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 Mechanical Engineering

(2023-2027)

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*				
BTME503	DCC	DYNAMICS OF MACHINE	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):

To introduce basic principles and applications of (A) Engine Mechanisms, (B) Governor Mechanisms, (C) Balancing of Inertia Forces, Friction and Brakes

Course Outcomes (COs):

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

1. Understand the need of engine mechanisms and displacement, velocity and acceleration of piston.
2. Understand Governor Mechanisms.
3. Understand and analyse Balancing of masses.
4. Understand utility of Friction in Machine parts and lubrication concepts.
5. Students would be able to analyze Cam movement, belt drives and braking.

Syllabus

Unit – I **(8 Hrs)**

Dynamics of Engine Mechanisms: Displacement, velocity and acceleration of piston; turning moment on crankshaft; turning moment diagram; Fluctuation of crankshaft speed; Analysis of flywheel.

Unit – II **(8 Hrs)**

Governor Mechanisms: Types of governors, characteristics of centrifugal governors, gravity and spring controlled centrifugal governors; hunting of centrifugal governors; inertia governors.

Unit – III **(9 Hrs)**

Balancing of Inertia Forces: Balancing of rotating masses; Two plane balancing; Determination of balancing masses (graphical and analytical methods); Balancing of rotors; Balancing of internal combustion engines, Single cylinder engines, In-line engines, V-twin engines, Radial engines, Lanchester technique of engine balancing.

Unit – IV **(9 Hrs)**

Friction: Frictional torque in pivots and collars by uniform pressure and uniform wear rate criteria, Boundary and fluid film lubrication, friction in journal and thrust bearings, concept of friction circle and axis, rolling friction.

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Choice Based Credit System (CBCS) Scheme in light of NEP-2020
B. Tech in Mechanical Engineering
(2023-2027)

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BTME503	DCC	DYNAMICS OF MACHINE	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Unit-V **(10 Hrs)**

Belt drives: Velocity ratio, limiting ratio of tension; power transmitted; centrifugal effect on belts; maximum power transmitted by belt; initial tension; creep; chain and rope drives.
Brakes: Band brake; Band and block brakes, Internal and external shoe brakes.
Dynamometer: Different types and their applications.
Dynamic Analysis of Cams: Response of un-damped cam mechanism (analytical method), follower response analysis by phase-plane method, jump and cross-over shock.

Text and Reference Books:

1. *"Theory of machines", by Rattan; Publisher: TMH, 2009.*
2. *"Mechanism and Machine Theory", by Ambekar; Publisher: PHI, 2007.*
3. *"Theory of Machines", by Thomas Bevan; Publisher: Pearson, 2010.*
4. *"Theory of Mechanisms and Machines", by Ghosh and Malik; East-West Press, 2015.*
5. *"Kinematics and dynamics of machinery", by Norton RL; Publisher: TMH, 2009.*
6. *"Theory of Machines", by P.L. Balaney; Publisher: Khanna, 2003.*

List of Experiments

1. To perform an experiment on Watt and Porter Governors and prepare performance characteristic curves to determine stability and sensitivity.
2. To perform an experiment on Proell Governor and prepare performance characteristic curves to determine stability and sensitivity.
3. To perform an experiment on Hartnell Governor and prepare performance characteristic curves to determine stability and sensitivity.
4. To determine the gyroscopic couple using a motorized gyroscope.
5. To study gyroscopic effects through demonstration models.
6. To study the concept of a dynamically equivalent system.
7. To study different types of dynamometers.
8. To study different types of clutches.
9. To study different types of brakes.
10. To study the dynamic behavior of a cam and follower under various operating conditions using CAM analysis apparatus.

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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								
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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.
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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

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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.
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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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Shri Vaishnav Institute of Technology and Science

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

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(2021-2025)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
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BTME510	AESE	DESIGN THINKING AND INNOVATION	60	20	20	0	0	2	0	0	2

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***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):

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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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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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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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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Shri Vaishnav Institute Of Information Technology
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
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BTCS306M	DCC	Fundamentals of Data Structures	60	20	20	30	20	3	0	2	4

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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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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
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BTCS306M	DCC	Fundamentals of Data Structures	60	20	20	30	20	3	0	2	4

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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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Shri Vaishnav Institute Of Information Technology
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
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BTCS306M	DCC	Fundamentals of Data Structures	60	20	20	30	20	3	0	2	4

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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) in the Light of NEP-2020
B.Tech. in Electronics and Instrumentation w.e.f. 2023

COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
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BTEI611		Data Acquisition System	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Educational Objectives (CEOs):

1. To know about the types of transducers and display systems associated with it.
2. To understand the function of Data Acquisition system.
3. To gain information about data acquisition, data logging and application of sensors in condition-based monitoring.
4. To learn about communication devices used in Data Acquisition system.

Course Outcomes (COs):

The students will be able to

1. Summarize the working and construction of sensors measuring various physical parameters.
2. Outline operations of various data acquisition and transmission systems.
3. Distinguish smart sensors from normal sensors by their operation and construction.
4. Classify various sensing methods used in condition monitoring.

Syllabus

UNIT I **7 Hrs.**

Introduction to Display System: Seven segment, Dot matrix, Multiplexed, Code converter, LCD (construction, principle), Plasma and vapor displays, OLED , Discharge tubes, application of display systems.

UNIT II **9 Hrs.**

Recorders: Galvanometric type, Null type, Potentiometer type, Strip Chart and circular chart type, Magnetic tape recorder, principle & operation, Digital tape recorders, Optical storage disk, recorders applications in data acquisition system. Computer control introduction: Need of computer in a control system-Functional block diagram of a computer control system, Data loggers-Supervisory computer control.

UNIT III **9Hrs.**

General Telemetric Systems: land line & RF telemetry, voltage, current and Position telemetry with feedback mechanism, RF telemetry, Amplitude modulation, Frequency modulation, Pulse modulation, pulse amplitude modulation, pulse code modulation, telemetry with time and frequency division multiplexing, telemetry hardware.

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

COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
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BTEI611		**Data Acquisition System**	60	20	20	30	20	3	0	2	**4**

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT IV **9 Hrs.**

Data Acquisition System (DAS): single channel and multi-channel, Supervisory control and data acquisition system (SCADA), Introduction to PLC: Sequential and programmable controllers, Architecture, Programming of PLC, Relay logic, Ladder logic and its IEEE standard.

UNIT V **9 Hrs.**

Data transfer techniques: DMA controller and data transfer in DMA mode, Serial data transmission methods, RS-232C: specifications connection and timing, RS-422, RS-423 applications GPIB/IEEE-488 standard digital interface use, Local Area networks and its standard, Universal serial bus design with its application, Foundation–Fieldbus, ModBus, TCP/IP.

Text Books:

1. Murty D V S, "Transducers & Instrumentation", PHI, New Delhi ,2016.
2. Sawhney A K, "Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai and Sons, 2015.

References:

1. H S Kalsi "Electronic Instrumentation" TMH, New delhi,2019.
2. Patranabis-Principles of Industrial Instrumentation 3rd Ed., TMH (2009)
3. D.Roy Choudhury and Shail B.Jain, Linear Integrated circuits, New age International Pvt. Ltd, 2017.

List of Experiments:

1. To learn about basics of LabView and its HMI (Human Machine Interface).
2. To Study the Various Palettes Used in LabView to create virtual instruments.
3. To perform and Study of Creation of Virtual Instruments, (Creation of Random Wave Analyzer.)
4. Implement Virtual Instrument (Random Wave Analyzer) & Control its Wave plot Speed by adding Time Delay.
5. Develop Virtual Instrument (Random Plot Analyzer) and also add a function that will calculate the mean values of Plot.
6. Design a HMI of PLC using LabView.
7. Develop HMI using LabView for Fahrenheit (°F) to Celsius (°C).
8. Design a table to create data logging.
9. Write a program for table of 2 using loop.
10. Design a HMI to display sine wave.

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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

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

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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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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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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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