**2**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**	**2**
CO 3	**3**	**2**	**–**	**2**	**2**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**	**2**
CO 4	**3**	**3**	**3**	**2**	**3**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**3**	**2**
CO 5	**3**	**3**	**3**	**3**	**3**	**–**	**–**	**–**	**2**	**2**	**–**	**3**	**3**	**1**