BONAM VENKATA CHALAMAYYA ENGINERING COLLEGE
ODALAREVU – 533 210, Andhra Pradesh, India
Autonomous

DEPARTMENT OF CSE (ARTIFICIAL INTELLIGENCE AND DATA SCIENCE)
COURSE STRUCTURE – BR23 REGULATIONS
For UG - B.Tech: CSE (ARTIFICIAL INTELLIGENCE AND DATA SCIENCE)
II Year Course Structure

Semester–II							
S.No.	Course Category	Course Code	Course Name	L	T	P	Credits
1.	HSMC	23HM4T05	Optimization Techniques	2	0	0	2
2.	ESC	23ES4T15	Statistical Methods for Data Science	3	0	0	3
3.	PCC	23CS4T04	Operating Systems	3	0	0	3
4.	PCC	23AD4T01	Introduction to Data Science	3	0	0	3
5.	PCC	23CS4T06	Software Engineering	3	0	0	3
6.	PCC	23CS4L04	Operating Systems Lab	0	0	3	1.5
7.	PCC	23AD4L01	Data Science using Python Lab	0	0	3	1.5
8.	PCC	23CS4S05	Full Stack development -I	0	1	2	2
9.	ESC	23ES4L06	Design Thinking & Innovation	1	0	2	2
Total				15	1	10	21
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation							

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II Year - II Semester	Code: 23ES4T15	L	T	P	C
		3	0	0	3

STATISTICAL METHODS FOR DATA SCIENCE

Course Objectives:

This course aims at providing knowledge on basic concepts of Statistics,Estimation and testing of hypotheses for large and small samples.

Course Outcomes: Student will be able to

CO Number	Course Outcome	Blooms Level
1	Analysing data and draw conclusion about collection of data and fitting of distribution	BL4
2	Analyzing the testing of hypothesis for Large and Small samples	BL4
3	Develop skills in problem solving of the regression analysis	BL3
4	Understanding the significance of Time Series data in various fields	BL2
5	Understanding the classification using Logistic Regression.	BL2

UNIT I

Data Visualization and Distributions

Introduction to Descriptive statistics, Data Visualization Techniques: Introduction to Statistical methods- Exploratory Data Analysis- Charts (Line, Pie, Bar); Plots (Bubble, Scatter); Maps (Heat, Dot Distribution);Diagrams (Trees and Matrices)-Principal Components Analysis

Introduction to Data Distributions - Probability Distributions – discrete (binomial, Poisson), Continuous Distributions (Normal, exponential).

UNIT II

Hypothesis Testing

Introduction to Parametric Estimation-Parametric Confidence Intervals Choosing a Statistic - Hypothesis Testing - Parametric test: the T-test - Applications to Hypothesis Tests-Pairwise comparisons.

UNIT III

Linear Regression and Multiple Regression

Regression: Linear Regression, Curvilinear Regression: Exponential Regression- Polynomial Regression- Power Model.

Practical Examples - The nature of the 'relationship' - Multiple Linear Regression - Important measurements of the regression estimate - Multiple Regression with Categorical Explanatory Variables - Inference in Multiple Regression - Variable Selection.

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UNIT IV

Time series:

Significance of Time series analysis, Components of Time series, Secular trend: Graphic method, Semi-average method, Method of moving averages, Method of least squares: straight line and non-linear trends, Logarithmic methods – Exponential trends, Growth curves, Seasonal Variations: Method of simple averages, Ratio-to-trend method, ratio-to-moving average method, Link relative method.

(Text book: K.Murugesan, P.Gurusamy , "Probability, Statistics and Random Processes")

UNIT V

Logistic Regression

The classification problem - Logistic Regression Setup - Interpreting the Results -Comparing Models - Classification Using Logistic Regression. and Atomicity, Recovery algorithm.

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

Textbooks:

1.Elizabeth Purdom, "Statistical methods for Data science"

2.K.Murugesan, P.Gurusamy , "Probability, Statistics and Random Processes"

Reference Books:

1.Manoj Kumar Srivastava and Namita Srivastava, Statistical Inference – Testing ofHypotheses, Prentice Hall of India, 2014.

2.Robert V Hogg, Elliot A Tannis and Dale L.Zimmerman, Probability and StatisticalInference,9th edition, Pearson publishers,2013.

3.Chris Chatfield, "The analysis of time series an introduction," 5th edition, Chapman &Hall/CRC.

4. Peter J. Brockwell, Richard A.Davis, "Introduction to Time series and Forecasting,"Second edition, Springer.

Web-Resources:

1.Online Learning Resources: epurdom.github.io/Stat131A/Rsupport/index.html.

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II Year - II Semester	Code: 23CS4T04	L	T	P	C
		3	0	0	3

OPERATING SYSTEMS
(Common to CSE/IT/CSE(AI&DS))

Course Objectives:

The main objectives of the course is to make student

- Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection
- Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
- Illustrate different conditions for deadlock and their possible solutions.

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Describe the fundamental concepts of operating systems	BL2
CO2	Apply the concept of a process, including creation, termination and scheduling	BL3
CO3	Analyse the Mutual exclusion, Deadlock detection	BL4
CO4	Apply the various memory management techniques.	BL3
CO5	Illustrate the File system	BL2

UNIT I **12Hrs**

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems System Structures: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging

UNIT II **12Hrs**

Processes: Process Concept, Process scheduling, Operations on processes, Inter-process communication. Threads and Concurrency: Multithreading models, Thread libraries, Threading issues. CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

UNIT III **12Hrs**

Synchronization Tools: The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization. Deadlocks: system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

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UNIT IV	**12Hrs**
Memory-Management Strategies: Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping. Virtual Memory Management: Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing Storage Management: Overview of Mass Storage Structure, HDD Scheduling.	
UNIT V	**13Hrs**
File System: File System Interface: File concept, Access methods, Directory Structure; File system Implementation: File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing. Protection: Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.	
Text Books: 1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018. 2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson , 2016	
Reference Books: 1. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018 2. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013 3. Schaum's Outline of Operating Systems, J Archer Harris, 2001.	
Online Learning Resources: 1. https://nptel.ac.in/courses/106/106/106106144/ 2. http://peterindia.net/OperatingSystems.html	

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II Year - II Semester	Code: 23AD4T01	L	T	P	C
		3	0	0	3

INTRODUCTION TO DATA SCIENCE

COURSE OBJECTIVES:

From the course the student will learn

1. Knowledge and expertise to become a data scientist.
2. Essential concepts of statistics and machine learning that are vital for data science;
3. Significance of exploratory data analysis (EDA) in data science.
4. Critically evaluate data visualizations presented on the dashboards
5. Suitability and limitations of tools and techniques related to data science process

Course Outcomes:

CO Number	Course Outcome	Blooms Level
CO1	Basic logic functions and logic gates creating project charter, retrieving data, cleansing, integrating and transforming data	BL1
CO2	Apply knowledge of functional units to design simple case studies on DS projects for predicting malicious URLs	BL3
CO3	Apply the Distributing data storage and processing with Hadoop framework	BL3
CO4	Understand the concepts of Neo4jfor dealing with graph databases and memory graph query language Cypher	BL3
CO5	Understand the concepts of Neo4jfor dealing with graph databases.	BL4

UNIT I:

Introduction to Data science, benefits and uses, facets of data, data science process in brief, big data ecosystem and data science

Data Science process: Overview, defining goals and creating project charter, retrieving data, cleansing, integrating and transforming data, exploratory analysis, model building, presenting findings and building applications on top of them

Unit II:

Applications of machine learning in Data science, role of ML in DS, Python tools like sklearn, modelling process for feature engineering, model selection, validation and prediction, types of ML, semi-supervised learning

Handling large data: problems and general techniques for handling large data, programming tips for dealing large data, case studies on DS projects for predicting malicious URLs, for building recommender systems

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UNIT III:

NoSQL movement for handling Bigdata: Distributing data storage and processing with Hadoop framework, case study on risk assessment for loan sanctioning, ACID principle of relational databases, CAP theorem, base principle of NoSQL databases, types of NoSQL databases, case study on disease diagnosis and profiling

UNIT IV:

Tools and Applications of Data Science: Introducing **Neo4j**for dealing with graph databases, graph query language **Cypher**, Applications graph databases, Python libraries like nltk and SQLite for handling Text mining and analytics, case study on classifying Reddit posts

UNIT V:

Data Visualization and Prototype Application Development: Data Visualization options, Crossfilter, the JavaScript MapReduce library, Creating an interactive dashboard with dc.js, Dashboard development tools. Applying the Data Science process for real-world problem-solving scenarios as a detailed case study.

Textbook:

1.Davy Cielen, Arno D.B.Meysman, and Mohamed Ali, "Introducing to Data Scienceusing Python tools", Manning Publications Co, Dreamtech press, 2016

2.Prateek Gupta, "Data Science with Jupyter" BPB publishers, 2019 for basics

Reference Books:

1.Joel Grus, "Data Science From Scratch", OReilly, 2019

2.Doing Data Science: Straight Talk From The Frontline, 1 st Edition, Cathy O'Neiland Rachel Schutt, O'Reilly, 2013

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II Year - II Semester	Code: 23CS4T06	L	T	P	C
		3	0	0	3

SOFTWARE ENGINEERING
(Common to CSE/IT/CSE(AI&DS))

Course Objectives:

The objectives of this course are to introduce

- Software life cycle models, Software requirements and SRS document.
- Project Planning, quality control and ensuring good quality software.
- Software Testing strategies, use of CASE tools, Implementation issues, validation & verification procedures.

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Describe impact on modern software development practices and apply various software development methodologies effectively.	BL2
CO2	Identify and explain the various complexities and challenges involved in managing software projects. and also gather, analyze, and specify software requirements.	BL4
CO3	Apply the skills and knowledge to design high-quality software, implement agile methodologies, and create effective user interfaces.	BL3
CO4	Apply the skills to write high-quality code, conduct thorough testing, and implement effective quality management practices to ensure reliable and high-quality software products.	BL3
CO5	Apply skills to effectively use CASE tools, manage software maintenance activities, and implement reuse strategies to enhance software development efficiency and quality.	BL3

UNIT I **13Hrs**

Introduction: Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering. Software Life Cycle Models: Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.

UNIT II **11Hrs**

Software Project Management: Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management. Requirements Analysis And Specification: Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

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UNIT III **12Hrs**
Software Design: Overview of the design process, How to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling. approaches to software design. Agility: Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Text Book 2) Function-Oriented Software Design: Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review. User Interface Design: Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interfacedesign methodology.
UNIT IV **10Hrs**
Coding And Testing: Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing, Testing object-oriented programs, Smoke testing, and Some general issues associated with testing. Software Reliability And Quality Management: Software reliability. Statistical testing, Software quality, Software quality management system, ISO 9000.SEI Capability maturity model. Few other important quality standards, and Six Sigma.

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	12Hrs
UNIT V Computer-Aided Software Engineering (Case): CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment. Software Maintenance: Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost. Software Reuse: reuse- definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.	
Text Books: 1. Fundamentals of Software Engineering, Rajib Mall, 5th Edition,PHI. 2. Software Engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, Mc-Graw Hill International Edition. 3. Software Engineering,Ugrasen Suman 4. Software Engineering ,k.k.Agrarwal &Yogesh Singh, NEW AGE INTERNATIONAL PUBLISHERS	
Reference Books: 1. Software Engineering, Ian Sommerville,10th Edition, Pearson. 2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.	
Online Learning Resources: 1) https://nptel.ac.in/courses/106/105/106105182/ 2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012605895063871 48827_shared/overview 3) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003 904735_shared/overview	

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II Year - II Semester	Code: 23CS4L04	L	T	P	C
		0	0	3	1.5

OPERATING SYSTEMS LAB
(Common to CSE/CSE(AI&DS))

Course Objectives:

The main objectives of the course are to

- Provide insights into system calls, file systems, semaphores,
- Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation
- Implement Bankers Algorithms to Avoid the Dead Lock

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Apply UNIX file system commands &system calls.	BL3
CO2	Apply process scheduling algorithms like FCFS, SJF, Priority, and Round Robin.	BL3
CO3	Apply IPC mechanisms such as semaphores, monitors and deadlocks.	BL3
CO4	Apply page replacement algorithms like FIFO, LRU, and LFU.	BL3
CO5	Apply memory allocation strategies.	BL3

Experiments covering the Topics:

- UNIX fundamentals, commands & system calls and shell programming
- CPU Scheduling algorithms, thread processing
- IPC, semaphores, monitors, deadlocks
- Page replacement algorithms, file allocation strategies
- Memory allocation strategies

Sample Experiments:

1. Practicing of Basic UNIX Commands and Shell programs.
2. Write programs using the following UNIX operating system calls fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms

a) FCFS b) SJF c) Priority d) Round Robin

5. Control the number of ports opened by the operating system with

a) Semaphore b) Monitors.

6. Write a program to illustrate concurrent execution of threads using pthreads library.
7. Write a program to solve producer-consumer problem using Semaphores.

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8. Implement the following memory allocation methods for fixed partition a) First fit b) Worst fit c) Best fit 9. Simulate the following page replacement algorithms a) FIFO b) LRU c) LFU 10. Simulate Paging Technique of memory management. 11. Implement Bankers Algorithm for Dead Lock avoidance and prevention 12. Simulate the following file allocation strategies a) Sequential b) Indexed c) Linked 13. Download and install nachos operating system and experiment with it
Reference Books: 1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018. 2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson, 2016 3. Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
Online Learning Resources: 1. https://www.cse.iitb.ac.in/~mythili/os/ 2. http://peterindia.net/OperatingSystems.html 3. www.cs.washington.edu/~tom/nachos 4. https://gradwise.in/

Note: At the end of Lab course students have to complete a Mini Project/Case Study for evaluation on Internal Marks.

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II Year - II Semester	Code: 23AD4L01	L	T	P	C
		0	0	3	1.5

DATA SCIENCE USING PYTHON LAB

Course Objectives:

The main objective of the course is to inculcate the basic understanding of DataScience and its practical implementation using Python.

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Implement basic he Shape and Reshaping of NumPy Array and Squeezing a NumPy Array	BL4
CO2	Implement and Perform following operations using pandas	BL3
CO3	Can Read file formats using pandas and apply the Distributing data to Stacking and Concatenating Numpy Arrays	BL3
CO4	Preprocessing techniques on loan prediction dataset -Feature Scaling	BL3
CO5	Applying the Data Science process for real world problem solving	BL4

List of Experiments

1. Creating a NumPy Array
   a. Basic ndarray
   b. Array of zeros
   c. Array of ones
   d. Random numbers in ndarray
   e. An array of your choice
   f. Imatrix in NumPy
   g. Evenly spaced ndarray
2. The Shape and Reshaping of NumPy Array
   a. Dimensions of NumPy array
   b. Shape of NumPy array
   c. Size of NumPy array
   d. Reshaping a NumPy array
   e. Flattening a NumPy array
   f. Transpose of a NumPy array

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3.Expanding and Squeezing a NumPy Array
  a. Expanding a NumPy array
  b. Squeezing a NumPy array
  c. Sorting in NumPy Arrays
4. Indexing and Slicing of NumPy Array
  a. Slicing 1-D NumPy arrays
  b. Slicing 2-D NumPy arrays
  c. Slicing 3-D NumPy arrays
  d. Negative slicing of NumPy arrays
5. Stacking and Concatenating Numpy Arrays
  a. Stacking ndarrays
  b. Concatenating ndarrays
  c. Broadcasting in Numpy Arrays
6. Perform following operations using pandas
  a. Creating dataframe
  b. concat()
  c. Setting conditions
  d. Adding a new column
7. Perform following operations using pandas
  a. Filling NaN with string
  b. Sorting based on column values
  c. groupby()
8. Read the following file formats using pandas
  a. Text files
  b. CSV files
  c. Excel files
  d. JSON files
9. Read the following file formats
  a. Pickle files
  b. Image files using PIL
  c. Multiple files using Glob
  d. Importing data from database

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10. Demonstrate web scraping using python
11. Perform following preprocessing techniques on loan prediction dataset
    a. Feature Scaling
    b. Feature Standardization
    c. Label Encoding
    d. One Hot Encoding
12. Perform following visualizations using matplotlib
    a. Bar Graph
    b. Pie Chart
    c. Box Plot
    d. Histogram
    e. Line Chart and Subplots
    f. Scatter Plot
13. Getting started with NLTK, install NLTK using PIP
14. Python program to implement with Python Sci Kit-Learn & NLTK
15. Python program to implement with Python NLTK/Spicy/Py NLPI.

Note: At the end of Lab course students have to complete a Mini Project/Case Study for evaluation on Internal Marks.

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II Year - II Semester	Code: 23CS4S05	L	T	P	C
		0	1	2	2

FULL STACK DEVELOPMENT – I
(Common to CSE/CSE(AI&DS)/CSE(AI&ML)/AIML)

Course Objectives:
The main objectives of the course are to
- Make use of HTML elements and their attributes for designing static web pages
- Build a web page by applying appropriate CSS styles to HTML elements
- Experiment with JavaScript to develop dynamic web pages and validate forms

Course Outcomes: Students are able to

CO Number	Course Outcome	Blooms Level
CO1	Apply HTML5 and CSS, differentiate types of CSS, with a focus on modern web design principles.	BL3
CO2	Apply understanding of HTML for developing basic web pages incorporating lists, links, images, tables, forms and frames	BL3
CO3	Creating and manipulating HTML tables, forms and frames	BL3
CO4	Effectively applying JavaScript with a focus on I/O, type conversion, and handling of both internal and external scripts	BL3
CO5	Developing proficiency in the use of JavaScript Functions, Events, and application of Node.js	BL3

Experiments covering the Topics:
- Lists, Links and Images
- HTML Tables, Forms and Frames
- HTML 5 and Cascading Style Sheets, Types of CSS
- Selector forms
- CSS with Color, Background, Font, Text and CSS Box Model
- Applying JavaScript - internal and external, I/O, Type Conversion
- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects
- JavaScript Functions and Events
- Node.js

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Sample Experiments:

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

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).

d. 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).

3. HTML 5 and Cascading Style Sheets, Types of CSS

a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, , tags.

b. Write a HTML program, to embed audio and video into HTML web page.

c. 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).

4. Selector forms

a. 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

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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
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. c. Write a program to explain the different ways for taking input. d. 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

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7. Java Script 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. 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.
8. Java Script 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. d. Write aprogram 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.,13 + 53+ 33 = 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)

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9. Java Script Functions and Events a. Design a appropriate function should be called to display i. Factorial of that number ii. Fibonacci series up to that number iii. Prime numbers up to that number iv. Is it palindrome or not b. 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 i. Factorial of that number ii. Fibonacci series up to that number iii. Prime numbers up to that number iv. Is it palindrome or not c. 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 xxxxxxx@xxxxxx.xxx)
Text Books: 1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013. 2. Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, 2019 (Chapters 1-11). 3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.
Online Learning Resources: 1. https://www.w3schools.com/html 2. https://www.w3schools.com/css 3. https://www.w3schools.com/js/ 4. https://www.w3schools.com/nodejs 5. https://gradwise.in/

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DESIGN THINKING & INNOVATION

Course Objectives:

This Course will enable students to

- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

Course Outcomes: Students are able to

COs	Statement	Blooms Level
CO1	Define the concepts related to design thinking.	L1
CO2	Explain the fundamentals of Design Thinking and innovation.	L2
CO3	Apply the design thinking techniques for solving problems in various sectors.	L3
CO4	Analyse to work in a multidisciplinary environment.	L4
CO5	Evaluate the value of creativity.	L5

UNIT – I **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, costumer, 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.

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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 modeling, 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.
Textbooks: 1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009. 2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.
Reference Books: 1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018. 2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018. 3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010. 4. Chesbrough.H, The era of open innovation, 2003.
Online Learning Resources: 1. https://nptel.ac.in/courses/110/106/110106124/ 2. https://nptel.ac.in/courses/109/104/109104109/ 3. https://swayam.gov.in/nd1_noc19_mg60/preview 4. https://onlinecourses.nptel.ac.in/noc22_de16/preview

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