Shri Vaishnav VidyapeethVishwavidyalaya, Indore

B.Tech (Mechatronics)

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*				
BTMT 501		Applied Hydraulics and Pneumatics	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; **Q/A** – Quiz/Assignment/Attendance, **MST** Mid Sem. Test.

***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 impart knowledge of Applied Hydraulics & Pneumatics.

Course Outcomes (COs):

Upon completion of the course, students will be able:

1. To Use Fluid Power Engineering and Power Transmission System.
2. To implement automation of Machine Tools and others Equipments in Fluid Power System.

Syllabus

UNIT I **8hrs.**

Introduction to fluid power, Types, advantages & applications of fluid power, Properties of hydraulic fluids , General types of fluids ,Fluid power symbols. Basics of Hydraulics,Applications of Pascal's Law, Laminar and Turbulent flow ,Reynolds's number ,Darcy's equation ,Losses in pipe, valves and fittings.

UNIT II **12hr.**

Sources of Hydraulic Power: Pumping theory, Pump classification, construction and working of pumps ,pump performance ,Variable displacement pumps,Fluid Power Actuators: Linear hydraulic actuators,Types of hydraulic cylinders:Single acting, Double acting, special cylinders like tanden, Rodless, Telescopic, Cushioning mechanism, Construction of double acting cylinder, Rotary actuators ,Fluid motors.

UNIT III **10hr.**

Construction of Control Components : Directional control valve, 3/2 way valve ,4/2 way valve ,Shuttle valve ,check valve ,pressure control valve, pressure reducing valve, Flow control valve : Fixed and adjustable, electrical control solenoid valves, Relays, ladder diagram. Accumulators and Intensifiers: Types of accumulators, intensifier Applications of Intensifier.

UNIT IV **10hr.**

Pneumatic Components: Properties of aircompressors,Filter, Regulator, Lubricator Unit ,Air control valves, Quick exhaust valves, pneumatic actuators. Fluid Power Circuit Design, Speed

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

control circuits, synchronizing circuit, Penumo hydraulic circuit, Sequential circuit design for simple applications using cascade method.

UNIT V **12hr.**

Servo systems :Hydro Mechanical, Electro hydraulic and proportional valves. Fluidics :Introduction to fluidic devices, simple circuits, Introduction to Electro Hydraulic Pneumatic logic circuits, ladder diagrams, PLC applications in fluid power control. Fluid power circuits; failure and troubleshooting.

Text Books:

1. Anthony Esposito, "Fluid Power with Applications", Pearson Education 2005.
2. Majumdar S.R., "Oil Hydraulics Systems- Principles and Maintenance", Tata McGraw-Hill, 2001.

Reference Books:

1. Srinivasan.R, "Hydraulic and Pneumatic controls", Vijay Nicole, 2006.
2. Shanmugasundaram. K, "Hydraulic and Pneumatic controls", Chand & Co, 2006.

List of Experiments:

1. Design and testing of Pressure Control Hydraulic Circuit.
2. Design and testing of Flow Control Hydraulic Circuit.
3. Implementation and testing of Directional Control Hydraulic Circuit.
4. Implementation and testing of Pressure Control pneumatic Circuit.
5. Design and testing of Flow Control pneumatic Circuit.
6. Development and analysis of Directional Control pneumatic Circuit.
7. Development and analysis of circuits with Logic Control.
8. Implementation and testing of Circuits with Timers.
9. Design of circuits with programmed Logic sequence using an optional PLC in electro hydraulic trainer.
10. Demonstration of P/I and I/P Converter.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav VidyapeethVishwavidyalaya, Indore

B.Tech (Mechatronics)

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*				
BTMT502		Introduction to ROBOTICS	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; **Q/A** – Quiz/Assignment/Attendance, **MST** Mid Sem. Test.

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives (CEOs):

1. To be familiar with the robotronics and its scope.
2. To study and learn the concept of actuators and sensors.
3. To understand the various robot control problems.
4. To get acquainted with the robot task planning.

Course Outcomes (COs):

The students will be able to:

1. Measure robot configuration/condition and its environment.
2. Send information to robot controller such as electronic signals to control a robot.
3. Use robot sensors and actuators as per the requirements.
4. Design different robots for industrial applications.

Syllabus

UNIT I **7hrs**

Introduction to robotics: Definition, Types, Uses, History, Key components, applications. Robot sensors: Vision Sensor, Force Sensor, Proximity Sensors, Tilt sensors, Robot configuration-condition and its environment, arm position concept.

UNIT II **8hrs**

Actuators : synchronous motor, Stepper motor, AC servo motor, Brushless DC servo motor, Brushed DC servo motor, Storage Hardware, Interface Hardware.

UNIT III **10hrs**

Robot Control: The control problems, State equations, Constant solutions, Linear feedback systems, Single axis PID control, PD gravity control, Computed torque control, Variable structure control, Impedance control.

UNIT IV **9hrs**

Robot Vision: Image representation, Polyhedral objects, Shape analysis, Segmentation, Iterative processing, Perspective transformation, structured illuminations, and Camera calibration.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

UNIT V **8hrs**

Task Planning, Industrial Applications of Robots: Robots in Space, Robots in Hazardous Environments, Medical Robots, Robots in Military, Robots at Home.

Text Books:

1. Robort J. Schilling, "Fundamental of Robotics, analysis of Control", Prentice Hall Publication, 2003.
2. Craig, "Introduction to Robotics: Mechanics and Control", Pearson Publication, 2017.

References:

1. Mikell Groover, Mitchell Weiss, Nicholas Odrey, Roger Nagel, "Industrial Robotics", Tata McGraw-Hill Education Pvt. Ltd., 2008.
2. Robert H. Bishop, "Mechatronics System, Sensors and Actuators, Fundamental and Modeling" CRC Press,2017

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya
B. Tech (Electrical Engineering)
SEMESTER V

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTEE502		POWER ELECTRONICS	3	1	2	5	60	20	20	30	20

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 Objectives:
This course aims to equip the students with a basic understanding of modern power semiconductor devices, various important topologies of power converter circuits for specific types of applications. The course also equips students with an ability to understand and analyze non-linear circuits involving power electronic converters.

Course Outcomes: Upon completion of the course, the student will be able to
1. Understand the principle of operation of commonly employed power electronic converters.
2. Analyze non-linear circuits with several power electronic switches.
3. Equipped to take up advanced courses in Power Electronics and its application areas.

Syllabus:

UNIT-I
Power Semiconductor diodes and Transistors: Types of power diodes-General purpose diodes-Fast recovery diodes- Their characteristics and applications, Bipolar junction transistors, Power MOSFETS P-Channel, N-Channel, IGBTs- Basic Structure and working, Steady state and switching characteristics-Comparison of BJT, MOSFET and IGBT-Their applications.

UNIT-II
Principle of operation of SCR, Static and dynamic characteristics-Two transistor analogy, condition of turn on & off of SCR, Gate characteristics, GTO, DIAC, TRIAC, UJT, IGCT Characteristics.
Trigger circuits-R, RC and UJT triggering circuits. Various commutation methods of SCRs, Protection of SCRs, Series and Parallel operation of SCRs, String efficiency.

UNIT-III
AC-DC Converter: Principles of controlled rectification—Study of single phase and three phase half controlled and full controlled bridge rectifiers with R, RL, RLE loads Effect of source inductances. Dual Converters—circulating current mode and Non-circulating current mode, Control Strategies.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya
B. Tech (Electrical Engineering)
SEMESTER V

UNIT-IV

DC-DC Converter: Classification of Choppers: A, B, C, D & E, Jones and Morgens chopper. Switching mode regulators - Study of Buck, Boost, Buck-Boost regulators.
AC-AC Converter: Principle of operation of Single Phase Bridge type cyclo-converters and their applications. Single phase and Three phase AC Voltage controllers with R & RL load.

UNIT-V

DC-AC Converter: Principle of operation of Single Phase Inverters-Three phase bridge inverters (180 and 120 Degree modes)-voltage control of invertors—Single Pulse Width Modulation-Multiple pulse width Modulation-Sinusoidal Pulse Width Modulation .Comparison of Voltage Source Inverter and Current Source Inverters.

Text Books:

1. Rashid, M.H, 'Power Electronics - Circuits, Devices and Applications', Prentice Hall Publications, 3 rd Edition, 2003.
2. M.D.Singh and K.B.Kanchandhani, 'Power Electronics', Tata McGraw-Hill Publishing Company Limited, 2nd Edition, 2006.

Reference Books:

1. Ned Mohan, Tore M. Undeland, William P. Robbins, 'Power Electronics', John Wiley & Sons Publications, 3rd Edition, 2006.
2. Vedam Subramaniam, 'Power Electronics', New Age International (P) Ltd Publishers, 2001.
3. Philip T. Krein, 'Elements of Power Electronics', Oxford University Press, 1st Edition, 2012.
4. V. R. Moorthi, 'Power Electronics- Devices, Circuits and Industrial Applications', Oxford University Press, 1st Edition, 2005. 4. P.S. Bimbhra, 'Power Electronics', Khanna Publishers, 3rd Edition, 13th Reprint, 2004

List of Experiments:

1. Show Static and dynamic characteristics of an SCR.
2. Examine Static and dynamic characteristics of TRAIC.
3. Examine Static and dynamic characteristics of DAIC.
4. Determine Characteristics of MOSFET and IGBT.
5. Analyze Single phase SCR Half controlled converter with R and RL load.
6. Analyze Single phase fully controlled (bridge) converter with R and RL load.
7. Design 3-phase SCR Half Controlled Converter (using simulation platform like MATLAB/Simulink)
8. Design of 3-phase SCR Fully Controlled Converter (using simulation platform like MATLAB /Simulink)
9. Recall of classes of commutation A, B, C, D, E, F.
10. Simulation of Chopper circuit using SCR.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Electrical Engineering)

SEMESTER V

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTEE 503		CONTROL SYSTEM ENGINEERING	3	1	2	5	60	20	20	30	20

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 Objectives:

The course will provide understanding of control system and mathematical modeling of the system

Course Outcomes:

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

1. Demonstrate the understanding of basic element 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: Standard test signals ,Time response of first order systems ,Characteristic Equation of Feedback control systems, Transient response of second order systems ,Time domain specifications , Steady state response , Steady state errors and error constants , P, PI, PD and PID Compensation

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.The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT IV **8 Hrs**

Frequency domain Analysis: Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and 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

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Bachelor of Technology (Electrical Engineering)

SEMESTER V

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, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Text Books:

1. I.J.Nagrath and M.Gopal," Control System Engineering", New Age International Pu blishers, 5th Edition, 2008.
2. Richard C Dorf; Robert H Bishop, "Modern control system", Pearson Education, 13th Edition, 2017.

References Books:

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., 4th Edition 2000 .

List of Practicals:

1. Perform step response of a transfer function
2. Perform impulse response of a transfer function
3. Perform ramp response of a transfer function
4. Analyze torque speed characteristics and determine the transfer function of a DC servomotor.
5. Analyze characteristics of a small AC servomotor and determine its transfer function.
6. Perform the transient and frequency response of a second order network.
7. Perform the performance of various types of controllers used to control the temperature of an oven.
8. Draw nyquist plot from a transfer function
9. Draw root locus from a transfer function
10. Draw bode plot from a transfer function

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

ShriVaishnavVidyapeethVishwavidyalaya
B.Tech/B.Tech+MBA(CSE) and B.Tech+M.Tech(CSE/CSE-CC/CSE-CF/CSE-BDA)
Choice Based Credit System (CBCS)-2018-19

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTCS403	UG	Data Structure and Algorithms	3	1	2	5	60	20	20	30	20

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 Objectives:

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:

Upon the completion of the course, 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

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

UNIT II

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.

Chairperson
Board of Studies
(Computer Science & Engineering,
Information Technology & Computer Applications)

Joint Registrar

UNIT III

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

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.

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

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.
3. Bhagat Singh & Thomas Naps, "Introduction to Data structure", 2nd Edition, Tata Mc-GrawHill 2009.
4. Robert Kruse, "Data Structures and Program Design",2nd Edition,PHI,1997.
5. Lipschutz Seymour,"Data structures with C" ,1st Edition ,Mc- GrawHill,2017.

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.

List of Practical:

Chairperson
Board of Studies
(Computer Science & Engineering,
Information Technology & Computer Applications)

Joint Registrar

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.
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. Program for implementation of Bubble sort
11. Program for Insertion sort
12. Program for Merge Sort
13. Program to implement Heap sort
14. Program to implement Quick sort
15. Program to Construct a Binary Search Tree and perform deletion, inorder traversal on it
16. To develop an algorithm for binary tree operations and implement the same.
17. To design an algorithm for sequential search, implement and test it.
18. To develop an algorithm for binary search and perform the same.

Chairperson
Board of Studies
(Computer Science & Engineering
Information Technology & Computer Applications)

Joint Registrar

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

B. Tech.(Mechatronics)

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*				
BTEI515		Data Communication	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; **Q/A** – Quiz/Assignment/Attendance, **MST** Mid Sem. Test.

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives(CEOs):

The purpose of this subject is to cover the underlying concepts and techniques used in Data Communication. In this subject we discuss various principles, standards for communication over different type of Communication Media

Course Outcomes(COs):

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

1. List and describe various data communication protocols.
2. List and describe various networking standards.
3. Describe alternative networking approaches and topologies.
4. Describe various important hardware devices used in networking.

Syllabus

Unit I **8Hrs**

Introduction to data communication: Components, bit rate, baud rate, Data transmission– Parallel and serial transmission, Synchronous and Asynchronous transmission, line configuration - Point to point and point to multipoint configuration, topology, transmission modes.

Unit II **7Hrs**

OSI reference model, TCP/IP reference model, DTE-DCE interface, interface standards, modems, cable modem, X.21 Modem, FDDI, IPV4 and IPV6.

Unit III **8Hrs**

Congestion control, CSMA/CD, Ethernet, digital subscriber line – ADSL, SDSL, VDSL. Plesiochronous digital hierarchy (PDH), Synchronous digital hierarchy (SDH), Terminal handling & polling, Handshaking, X.25.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Unit IV **8Hrs**

Switching techniques- Circuit, Packet and Message switching, Types of error- single bit error, burst error, Error detection- Vertical redundancy check, Longitudinal redundancy check, Cyclic redundancy check, error correction- Hamming code, Integrated services digital network (ISDN), ISDN services, digital signals, digital to digital encodings.

Unit V **7Hrs**

RJ-45, BNC Connector, Network interface card, ARQ, Sliding Window protocol, Connecting Devices: Active and Passive Hubs, Repeaters, Bridges, Two & Three layer switches & Gateway, Asynchronous transfer mode (ATM).

Text Books:

1. Forouzan, Data Communications and Networking, II-Edition, (TMH).

References:

1. Tomasi, Advanced Electronic Communication Systems, Sixth edition, 2009, PHI Learning.
2. Tomasi, Introduction to Data Communication Systems, Fourth edition, 2005, Pearson Education.
3. William Stallings, Data and Computer Communications, Eighth edition, Pearson Education.
4. Brijendra Singh, Data Communications and Networks, Third edition, 2011, PHI Learning.
5. A. S. Tanenbum, Computer Network, Fifth edition, 2011, Pearson Education.
6. C. Prakash Gupta, Data communication and Computer Networks, Second edition, 2014, PHI Learning
7. Miller, "Data Network and Communication", First edition, 1999, Cengage Delmar Learning

LIST OF EXPERIMENTS:

1. To perform data transmission using RS-232 Interface.
2. To perform Synchronous and Asynchronous transmission.
3. To perform Parallel and Serial transmission.
4. To perform data transmission using Fiber optics.
5. To demonstrate Protocols in data communication.
6. To demonstrate Wireless communication.
7. To Implementation of Ring topology using DB-9.
8. To perform data transmission using Network Interface Card.
9. To implement cross cable connection and straight cable connection.
10. To demonstrate digital subscriber line-ADSL for broadband connection.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav VidyapeethVishwavidyalaya, Indore

B.Tech (Mechatronics)

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*				
BTMT511		Automation	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; **Q/A** – Quiz/Assignment/Attendance, **MST** Mid Sem. Test.

***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):

Provides the knowledge of the industrial automation, systems design, PLC, DCS installation, modification, maintenance, and repair.

Course Outcomes (COs):

Student will be able to:

1. Demonstrate the General function of Industrial Automation.
2. Implement Programmable Logic Controller in various application.
3. Insure Safety in Industrial Automation.
4. Use various types of Industrial Sensors.

Syllabus

UNIT I **10hr**

Introduction to Industrial Automation, type of automation system, Benefits of automation. Automation pyramid, automation tools like PAC, PLC, SCADA, DCS, Comparison of PLC, PAC, and SCADA on the basis of Performance criteria Control system audit.

UNIT II **10hr**

Definition of protocol, OSI model, Modbus (ASCI I/RTU), HART Protocol: Introduction, frame structure, programming, implementation examples, benefits, advantages and limitation. Foundation Fieldbus H1: Introduction, frame structure, implementation examples, benefits, advantages and limitation. Comparison of HART, Foundation Fieldbus.

UNIT III **8hr**

DCS Project: Development of User Requirement Specifications, Functional Design Specifications for automation tool, GAMP, FDA.

UNIT IV **8hr**

Programmable Logic Controllers: Introduction of Advanced PLC programming, Selection of processor, Input/output modules, Interfacing of Input/output devices, study of SCADA software, Interfacing of PLC with SCADA software.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

UNIT V **10hr**

DCS: Introduction to architecture of different makes, DCS Specifications, configuration of DCS blocks for different applications, Interfacing of protocol based sensors, actuators, Plant wide database management, Security and user access management, MES, ERP Interface.

Text Books:

1. S.K.Singh, Computer aided process control, PHI, 2004.
2. Webb & Reis, Programmable logic Controllers',(Prentice Hall of India),2002
3. Madhuchhanda Mitra and Samarjit Sen Gupta, "Programmable Logic Controllers(PLC) and Industrial Automation", Penram International Publishing (India) Pvt. Ltd. 2007.

References:

1. Gary Dunning, 'Introduction to Programmable logic Controllers', (Delmar Publisher), 2011.
2. Krishna Kant,Computer Based Process control, PHI, 2011.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav VidyapeethVishwavidyalaya, Indore

B.Tech (Mechatronics)

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*				
BTEI511		Instrumentation System Design	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit; **Q/A** – Quiz/Assignment/Attendance, **MST** Mid Sem. Test.
***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 introduce the basic functional elements of instrumentation
2. To educate on the comparison between various measurement techniques
3. To introduce various types of control panel and its design.
4. To introduce various transducers and signal conditioning methods.

Course Outcomes (COs):

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

1. Apply knowledge of measurement system.
2. Identify, formulate, and solve the fundamentals of designing
3. Use various types of control panel and its design.

Syllabus

UNIT I **12 hr**

Introduction to Chemical instrumental analysis, advantages over classical methods, Laws of photometry(Beer and Lambert's law), Basic Components of analytical instruments,Chromatography: Classification, Gas chromatography: principle, constructional details, Zirconia-probe oxygen analyser.

UNIT II **10 hr**

Colorimeters, spectrophotometers (UV-Visible), monochromators, filters, grating, prism, dual wavelength and double monochromator systems, rapid scanning spectrophotometers, IR spectrophotometers.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

UNIT III **10hr**

Flame Photometry: Principle, constructional details, flue gases, atomizer, burner, optical system, recording system. Atomic absorption spectrophotometers: Theoretical concepts, instrumentation: hollow cathode lamps, burners and flames, plasma excitation sources, optical and electronic system.

UNIT IV **6 hr**

Measurement of pH, Conductivity, detection on the basis of scattering-Nephalometer, Laboratory Instruments: Centrifuge, oven, waterbath, Incubators, stirrers, Densitometer.

UNIT V **8hr**

Mass Spectrometer (MS): Principle, ionization methods, mass analyzer types – magnetic deflection type, time of flight, quadruple, radio frequency, detectors for MS, applications X-ray spectrometry: Instrumentation for X-ray spectrometry, X-ray diffractometer.

Text Books:

1. Handbook of Analytical Instruments, R. S. Khandpur, Tata McGraw–Hill Publications, 3rd edition (2010).
2. Instrumental Methods of Analysis, Willard, Merritt, Dean, Settle, CBS Publishers & Distributors, New Delhi, Seventh edition.(2005)

References :

1. Instrumental Methods of Chemical Analysis, Galen W. Ewing, McGraw-Hill Book Company, Fifth edition.(2012)
2. Introduction to Instrumental Analysis, Robert D. Braun, McGraw-Hill Book Company(2008)
3. Patranabis D-Principles of Industrial Inst. TMH Publication(2012)
4. Merritt W H W, Dean LL and Settie JA - Instrumental Methods of Analysis.(2013)
5. Skoog DA and West DM - Principles of Instrumental Analysis. Hand book of Analytical Instrument Technology, Vol-11, Analysis Instruments, Butter worthsScientific Publication, London.(2011)

LIST OF EXPERIMENTS:

1. To perform & Study of Gas chromatograph.
2. To analysis & Study of X-Ray Spectrometer.
3. To understand & Study Ultraviolet & Visible Spectrophotometer.
4. To Analysis & Study of Mass spectrometer.
5. To understand and analysis Viscosity measurement.
6. To perform & study Turbidity measurement.
7. To understand and study conductivity meter.
8. To analysis pH of the given solution using pH meter.
9. Application of Differactometer,
10. Use of Densitometer.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore