

**Optimization Techniques
(Common to AIML & IT)**

Semester: IV**Course Code: 231HS4T02**

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| L | T | P | C |
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Course Outcomes: At the end of the Course, Student will be able to:

- CO1:** Apply the constraints and solve single and multivariable optimization problems in Engineering
- CO2:** Solve the linear programming problem using Simplex algorithm
- CO3:** Solve the transportation problem for basic and optimal solutions
- CO4:** Solve unconstrained and constrained non-linear programming problems using 1-dimensional minimization and penalty function methods
- CO5:** Solve dynamic programming problems using calculus and tabular methods

Mapping of Course Outcomes with Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | 1 | - | 2 |
| CO2 | 3 | 3 | 2 | - | - | - | - | - | - | 1 | - | 2 |
| CO3 | 3 | 3 | 2 | - | - | - | - | - | - | 1 | - | 2 |
| CO4 | 3 | 3 | 2 | - | - | - | - | - | - | 1 | - | 2 |
| CO5 | 3 | 3 | 2 | - | - | - | - | - | - | 1 | - | 2 |

Mapping of Course Outcomes with Program Specific Outcomes:

| CO/PSO | PSO1 | PSO2 |
|------------|------|------|
| CO1 | 2 | - |
| CO2 | 2 | - |
| CO3 | 2 | - |
| CO4 | 2 | - |
| CO5 | 2 | - |

UNIT – I

Introduction and Classical Optimization Techniques: Statement of an Optimization problem, design vector, design constraints, constraint surface, objective function, objective function surfaces, classification of Optimization problems.

Classical Optimization Techniques: Single variable Optimization, multi variable Optimization without constraints, necessary and sufficient conditions for minimum/maximum, multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers, multivariable Optimization with inequality constraints, Kuhn – Tucker conditions

UNIT – II

Linear Programming: Standard form of a linear programming problem, geometry of linear programming problems, definitions and theorems, solution of a system of linear simultaneous equations, pivotal reduction of a general system of equations, motivation to the simplex method, simplex algorithm.

UNIT – III

Transportation Problem:

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method, testing for optimality of balanced transportation problems, Special cases in transportation problem.

UNIT – IV

Nonlinear Programming:

Unconstrained cases, One – dimensional minimization methods: Classification, Fibonacci method, Univariate method, steepest descent method. Constrained cases– Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method, Basic approaches of Interior and Exterior penalty function methods,

UNIT – V

Dynamic Programming:

Dynamic programming multistage decision processes, types, concept of sub optimization and the principle of optimality, computational procedure in dynamic programming, examples illustrating the calculus method of solution, examples illustrating the tabular method of solution.

Text Books:

1. “Engineering optimization: Theory and practice”, S. S.Rao, New Age International (P) Limited, 3rd edition.
2. “Introductory Operations Research”, H.S. Kasene & K.D. Kumar, Springer (India), Pvt. Ltd.

Reference Books:

1. [“Optimization Methods in Operations Research and systems Analysis”, by K.V. Mital and C. Mohan, New Age International \(P\) Limited, Publishers, 3rd edition.](#)
2. [Operations Research, Dr.S.D.Sharma, Kedarnath, Ramnath & Co](#)

Probability and statistics
(Common to AIML, CSE, CSE-DS & IT)

Semester: IV**Course Code: 231BS4T03**

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Course Outcomes: At the end of the Course, Student will be able to:**CO1:** Compute mean, median, mode, standard deviation and variance.**CO2:** Apply various Probability distributions for both discrete and continuous random variables.**CO3:** Compute mean and variance of sample means with replacement and without replacement and estimating maximum errors.**CO4:** Apply various tests to test the hypothesis concerning mean, Proportion and variance.**CO5:** Apply the concepts of correlation and regression to the given statistical data.**Mapping of Course Outcomes with Program Outcomes:**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO2 | 3 | 2 | - | - | - | - | - | - | - | - | - | - |
| CO3 | 2 | 3 | - | - | - | - | - | - | - | - | - | - |
| CO4 | 3 | 2 | - | - | - | - | - | - | - | - | - | - |
| CO5 | 3 | 2 | - | - | - | - | - | - | - | - | - | - |

Mapping of Course Outcomes with Program Specific Outcomes:

| CO/PSO | PSO1 | PSO2 |
|--------|------|------|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |

UNIT – I**Descriptive statistics and methods for data science:**

Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability (spread or variance) Skewness Kurtosis

UNIT – II**Probability and Distributions:**

Probability – Conditional probability and Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution function – Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

UNIT – III**Sampling Theory:**

Introduction – Population and samples – Sampling distribution of Means and Variance – Point and Interval estimations – Maximum error of estimate – Central limit theorem (without proof)-

UNIT – IV**Tests of Hypothesis:**

Introduction – Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Test of significance for large samples and small samples: Single and difference means – Single and two proportions – Z-test, t-test, F-test, χ^2 -test.

UNIT – V**Correlation and Regression:**

Correlation – Correlation coefficient – Rank correlation. Linear Regression: Straight line – Multiple Linear Regression - Regression coefficients and properties – Curvilinear Regression: Parabola – Exponential – Power curves.

Text Books:

1. Probability and Statistics for Engineers, Miller and Freund's, 7/e, Pearson.
2. Fundamentals of Mathematical Statistics, S. C. Gupta and V.K. Kapoor. 11/e, Sultan Chand & Sons Publications.
3. Probability, Statistics and Random Processes, Murugesan, Anuradha Publishers, Chennai

Reference Books:

1. Probability, Statistics and Random processes, T. B. Veeraju, TMH.
2. Probability and statistics by T.K.V. Iyengar, B. Krishna Gandhi, S Ranganatham, MVSSN Prasad, S. Chand publishers.
3. Higher engineering mathematics by John Bird, 5th edition Elsevier Limited.

Web Links:

1. [ps://archive.nptel.ac.in/content/syllabus_pdf/111105041.pdf](https://archive.nptel.ac.in/content/syllabus_pdf/111105041.pdf)
2. [p://mathworld.wolfram.com/topics/ProbabilityandStatistics.html](https://mathworld.wolfram.com/topics/ProbabilityandStatistics.html)
3. [ps://www.math.net/probability-and-statistics](https://www.math.net/probability-and-statistics)
4. [p://nptel.ac.in/courses/111105041/1](https://nptel.ac.in/courses/111105041/1)
5. [ps://www.khanacademy.org/math/statistics-probability](https://www.khanacademy.org/math/statistics-probability)

Machine Learning**Semester: IV****Course Code: 231AM4T02**

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

- CO1:** Explain the evolution, paradigms, stages, and techniques of Machine Learning.
- CO2:** Apply nearest neighbor-based models, covering proximity measures, distance metrics, classification algorithms.
- CO3:** Demonstrate classification and regression models, including impurity measures, properties, bias-variance trade-off.
- CO4:** Analyze linear discriminants in machine learning, perceptron classifiers; support vector machines (SVMs) and multi-layer perceptrons (MLPs) with back propagation for training.
- CO5:** Apply clustering techniques on given data, find similarity of classes.

Mapping of Course Outcomes with Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 1 |
| CO2 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 |
| CO3 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | - | 1 |
| CO4 | 2 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 |
| CO5 | 2 | 3 | 1 | 2 | - | - | - | - | - | - | - | 2 |

Mapping of Course Outcomes with Program Specific Outcomes:

| CO/PSO | PSO1 | PSO2 |
|------------|------|------|
| CO1 | 2 | - |
| CO2 | 1 | - |
| CO3 | 2 | - |
| CO4 | 2 | - |
| CO5 | 2 | - |

UNIT – I

Introduction to Machine Learning: Evolution of Machine Learning, Paradigms for ML, Learning by Rote, Learning by Induction, Reinforcement Learning, Types of Data, Matching, Stages in Machine Learning, Data Acquisition, Feature Engineering, Data Representation, Model Selection, Model Learning, Model Evaluation, Model Prediction, Search and Learning, Data Sets.

UNIT – II

Nearest Neighbor-Based Models: Introduction to Proximity Measures, Distance Measures, Non-Metric Similarity Functions, Proximity Between Binary Patterns, Different Classification Algorithms Based on the Distance Measures, K-Nearest Neighbor Classifier, Radius Distance Nearest Neighbor Algorithm, KNN Regression, Performance of Classifiers, Performance of Regression Algorithms.

UNIT – III

Models Based on Decision Trees: Decision Trees for Classification, Impurity Measures, Properties, Regression Based on Decision Trees, Bias–Variance Trade-off, Random Forests for Classification and Regression. The Bayes Classifier: Introduction to the Bayes Classifier, Bayes’ Rule and Inference, The Bayes Classifier and its Optimality, Multi-Class Classification | Class Conditional Independence and Naive Bayes Classifier (NBC)

UNIT – IV

Linear Discriminants for Machine Learning: Introduction to Linear Discriminants, Linear Discriminants for Classification, Perceptron Classifier, Perceptron Learning Algorithm, Support Vector Machines, Linearly Non-Separable Case, Non-linear SVM, Kernel Trick, Logistic Regression, Linear Regression, Multi-Layer Perceptrons (MLPs), Backpropagation for Training an MLP.

UNIT – V

Clustering : Introduction to Clustering, Partitioning of Data, Matrix Factorization | Clustering of Patterns, Divisive Clustering, Agglomerative Clustering, Partitional Clustering, K-Means Clustering, Soft Partitioning, Soft Clustering, Fuzzy C-Means Clustering, Rough Clustering, Rough K-Means Clustering Algorithm, Expectation Maximization-Based Clustering, Spectral Clustering.

Text Books:

1. “Machine Learning”, Tom M. Mitchell, McGraw-Hill Publication.
2. “Machine Learning Theory and Practice”, M N Murthy, V S Ananthanarayana, Universities Press (India), 2024

Reference Books:

1. “Machine Learning in Action”, Peter Harrington, DreamTech
2. “Introduction to Data Mining”, Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition.

Web Links:

1. <https://nptel.ac.in/courses/106105077>
2. <https://www.kaggle.com>
3. <https://aima.cs.berkeley.edu>
4. https://ai.berkeley.edu/project_overview.html
5. <http://www.zuj.edu.jo/download/machine-learning-tom-mitchell-pdf>

Database Management Systems (Common to AIML, CSE& IT)

Semester: IV**Course Code: 231CS4T02**

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| L | T | P | C |
| 3 | 0 | 0 | 3 |

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

- CO1:** Summarize the database characteristics and architectures.
- CO2:** Design Entity – relationship diagrams for given scenarios.
- CO3:** Implement relational database using SQL
- CO4:** Apply normalization techniques for efficient database design
- CO5:** Analyze the mechanisms of transaction management, storage management and indexing.

Mapping of Course Outcomes with Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2 | 1 | - | - | - | - | - | - | - | - | - | |
| CO2 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| CO3 | 2 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | 1 |
| CO4 | 2 | 2 | 3 | - | - | - | - | - | - | - | - | 1 |
| CO5 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 1 |

Mapping of Course Outcomes with Program Specific Outcomes:

| CO/PSO | PSO1 | PSO2 |
|------------|------|------|
| CO1 | 1 | - |
| CO2 | 2 | - |
| CO3 | 3 | - |
| CO4 | 2 | - |
| CO5 | 2 | - |

UNIT – I

Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

UNIT – II

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus.

BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

UNIT – III

SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non updatable), relational set operations

UNIT – IV

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

UNIT – V

Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing

Text Books:

1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts, 5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

Reference Books:

1. Introduction to Database Systems, 8th edition, C J Date, Pearson.
2. Database Management System, 6th edition, RamezElmasri, Shamkant B. Navathe, Pearson
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

Web Links:

1. <https://nptel.ac.in/courses/106/105/106105175/>
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview

Digital Logic & Computer Organization
(Common to AIML, CSE(DS))

Semester: IV**Course Code: 231AM4T01**

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| 3 | 0 | 0 | 3 |

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

- CO1:** Apply number systems, binary codes, signed numbers, design and simplify logic circuit
- CO2:** Develop advanced digital logic circuits and the foundational structure of computers.
- CO3:** Apply computer arithmetic operations and processor organization principles
- CO4:** Explain the concepts of memory hierarchy comprehensively
- CO5:** Explain the architecture and functionality of central processing unit

Mapping of Course Outcomes with Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| CO2 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 |
| CO3 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 1 |
| CO4 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 1 |
| CO5 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 1 |

Mapping of Course Outcomes with Program Specific Outcomes:

| CO/PSO | PSO1 | PSO2 |
|------------|------|------|
| CO1 | - | 2 |
| CO2 | - | 1 |
| CO3 | - | 2 |
| CO4 | - | 2 |
| CO5 | - | 2 |

UNIT – I

Data Representation: Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes

Digital Logic Circuits-I: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers

UNIT – II

Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters

Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture

UNIT – III

Computer Arithmetic : Addition and Subtraction of Signed Numbers, Design of Fast

Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

UNIT – IV

Processor Organization:

The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage

UNIT – V

Input/Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

Text Books:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, SafwatZaky, 6th edition, McGraw Hill, 2023
2. Digital Logic and Computer Design, Morris Mano, Pearson Education 11th Edition.
3. Computer System Architecture, M. Morris Mano, PHI, 3rd edition.

Reference Books:

1. Digital Logic and Computer Organization, Rajaraman, Radhakrishnan, PHI.
2. Computer Organization, Hamacher, Vranesic and Zaky, TMH, 5th edition.
3. Computer Organization & Architecture: Designing for Performance, William Stallings, PHI, 7th edition.

Web Links:

1. <http://nptel.ac.in/courses/106106092/>
2. <http://nptel.ac.in/courses/106103068/2>
3. <http://www.cuc.ucc.ie/CS1101/David%20Tarnoff.pdf>
4. <https://www.geeksforgeeks.org/computer-arithmetic-set-1/>
5. https://onlinecourses.nptel.ac.in/noc20_ee11/preview

AI & ML Lab

Semester: IV
Course Code: 231AM4L01

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

- CO1:** Equip with a thorough understanding of key artificial intelligence concepts and techniques.
CO2: Enable problem-solving methods using artificial intelligence techniques.
CO3: Apply the concepts of expert systems and machine learning.
CO4: Gain proficiency in computing central tendency measures and implementing data preprocessing techniques.
CO5: learn about classification and regression algorithms
CO6: apply different clustering algorithms for a problem.

Mapping of Course Outcomes with Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 1 | 2 | 2 | 2 | 2 | - | - | - | 1 | 1 | | 2 |
| CO2 | 2 | 2 | 3 | | 2 | - | - | - | 1 | 1 | | 2 |
| CO3 | 1 | 2 | 3 | 2 | 2 | - | - | - | 1 | 1 | | 2 |
| CO4 | 1 | 2 | 3 | 2 | 2 | - | - | - | 1 | 1 | | 2 |
| CO5 | 1 | 2 | 3 | 2 | 2 | - | - | - | 1 | 1 | | 2 |
| CO6 | 1 | 1 | 3 | 2 | 2 | - | - | - | 1 | 1 | | 2 |

Mapping of Course Outcomes with Program Specific Outcomes:

| CO/PSO | PSO1 | PSO2 |
|------------|------|------|
| CO1 | - | 2 |
| CO2 | - | 3 |
| CO3 | - | 1 |
| CO4 | - | 2 |
| CO5 | - | 2 |
| CO6 | - | 2 |

WEEK 1:

Pandas Library

- Write a python program to implement Pandas Series with labels.
- Create a Pandas Series from a dictionary.
- Creating a Pandas Data Frame.
- Write a program which makes use of the following Pandas methods
 i) describe () ii) head () iii) tail () iv) info ()

WEEK 2:

Pandas Library: Visualization

- Write a program which use pandas inbuilt visualization to plot following graphs:
 i. Bar plots ii. Histograms iii. Line plots iv. Scatter plots

WEEK 3:

Write a Program to Implement Breadth First Search using Python.

WEEK 4:

Write a program to implement Best First Searching Algorithm

WEEK 5:

Write a Program to Implement Depth First Search using Python.

WEEK 6:

Write a program to implement the Heuristic Search

WEEK 7:

Write a python program to implement A* and AO* algorithm. (Ex: find the shortest path)

WEEK 8:

Apply the following Pre-processing techniques for a given dataset.

- a. Attribute selection
- b. Handling Missing Values
- c. Discretization
- d. Elimination of Outliers

WEEK 9:

Apply KNN algorithm for classification and regression

WEEK 10:

Demonstrate decision tree algorithm for a classification problem and perform parameter tuning for better results

WEEK 11:

Apply Random Forest algorithm for classification and regression

WEEK 12:

Demonstrate Naïve Bayes Classification algorithm.

AUGMENTED EXPERIMENT 1:

Apply Support Vector algorithm for classification

AUGMENTED EXPERIMENT 2:

Implement the K-means algorithm and apply it to the data you selected. Evaluate performance by measuring the sum of the Euclidean distance of each example from its class center. Test the performance of the algorithm as a function of the parameters K.

Reference Books:

1. Machine Learning Probabilistic Approach, Kevin P. Murphy, MIT Press.
2. Stephen Marsland, "Machine Learning -An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series.
3. Andreas C. Müller and Sarah Guido "Introduction to Machine Learning with Python: A Guide for Data Scientists", Oreilly

Web Links:

1. <https://www.deeplearning.ai/machine-learningyearning/>
2. <https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html>
3. <https://www.deeplearning.ai/machine-learningyearning/>
4. <https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html>

Database Management Systems Lab
(Common to AIML, CSE & IT)

Semester: IV
Course Code: 231CS4L02

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

- CO1:** Construct a database schema for a given problem-domain.
- CO2:** Apply database language commands to create simple database
- CO3:** Apply integrity constraints on a database using RDBMS.
- CO4:** Analyze the database using queries to retrieve records.
- CO5:** Develop PL/SQL stored procedures, stored functions, cursors and packages.

Mapping of Course Outcomes with Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2 | 1 | 1 | 1 | 1 | - | - | - | 1 | 2 | - | - |
| CO2 | 2 | 1 | 1 | 1 | 1 | - | - | - | 1 | 2 | - | - |
| CO3 | 2 | 2 | 1 | 1 | 3 | - | - | - | 1 | 2 | - | - |
| CO4 | 2 | 2 | 1 | 1 | 3 | - | - | - | 1 | 2 | - | - |
| CO5 | 2 | 2 | 1 | 1 | 3 | - | - | - | 1 | 2 | - | - |

Mapping of Course Outcomes with Program Specific Outcomes:

| CO/PSO | PSO1 | PSO2 |
|------------|------|------|
| CO1 | 1 | - |
| CO2 | 1 | - |
| CO3 | 1 | - |
| CO4 | 2 | - |
| CO5 | 2 | - |

WEEK 1:

Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

WEEK 2:

Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

WEEK 3:

Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

WEEK 4:

Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between,

least, greatest, trunc, round, to_char, to_date)

WEEK 5:

- i. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
- ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

WEEK 6:

Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

WEEK 7:

Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops Using ERROR Handling, BUILT –IN Exceptions, USER defined Exceptions, RAISE APPLICATION ERROR.

WEEK 8:

Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

WEEK 9:

Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

WEEK 10:

Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

WEEK 11:

Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

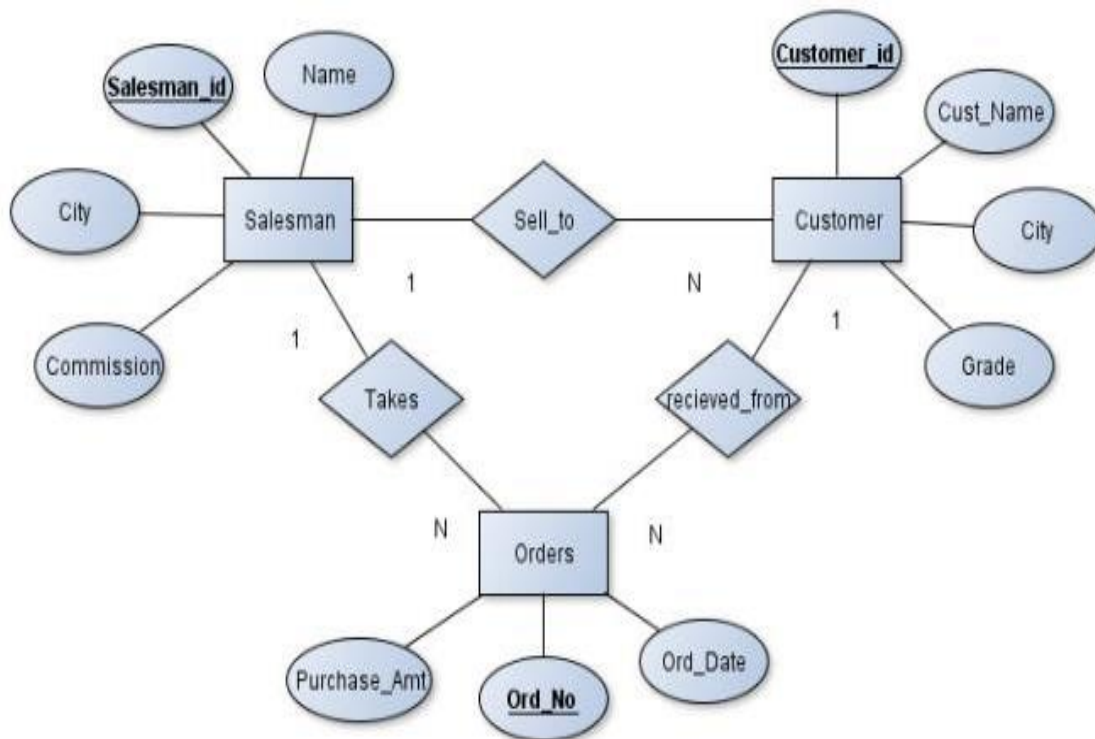
WEEK 12:

Create a table and perform the search operation on table using indexing and nonindexing techniques.

List of Augmented Experiments(Any of Two)

Week 13

For a Sales Order Database System, based on the given E-R diagram.



- Design a schema by applying functional dependencies.
- Apply constraints and verify them.

Week 14

Based on the following schema for a Library Database:

BOOK (Book_id, Title, Publisher_Name, Pub_Year)

BOOK_AUTHORS (Book_id, Author_Name) PUBLISHER (Name, Address, Phone)

BOOK_COPIES (Book_id, Branch_id, No-of_Copies)

BOOK_LENDING (Book_id, Branch_id, Card_No, Date_Out, Due_Date)

LIBRARY_BRANCH (Branch_id, Branch_Name, Address)

- Draw the E-R diagram and show the necessary multiplicity and associations among them.
- Draw the Schema diagram and show the necessary associations among them.

Week 15

For a Faculty Database

EMPLOYEE (EMPID, FName, LName, Address, Sex, Salary, DeptNo)

DEPARTMENT (DeptNo, DName, HOD_EMPID)

PROJECT (ProjNo, PName, DeptNo) WORKS_ON

(EMPID, ProjNo, Hours)

EMPLOYEE DATA

| EMPID | FName | LName | Address | Sex | Salary | DeptNo |
|-------|----------|----------|-------------|-----|--------|--------|
| 1201 | Adarsh | Kumar | Kakinada | F | 150000 | 1 |
| 1240 | Mahi | John | Rajahmundry | F | 95000 | 1 |
| 1245 | Ramu | Murty | Rajahmundry | M | 90000 | 2 |
| 1234 | Aditya | Surya | Bangalore | M | 80000 | 1 |
| 1247 | Jack | Paul | Bangalore | M | 75000 | 2 |
| 1235 | Pradeep | Chitra | Rajahmundry | M | 78000 | 1 |
| 1211 | Srinivas | Kumar | Hyderabad | M | 59000 | 1 |
| 1492 | Gopala | Rao | Kakinada | M | 65000 | 2 |
| 1250 | Eswari | Nirupama | Kakinada | F | 65000 | 2 |

DEPARTMENT DATA

| DeptNo | DName | HOD_EMPID |
|--------|-------|-----------|
| 1 | CSE | 1240 |
| 2 | IT | 1245 |

PROJECT DATA

| ProjNo | PName | DeptNo |
|--------|----------|--------|
| 100 | IoT | 1 |
| 101 | CLOUD | 1 |
| 102 | BIGDATA | 2 |
| 103 | NETWORKS | 2 |
| 104 | IoT | 2 |
| 105 | NETWORKS | 1 |

WORKS_ON DATA

| EMPID | ProjNo | Hours |
|-------|--------|-------|
| 1245 | 104 | 16 |
| 1240 | 101 | 22 |
| 1201 | 100 | 31 |
| 1250 | 102 | 25 |
| 1492 | 103 | 25 |
| 1235 | 105 | 29 |

Text Books:

1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah, "Database Systems Using Oracle", PHI.
3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education.

Reference Books:

1. SQL, PL/SQL The programming language of ORACLE, Ivan Bayross, Fourth edition, BPB Publication.
2. SQL/PLSQL for ORACLE 9i, P.S.Deshpande, Dreamtech Press.
3. Teach yourself PL/SQL in 21 days, Tom Luers, Timothy Atwood and Jonatham Gennick, First Edition, Techmedia.

Web Links:

1. <http://nptel.ac.in/courses/106106093/6>
2. <http://www.tutorialspoint.com/plsql/>
3. <https://www.plsql.co/>
4. <https://www.w3schools.com/sql/>
5. <http://www.oracle.com/technetwork/database/features/plsql/index.html>

Full Stack Development - 1
(Common to AIML, CSE & CSE-DS)

Semester: IV**Course Code: 201CS4S01**

| | | | |
|----------|----------|----------|----------|
| L | T | P | C |
| 0 | 1 | 2 | 2 |

Course Outcomes: At the end of the Course, Student will be able to:**CO1:** Make use of HTML tags, elements and their attributes for designing static web pages**CO2:** Apply form elements for developing Registration and Login web pages.**CO3:** Build a web page by applying appropriate CSS styles to HTML elements.**CO4:** Develop a real time web site using the core concepts of HTML5 and JavaScript concepts.**CO5:** Develop a real time web site using the core concepts of HTML5 and advanced JavaScript along with media.**Mapping of Course Outcomes with Program Outcomes:**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 2 | 2 | 2 | - | 2 | - | - | - | - | - | - | 2 |
| CO2 | 2 | 2 | 2 | - | 2 | - | - | - | - | - | - | 2 |
| CO3 | 2 | 3 | 3 | - | 3 | - | - | - | - | - | - | 3 |
| CO4 | 2 | 3 | 3 | - | 3 | - | - | - | - | - | - | 2 |
| CO5 | 2 | 3 | 3 | - | 3 | - | - | - | - | - | - | 2 |

Mapping of Course Outcomes with Program Specific Outcomes:

| CO/PSO | PSO1 | PSO2 |
|------------|------|------|
| CO1 | 2 | - |
| CO2 | 2 | - |
| CO3 | 2 | - |
| CO4 | 2 | - |
| CO5 | 2 | - |

List of Experiments

WEEK 1:

Lists, Links and Images :

a. Write a HTML program, to explain the working of lists.

Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.

b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target Attributes.

c. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective profiles.

d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full sized version

of the image. Create an image gallery using this technique

WEEK 2:

HTML Tables, Forms and Frames :

- a. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)
- b. Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.).
- c. Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).

WEEK 3:

HTML 5 :

- a. Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame image, second frame paragraph, third frame hyperlink. And also make sure of using “no frame” attribute such that frames to be fixed).
- b. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, <div>, tags.
- c. Write a HTML program, to embed audio and video into HTML web page.

WEEK 4:

Cascading Style Sheets, Types of CSS and Selector forms :

- a. Write a program to apply different types (or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).
- b. Write a program to apply different types of selector forms
 - i. Simple selector (element, id, class, group, universal)
 - ii. Combinator selector (descendant, child, adjacent sibling, general sibling)
 - iii. Pseudo-class selector
 - iv. Pseudo-element selector
 - v. Attribute selector
- c. Selector forms
 - i. Write a program to apply different types of selector forms
 - ii. Simple selector (element, id, class, group, universal)
 - iii. Combinator selector (descendant, child, adjacent sibling, general sibling)
 - iv. Pseudo-class selector
 - v. Pseudo-element selector
 - vi Attribute selector
- d. Write a program to apply different types of selector forms
 - i. Simple selector (element, id, class, group, universal)
 - ii. Combinator selector (descendant, child, adjacent sibling, general sibling)
 - iii. Pseudo-class selector
 - iv. Pseudo-element selector
 - v. Attribute selector

WEEK 5:

CSS with Color, Background, Font, Text and CSS Box Model :

- a. Write a program to demonstrate the various ways you can reference a color in CSS.
- b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down.
- c. Write a program using the following terms related to CSS font and text:
 - i. font-size ii. font-weight iii. font-style
 - iv. text-decoration v. text-transformation vi. text-alignment
- d. Write a program, to explain the importance of CSS Box model using
 - i. Content ii. Border iii. Margin iv. padding

WEEK 6:

Applying JavaScript - internal and external, I/O, Type Conversion :

- a. Write a program to embed internal and external JavaScript in a web page.
- b. Write a program to explain the different ways for displaying output.

WEEK 7:

- a. Write a program to explain the different ways for taking input.
 - b. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not
- JavaScript Pre-defined and User-defined Objects :
- a. Write a program using document object properties and methods.
 - b. Write a program using window object properties and methods.
 - c. Write a program using array object properties and methods.

WEEK 8:

JavaScript Pre-defined and User-defined Objects :

- d. Write a program using math object properties and methods.
- e. Write a program using string object properties and methods.
- f. Write a program using regex object properties and methods.
- g. Write a program using date object properties and methods.
- h. Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.

WEEK 9:

JavaScript Conditional Statements and Loops :

- a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words "LARGER NUMBER" in an information message dialog. If the numbers are equal, output HTML text as "EQUAL NUMBERS".
- b. Write a program to display week days using switch case.
- c. Write a program to print 1 to 10 numbers using for, while and do-while loops.

WEEK 10:

JavaScript Conditional Statements and Loops :

- d. Write a program to print data in object using for-in, for-each and for-of loops
- e. Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e., $1^3 + 5^3 + 3^3 = 153$]
- f. Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (Eg: If deposited amount is Rs.163, the output should be 1-100's, 1-50's, 1-10's, 1-2's & 1-1's)

WEEK 11:

Javascript Functions and Events

- a. Design a appropriate function should be called to display
- b. Factorial of that number
- c. Fibonacci series up to that number
- d. Prime numbers up to that number
- e. Is it palindrome or not

WEEK 12:

- a. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display
 1. Factorial of that number
 2. Fibonacci series up to that number
 3. Prime numbers up to that number
 4. Is it palindrome or not
- b. Write a program to validate the following fields in a registration page
 - i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
 - ii. Mobile (only numbers and length 10 digits)
 - iii. E-mail (should contain format like xxxxxxxx@xxxxxx.xxx)

List of Augmented Experiments: (Any 2 must be completed)

13. Design a web page with all the features of HTML elements.
14. Design a web page with new features of HTML5.
15. Design a web page with all the features of HTML elements and apply CSSstyles.
16. Design a web page with new features of HTML5 and CSS3.

Text Books:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson.
2. Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, (Chapters 1-11).
3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasam Subramanian, 2nd edition, APress, O'Reilly.

Web Links:

1. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0135015558437027848287/overview
2. <https://www.w3schools.com/css>
3. <https://www.w3schools.com/js/>
4. <https://www.w3schools.com/nodejs>
5. <https://www.w3schools.com/html>
6. <https://www.w3schools.com/typescript>

Design Thinking & Innovation
(Common to all Branches)

Semester: IV**Course Code: 231ES4T04**

| | | | |
|----------|----------|----------|----------|
| L | T | P | C |
| 1 | 0 | 2 | 2 |

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

- CO1:** Interpret the concepts of Design Thinking principles and role of new materials in industry.
- CO2:** Apply Design Thinking process to drive innovations.
- CO3:** Develop skills to generate and implement creative ideas.
- CO4:** Develop skills in problem formation, product planning, and specification.
- CO5:** Apply Design Thinking to business models and refine prototypes

Mapping of Course Outcomes with Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 1 | - | 1 | - | - | - | 2 | - | - | - | - | - |
| CO2 | - | - | 2 | - | - | - | - | 1 | 1 | - | - | - |
| CO3 | - | - | - | - | - | - | - | 1 | 1 | 2 | 1 | - |
| CO4 | - | 1 | - | - | - | - | - | - | - | - | 2 | - |
| CO5 | - | 1 | - | - | - | - | - | - | 2 | 2 | - | - |

Mapping of Course Outcomes with Program Specific Outcomes:

| CO/PSO | PSO1 | PSO2 |
|------------|------|------|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |

UNIT – I**Introduction:**

Introduction to Design Thinking: Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT – II

Design Thinking Process : Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, customer, journey map, brainstorming, product development Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development

UNIT – III

Innovation : Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation,

Debate on value-based innovation

UNIT – IV

Product Design: Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT – V

Design Thinking in Business Processes: Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Text Books:

1. Tim Brown, Change by design, 1/e, Harper Bollins.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press.
3. William lidwell, Kritinaholden, & Jill butter, Universal principles of design, 2/e, Rockport Publishers.

Web Links:

1. <https://nptel.ac.in/courses/109/104/109104109/>
2. https://swayam.gov.in/nd1_noc19_mg60/preview
3. https://onlinecourses.nptel.ac.in/noc22_de16/preview

Note: The performance of the student is evaluated through Continuous Internal Evaluation with a maximum of 100 marks (there is no external evaluation).

COGNITIVE ENGLISH FOR ENGINEERS - II

(Common to CSE, IT, AIML & CSE(DS))

Semester : IV

Course Code: 231MC4T03

| | | | |
|----------|----------|----------|----------|
| L | T | P | C |
| 0 | 0 | 2 | 0 |

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

- CO1:** Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
- CO2:** Apply communication skills through various language learning activities
- CO3:** Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- CO4:** Evaluate and exhibit professionalism in participating in debates and group discussions.
- CO5:** Develop the capacity to use various writing forms to achieve their professional needs.

Mapping of Course Outcomes with Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | 3 | - | - |

Mapping of Course Outcomes with Program Specific Outcomes:

| CO/PSO | PSO1 | PSO2 |
|--------|------|------|
| CO1 | - | - |
| CO2 | - | - |
| CO3 | - | - |
| CO4 | - | - |
| CO5 | - | - |

List of Topics:

1. City Living – Discuss living in cities, Changes to a home, write an email to complaint.
2. Dilemmas – Discuss personal finance, Moral dilemmas and crime, Be encouraging, Write a review.
3. Discoveries – Discuss new inventions, People's lives and achievements, Express uncertainty, Write an essay expressing a point of view.
4. Possibilities – Speculate about the past, Discuss life achievements, How you felt, Write a narrative.

Suggested Software:

- Cambridge Empower
- Young India Films
- Walden Infotech

Text Books:

1. Cambridge Empower – Second Edition B2 Level

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford University Press.
2. Taylor Grant: *English Conversation Practice*, Tata McGraw-Hill Education India
3. Hewing's, Martin. *Cambridge Academic English (B2)*. CUP.
4. J. Sethi & P.V. Dhamija. *A Course in Phonetics and Spoken English*, (2nd Ed), Kindle.

Web Links:**Spoken English:**

1. www.cambridgeone.org
2. www.englishinteractive.net
3. <https://www.britishcouncil.in/english/online>
4. <http://www.letstalkpodcast.com/>
5. <https://www.youtube.com/c/EnglishClass101/featured>

Voice & Accent:

1. www.cambridgeone.org
2. <https://www.youtube.com/user/letstalkaccent/videos>
3. <https://www.youtube.com/c/EngLanguageClub/featured>
4. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc