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Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in the Light of NEP-2020
B.Tech. EEE All Branches w.e.f. 2023

COURSE CODE	CATE GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEE503		Control System Engineering	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** – Credit.
***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The course will provide understanding of control system and mathematical modeling of the system.

Course Outcomes (COs):
After the successful completion of this course students will be able to
1. Demonstrate the understanding of basic elements and modeling of the control system.
2. Analyze the stability in time domain and frequency domain
3. Design the controller and compensators for the system

Syllabus

UNIT I **8 Hrs.**
Introduction: Basic Elements of Control System, Open loop and Closed loop systems, Differential equation, Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems, Block diagram reduction Techniques, Signal flow graph, Constructional and working concept of AC servomotor.

UNIT II **8 Hrs.**
Time Domain Analysis: Time domain analysis of closed loop systems: Test signals, time response of first and second order systems, Time domain performance specifications, Steady state error & error constants Feedback control actions: Proportional, derivative and integral control.

UNIT III **8 Hrs.**
Stability Analysis and Root locus: The concept of stability, Routh's stability criterion, qualitative stability and conditional stability, limitations of Routh's stability. Characteristics equation of closed loop system root loci, construction of loci, Effect of adding, poles and Zeros on the loci, Stability by root loci.

UNIT IV **8 Hrs.**
Frequency domain Analysis: Frequency, Domain analysis, Bode plots, Determination of frequency domain specifications, Phase margin and Gain margin, Stability analysis from Bode plots, Polar plots, Nyquist plots, Stability analysis, Compensation techniques: Lag, Lead, Lead-Lag Controllers design in frequency Domain.

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Choice Based Credit System (CBCS) in the Light of NEP-2020
B.Tech. EEE All Branches w.e.f. 2023

COURSE CODE	CATE GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEE503		Control System Engineering	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** – Credit.
***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT V **8 Hrs.**

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Solution of state equation: Eigen values & eigenvectors digitalization state transitive matrix, Concepts of Controllability and Observability.

Text Books:

1. Richard C Dorf; Robert H Bishop, "Modern control system", Pearson Education, 14th Edition, 2022
2. I. J. Nagrath and M. Gopal, "Control System Engineering", New Age International Publishers, 7th Edition, 2021.

References:

1. M. F. Golnaraghi and Benjamin C Kuo, "Automatic control systems", New York McGraw-Hill Education, 9th Edition, 2017.
2. M. Gopal, "Digital Control and State Variable Methods", Tata McGraw- Hill 4th Edition, 2014.
3. Joseph J. DiStefano, Allen R Stubberud and Ivan J Williams, Schaum's Outline Series, "Feedback and Control Systems", Tata McGraw- Hill, 2nd Edition 2014.
4. John J. D'azzo & Constantine H. Houpis, "Linear control system analysis and design", Tata McGraw-Hill., 5th Edition 2003.

List of Experiments:

1. To study the torque speed characteristics and determine the transfer function of a DC motor.
2. To study the characteristics of a small AC servomotor and determine its transfer function.
3. To study the performance of various types of controllers used to control the temperature of an oven.
4. To study the performance characteristics of an analogues PID controller using simulated systems.
5. Perform impulse response of a transfer function.
6. Perform ramp response of a transfer function.
7. Perform the transient and frequency response of a second order network.
8. Draw Nyquist plot from a transfer function.
9. Draw root locus from a transfer function.
10. Draw a bode plot from a transfer function.

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Name of Program: Bachelor of Technology in Electronics & Communication

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC504	EC	CMOS VLSI Design	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

To inculcate the concepts of CMOS VLSI Design and relate its importance in today's scenario.
To impart knowledge based on design of analog as well as digital VLSI circuits.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes
The students will be able to:

1. Demonstrate the working and device physics related to CMOS.
2. Design circuits based on combinational logic.
3. Design analog circuits related to CMOS.
4. Draw stick diagrams and design layouts for different devices and circuits.

Syllabus

UNIT I **9 Hrs.**

Introduction / Orientation: VLSI Design flow, Y- Chart, Structured design strategies: Hierarchy, Regularity, Modularity and Locality. Design Methods: Microprocessor/DSP, Programmable Logic, GA and SOG, Cell based design, Full custom Design; Platform based design/SOC. Design Economics.

UNIT II **10 Hrs.**

MOS Transistor Theory: MOS device equations, Second order effects: Mobility degradation and velocity saturation, Body effect, Short channel effects, Narrow width effects. CMOS Inverter DC Characteristics-VI Characteristics, Beta Ratio effects, Noise Margin. Scaling - Transistor Scaling, Supply Voltage Scaling, Interconnect Scaling.

UNIT III **9 Hrs.**

Delay and Power Considerations: Delay Definitions, Transient response, RC Delay model, Linear Delay Model. CMOS Logic implementations and Logical Effort. Power Definitions, Dynamic Power, Static Power, Latch up triggering and prevention.

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UNIT IV **8 Hrs.**

CMOS Processing Technology: Wafer Formation, Photolithography, N-well process, Twin tub process, Stick Diagrams, layout design rules, CMOS process enhancements.

UNIT IV **9 Hrs.**

Analog CMOS design: Introduction to analog design, Current Mirror, Single stage amplifier: Common source with diode, resistive and current source connected load, Source follower, Differential amplifiers. Frequency response: Miller effect, Association of Poles with nodes, common source stage and source followers.

Text Books:

1. Neil H.E. Weste, David Money Harris, "CMOS VLSI Design, A circuits and systems perspective", 4th Edition, Pearson, 2010.
2. Neil H.E. Weste, David Money Harris Ayan Banerjee, "CMOS VLSI Design, A circuits and systems perspective", 4th Edition, Pearson Education, 2010.
3. Behzad Razavi, "Design of Analog CMOS Integrated Circuits", Tata McGraw-Hill Education, 2016.
4. Peter Van Zant, "Microchip Fabrication, A Practical Guide to Semiconductor Processing", 6th Edition, McGraw Hill Professional, 2013.

References:

1. Sung Mo Kang, Yusuf Lebliabici, "CMOS Digital Integrated Circuits: Analysis and Design", 4th Edition, Tata McGraw Hill, 2015.
2. Douglas A. Pucknell, Kamran Eshraghian, "Basic VLSI Design",3rd Edition, Prentice Hall, 1994.
3. S. M. Sze, VLSI Technology, 2nd Edition, Tata McGraw-Hill Education, 2003.

List of Experiments:

1. Introduction to layout EDA tools and Technologies.
2. Study of Stick Diagrams and Euler's Path.
3. Layout Design of Resistors, Capacitors and MOSFETS.
4. Layout Design for Logic gates.
5. Layout Design for Half adder and Full adder.
6. Layout Design for Multiplexer.
7. Layout Design for Encoders and Decoders.
8. Layout Design for SRAM.
9. Layout Design for Flip Flops.
10. Layout Design for 4-Bit Multiplier.
11. Study of different packages and Bonding pads.

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Choice Based Credit System (CBCS) in the Light of NEP-2020
B.Tech. EC/ECIOT/EC-VLSI w.e.f. 2024

SUBJECT CODE	CATE-GORY	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assess-ment*	END SEM University Exam	Teachers Assess-ment*				
BTEC525N		FPGA Based System Design	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** – Credit.
***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives

The objective of this course is to-

1. Introduce basic concepts of Verilog Hardware Description Language.
2. Describe FPGA implementation of digital systems.

Course Outcomes

After completion of this course the students will be able to-

1. Describe digital hardware in terms of its structure or behavior using Verilog HDL.
2. Configure FPGA boards for specific design need.

Syllabus

UNIT I

Programmable Logic Devices and Computer Aided Design Tools:

Introduction to design of digital hardware, Programmable Logic Devices- PAL, PLA, CPLD and FPGA.

CAD Tools: Introduction, Design flow, Synthesis, RTL Synthesis, Overview of Synthesis Steps, Net List Generation, Gate Optimization, Technology Mapping, Simulation, Functional and Timing Simulation, Physical Design Steps: Placement, Routing and Static Timing Analysis.

UNIT II

Verilog HDL Basics

Introduction of HDL, Verilog and VHDL, Top Down and Bottom Up design, Data Flow Modeling , Structure and Behavioral Modeling, Verilog Basic Constructs, White Space, Comments, Nets and Variables, Data Types, Identifiers, Signal Values, Numbers, Parameters.

Module and Ports: Module Declaration, List of Ports, Port Types, Port Declaration, Port Connection Rules.

UNIT III

Concurrent Statements

Verilog Operators: Arithmetic, Bitwise, Logical, Reduction, Relational, Shift, Conditional, Concatenation, Replication. Operator Precedence, Gate Instantiation, Signal Assignments, Continuous

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Vishwavidyalaya, Indore	Vishwavidyalaya, Indore		

Assignment, Delays, Data Flow Modeling and Structure Modeling, Module Instantiation, Design of various Combinational Logic Circuits i.e. Adders, Multiplexers, Encoders and Decoders.

UNIT 4

Procedural Statements

Always and Initial Block, Sensitivity List, Blocking and Non Blocking Assignments, If-else Statements, For Loop, While Loop, Generate statement, Verilog Function and Task, Finite State Machines- Melay and Moore Models, Behavioral Modeling of Various Combinational Circuits. Behavioral Modeling of Various Sequential Circuits- Latches and Flip Flops, Shift Registers and Counters.

UNIT 5

Test Bench

Verification Concepts, Test Bench Overview, Linear Test bench, File I/O Based Test bench, State Machine based Test bench, Task based Test bench, Self Checking Test bench, Stimulus Generator, Bus Functional Models, Driver, Receiver, Protocol Monitor, Scoreboard, Checker, Coverage.

Text Books

1. Stephen Brown I Zvanko Vranesic, "Fundamentals of Digital Logic with Verilog Design", The Mc Graw Hill, Third Edition 2014.
2. Samir Palnitkar, "Verilog HDL – A Guide to Digital Design and Synthesis", Pearson, Second Edition, 2003.

Reference Books

1. Peter Wilson, "Design Recipes for FPGA using Verilog and VHDL", Newnes Publication, Second Edition 2016.
2. M. Morris Mano, Michael D. Cilletti, "Digital Design With An Introduction to The Verilog HDL", Pearson, Fifth Edition 2012.

List of experiments

Students should implement and verify digital logic design using Verilog HDL. After synthesis and simulation the design should be implemented on FPGA board.

1. Design of Boolean Functions using Gate Instantiation.
2. Design of various Adders Circuits.
3. Design of various Multiplexers.
4. Design and analysis of Encoder and Decoders.
5. Design of various Latches and Flip Flops with Preset and Clear capability.
6. Design of various Shift registers.
7. Design Johnson and Ring counters.
8. Design Synchronous and Asynchronous Up/Down Counters.
9. Design of Frequency Divider Circuit.
10. Design of Mealy and Moore Finite State Machines.

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Choice Based Credit System (CBCS) in the Light of NEP-2020
B.Tech. in All Branches w.e.f. 2023

COURSE CODE	CATE GORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTECIOT508		Introduction to AI and ML	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit.
***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
The course is designed to aid students understand the fundamentals of Artificial Intelligence and Machine Learning and apply the principles of AIML to develop intelligent systems and solve real-world problems using various algorithms and techniques.

Course Outcomes (COs):
After completing the course, students should be able to:
1. Understand the basic concepts, mathematical foundations, and applications of Artificial Intelligence and Machine Learning.
2. Apply supervised learning algorithms for classification and regression tasks and evaluate model performance using appropriate metrics.
3. Implement unsupervised learning techniques for clustering and dimensionality reduction problems.
4. Design and develop neural networks and deep learning models for image and text processing applications.

Syllabus

UNIT I **7 Hrs.**

Introduction to Artificial Intelligence: Definition, History, Applications, Intelligent Agents, Types of agents, Problem Solving Agents.
Mathematical Foundations: Linear Algebra, Vectors, Matrices, Eigenvalues. Probability Theory: Random variables, Probability distributions, Bayes theorem. Statistics: Mean, Variance, Correlation.

UNIT II **6 Hrs.**

Introduction to Machine Learning: Types of Learning, Machine Learning pipeline. Supervised Learning: Linear Regression, Logistic Regression, Decision Trees, Random Forest, Support Vector Machines (SVM), Naive Bayes Classifier.

UNIT III **6 Hrs.**

Model Evaluation: Cross-validation, Confusion Matrix, Accuracy, Precision, Recall, F1-Score, ROC-AUC curve. Unsupervised Learning: K-Means Clustering, Hierarchical Clustering, DBSCAN, Principal Component Analysis (PCA), Dimensionality Reduction techniques.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTECIOT508		Introduction to AI and ML	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit.
***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

UNIT IV **7 Hrs.**

Artificial Neural Networks: Perceptron, Multi-layer Perceptron, Activation functions, Backpropagation algorithm, Gradient Descent variants.
Deep Learning: Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN), LSTM, Applications in image recognition and sequence modeling.

UNIT V **6 Hrs.**

Ensemble Learning: Bagging, Boosting, AdaBoost, XGBoost. Natural Language Processing: Text preprocessing, Bag of Words, TF-IDF, Word embeddings. Introduction to Reinforcement Learning: Agent, Environment, Reward, Q-Learning. Ethics in AI: Bias, Fairness, Privacy, Responsible AI.

Text Books:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 4th Edition, Pearson, 2020.
2. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow", 3rd Edition, O'Reilly Media, 2022.
3. Christopher M. Bishop, "Pattern Recognition and Machine Learning", 1st Edition, Springer, 2006.

Reference Books:

1. Tom M. Mitchell, "Machine Learning", 1st Edition, McGraw-Hill Education, 1997.
2. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, "Deep Learning", MIT Press, 2016.
3. Sebastian Raschka and Vahid Mirjalili, "Python Machine Learning", 3rd Edition, Packt Publishing, 2019.

List of Experiments:

1. To implement Linear Regression algorithm in Python for prediction tasks.
   a. Using Scikit-learning library.
   b. From scratch using gradient descent.
2. To implement Logistic Regression in Python for binary classification problems.
3. To build a Decision Tree classifier in Python and visualize the decision boundaries and tree structure.

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B.Tech. in All Branches w.e.f. 2023

COURSE CODE	CATE GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
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BTECIOT508		Introduction to AI and ML	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit.
***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

4. To implement K-Means clustering algorithm in Python and determine optimal number of clusters using Elbow method.
5. To develop a Support Vector Machine (SVM) classifier in Python for multi-class classification with different kernels.
6. To implement Principal Component Analysis (PCA) in Python for dimensionality reduction and data visualization.
7. To build and train a Multi-layer Perceptron (Neural Network) in Python using backpropagation algorithm on MNIST dataset.
8. To develop a Convolutional Neural Network (CNN) in Python for image classification using CIFAR-10 or custom image dataset.
9. To implement Natural Language Processing tasks in Python using text preprocessing, TF-IDF, and sentiment analysis.
10. To compare different ensemble learning methods (Bagging, Boosting, Random Forest) in Python and evaluate model performance using cross-validation.

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Choice Based Credit System (CBCS)-2023-27
SEMESTER-III

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment *	END SEM University Exam	Teachers Assessment *				
BTCS306M	DCC	Fundamentals of Data Structures	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. To understand efficient storage mechanisms of data for an easy access.
2. To design and implementation of various basic and advanced data structures.
3. To introduce various techniques for representation of the data in the real world.
4. To develop application using data structures.
5. To understand the concept of protection and management of data.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.
The students will be able to

1. Get a good understanding of applications of Data Structures.
2. Develop application using data structures.
3. Handle operations like searching, insertion, deletion, traversing mechanism etc.on various data structures.
4. Decide the appropriate data type and data structure for a given problem.
5. Select the best algorithm to solve a problem by considering various problem characteristics, such as the data size, the type of operations, etc.

Syllabus:

UNIT I **10HRS**

Introduction: Overview of Data structures, Types of data structures, Primitive and Non Primitive data structures and Operations, Introduction to Algorithms & complexity notations. Characteristic of Array, One Dimensional Array, Operation with Array, Two Dimensional Arrays, Three or Multi-Dimensional Arrays, Sparse matrix, Drawbacks of linear arrays.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment *	END SEM University Exam	Teachers Assessment *				
BTCS306M	DCC	Fundamentals of Data Structures	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Strings, Array of Structures, Pointer and one dimensional Arrays, Pointers and Two Dimensional Arrays, Pointers and Strings, Pointer and Structure.

UNIT II **9HRS**

Linked List: Linked List as an ADT, Linked List Vs. Arrays, Dynamic Memory Allocation & De-allocation for a Linked List, Types of Linked List: Circular & Doubly Linked List. Linked

List operations: All possible insertions and deletion operations on all types of Linked list Reverse a Single Linked List; Divide a singly linked list into two equal halves, Application of Linked List.

UNIT III 8**HRS**

Stack: The Stack as an ADT, Stack operation, Array Representation of Stack, Link Representation of Stack, Application of stack – Recursion, Polish Notation . Types of Recursion, problem based on Recursion: Tower of Hanoi

The Queue :The Queue as an ADT, Queue operation, Array Representation of Queue, Linked Representation of Queue, Types of Queue :Circular Queue & Dequeue, Introduction of Priority Queue, Application of Queues.

UNIT IV **7HRS**

Tree: Definitions and Concepts of Binary trees, Types of Binary Tree, Representation of Binary tree: Array & Linked List. General tree, forest, Expression Tree. Forest and general tree to binary tree conversion. Binary Search Tree Creation, Operations on Binary Search Trees: insertion, deletion & Search an element, Traversals on Binary SEARCH TREE and algorithms. Height balanced Tree: AVL, B-Tree, 2-3 Tree, B+Tree: Creation, Insertion & Deletion.

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SEMESTER-III

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
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BTCS306M	DCC	Fundamentals of Data Structures	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; *__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Graph: Definitions and Concepts Graph Representations: Adjacency MATRIX, Incidence matrix, Graph TRAVERSAL (DFS & BFS), Spanning Tree and Minimum Cost Spanning Tree: Prim's & Kruskal's Algorithm.

UNIT V 8**HRS**

Sortings: Sorting Concept and types of Sorting, Stable & Unstable sorting. Concept of Insertion Sort, Selection sort, Bubble sort, Quick Sort, Merge Sort, Heap & Heap Sort, Shell Sort & Radix sort. Algorithms and performance of Insertion, selection, bubble, Quick sort & Merge sort.

Text Books:

1. Ashok N. Kamthane, "Introduction to Data structures", 2nd Edition, Pearson Education India,2011.
2. Tremblay & Sorenson, "Introduction to Data- Structure with applications", 8th Edition, Tata McGrawHill,2011.

References:

1. Rajesh K. Shukla ,Data Structures Using C & C++, Wiley-India 2016.
2. ISRD Group ,Data Structures Using C, TataMcGraw-Hill 2015.
3. E. Balagurusamy ,"Data Structure Using C" ,Tata McGraw-Hill 2017.
4. Prof. P.S. Deshpande, Prof. O.G. Kakde, C & Data Structures, Charles River Media 2015 .
5. Gav Pai, Data Structures, Tata McGraw-Hill, 2015.

Suggested list of Practicals:-

1. To develop a program to find an average of an array using AVG function.
2. To implement a program that can insert, delete and edit an element in array.

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B.Tech(CSE), B.Tech+MBA(CSE) and B.Tech+M.Tech(CSE)
Choice Based Credit System (CBCS)-2023-27
SEMESTER-III

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment *	END SEM University Exam	Teachers Assessment *				
BTCS306M	DCC	Fundamentals of Data Structures	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

3. To implement an algorithm for insert and delete operations of circular queue and implement the same using array.
4. Write a menu driven program to implement the push, pop and display option of the stack with the help of static memory allocation.
5. Write a menu driven program to implement the push, pop and display option of the stack with the help of dynamic memory allocation.
6. Write a menu driven program to implementing the various operations on a linear queue with the help of static memory allocation.
7. Write a menu driven program to implementing the various operations on a linear queue with the help of dynamic memory allocation.
8. Write a menu driven program to implement various operations on a linear linked list.
9. Write a menu driven program to implement various operations on a circular linked list
10. Write a program for implementation of Bubble sort
11. Write a program for Insertion sort
12. Write a program for Merge Sort
13. Write a program to implement Heap sort
14. Write a program to implement Quick sort
15. Write a program to Construct a Binary Search Tree and perform deletion, in order traversal on it
16. Write a program to develop an algorithm for binary tree operations and implement the same.
17. Write a program to design an algorithm for sequential search, implement and test it.
18. Write a program to develop an algorithm for binary search and perform the same.

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Technology and Science

Choice Based Credit System (CBCS) Scheme in light of NEP-2020

B. Tech in AU/ME/CE/EE/EEE/EC/EC-IOT/EI/R&A/MT

(2021-2025)

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BTME510	AESE	DESIGN THINKING AND INNOVATION	60	20	20	0	0	2	0	0	2

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Course Educational Objectives (CEOs):

The objective of this course is to provide (A) the new ways of creative thinking and learn the innovation cycle of design thinking process, (B) understand product design and prototyping and (C) develop innovative product.

Course Outcomes (COs):

After completion of this course student will able to

1. Compare and classify the various learning styles and memory techniques and apply them in their engineering education
2. Analyze emotional experience and inspect emotional expressions to better understand users while designing innovative products
3. Develop new ways of creative thinking and learn the innovation cycle of design thinking process for developing innovative products
4. Propose real-time innovative engineering product designs and choose appropriate frameworks, strategies, techniques during prototype development
5. Perceive individual differences and its impact on everyday decisions and further Create a better customer experience

Syllabus

Unit I **(6 Hrs)**

Learning: understanding the learning process, Kolb's learning styles, assessing and interpreting.

Memory: understanding the memory process, problems in retention, memory enhancement techniques.

Emotions: understanding emotions, experience & expression, assessing empathy, application with peers.

Unit II **(6 Hrs)**

Design Thinking: definition, need, objective, concepts & brainstorming, stages of design thinking process (explain with examples) – **empathize, define, ideate, prototype, test**.

Creative Thinking: understanding creative thinking process, understanding problem solving, creative problem solving test.

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Unit III **(6 Hrs)**

Product Design: process of engineering product design, design thinking approach, stages of product design, examples of best product designs and functions, assignment – engineering product design. Prototyping: What is prototype? Why prototype? Rapid prototype development process, testing, sample example, test group marketing

Unit IV **(6 Hrs)**

Celebrating the Difference: understanding individual differences & uniqueness, group discussion and activities to encourage the understanding, acceptance and appreciation of individual differences Customer Centricity: practical examples of customer challenges, use of design thinking to enhance customer experience, parameters of product experience, alignment of customer expectations with product design.

Unit V **(6 Hrs)**

Feedback, Re-design & Re-create: feedback loop, focus on user experience, address "ergonomic challenges, user focused design, rapid prototyping & testing, final product, final presentation – **"solving practical engineering problem through innovative product design & creative solution".**

Text and Reference Books:

1. E. Balaguruswamy "Developing Thinking Skills (The way to Success)" Khanna Book Publishing Company, 2022.
2. Gavin Ambrose and Paul Harris "Basics Design 08: Design Thinking" Bloomsbury Publishing India Pvt. Ltd. 2009.
3. Vijay Kumar "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization" Wiley Pub. 2012.
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.
5. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
6. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.

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BTEC 507	DCC	Programming in Python	0	0	0	30	20	0	0	2	1

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Course Objective:

1. Learn Syntax and Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Implement Object Oriented Programming concepts in Python.

Course Outcome:

After learning the course, the student will be able:

1. To develop proficiency in creating applications using the Python Programming Language.
2. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
3. To be able to do testing and debugging of code written in Python.
4. To be able to draw various kinds of plots using PyLab.
5. To be able to do text filtering in Python.

Syllabus

UNIT I

Introduction: History of Python, Need of Python Programming, Running Python Scripts, Variables, Assignment, Operators and Expressions: Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations.

UNIT II

Data Structures: Lists, Tuples, Sets, Dictionaries, Sequences.
Control Flow - if, if-elif-else, for, while, break, continue. Functions - Defining Functions, Calling Functions, Passing Arguments. Modules: Creating modules, import statement, from, import statement, name spacing.

UNIT III

Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

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UNIT IV

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data Hiding.

UNIT V

File Handling: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data.

List of Experiments:

1. Develop programs to understand the control structures of python.
2. Develop programs to learn different types of structures (list, dictionary, tuples) in python.
3. Write a Python program to sum all the items in a list.
4. Write a Python program to get the largest and smallest number from a list.
5. Develop programs for data structure algorithms using python – searching and sorting.
6. Write a Python Program to perform Linear Search.
7. Write a Python Program to perform Binary Search.
8. Write a Python Program to perform Selection sort.
9. Write a Python Program to perform Insertion sort.
10. Write a Python Program to perform Merge sort.
11. Write a Python program to get a list, sorted in increasing order by the last element in each tuple from a given list of non-empty tuples: Sample List: [(2, 5), (1, 2), (4, 4), (2, 3), (2, 1)] Expected Result: [(2, 1), (1, 2), (2, 3), (4, 4), (2, 5)]
12. Write a Python program to check a list is empty or not.
13. Write a Python program to remove duplicates from a list.
14. Programs that take command line arguments (word count).
15. Write a Program that Reads a Text File and Counts the Number of Times a Certain Letter Appears in the Text File.
16. Write a Program to Read a Text File and Print all the Numbers Present in the Text File.

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17. Write a Program to find the most frequent words in a text read from a file.
18. Implement Object Oriented Programming concepts in Python.
19. Write A Program to Append, Delete and Display Elements of a List Using Classes.
20. Write A Program to Create a Class and Compute the Area and the Perimeter of the Circle.
21. Write A Program to Create a Class which Performs Basic Calculator Operations.
22. Write A Program to Create a Class in which One Method Accepts a String from the User and another prints it.
23. Learn to plot different types of graphs using PyPlot.

References:

1. John V Guttag. "Introduction to Computation and Programming Using Python", 3nd edition,Prentice Hall of India, 2021
2. Wesley J. Chun. "Core Python Programming" 3rd Edition, Prentice Hall, 2012
3. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", Wiley, 2013
4. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication, 2nd edition, 2018.

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