Shri Vaishnav VidyapeethVishwavidyalaya, Indore

Six Year Dual Degree (B.Tech.+M.Tech.)-Mechatronics

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	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;
***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 about Applied Hydraulics & Pneumatics.

Course Outcomes (COs):

Upon completion of the course, students will be able:

1. To know the advantages and applications of Fluid Power Engineering and Power Transmission System.
2. To learn the Applications of Fluid Power System in automation of Machine Tools and others Equipments.

Syllabus

UNIT I **8hr.**

Introduction to fluid power, Advantages of fluid power, Application of fluid power system. Types of fluid power systems, 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 – Gear pump, Vane Pump, piston pump, 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, Gear, Vane and Piston motors.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav VidyapeethVishwavidyalaya, Indore

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, sequence valve, Flow control valve – Fixed and adjustable, electrical control solenoid valves, Relays, ladder diagram. Accumulators and Intensifiers: Types of accumulators – Accumulators circuits, sizing of accumulators, intensifier – Applications of Intensifier – Intensifier circuit.

UNIT IV **10hr.**

Pneumatic Components: Properties of air – Compressors – Filter, Regulator, Lubricator Unit – Air control valves, Quick exhaust valves, pneumatic actuators. Fluid Power Circuit Design, Speed control circuits, synchronizing circuit, Penumo hydraulic circuit, Sequential circuit design for simple applications using cascade method.

UNIT V **12hr.**

Servo systems – Hydro Mechanical servo systems, Electro hydraulic servo systems 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.
3. Majumdar S.R., "Pneumatic systems – Principles and maintenance", Tata McGraw Hill, 1995
4. Anthony Lal, "Oil hydraulics in the service of industry", Allied publishers, 1982.
5. Harry L. Stevart D.B, "Practical guide to fluid power", Taraoeala sons and Port Ltd. Broadey, 1976.
6. Michael J, Prinches and Ashby J. G, "Power Hydraulics", Prentice Hall, 1989.
7. Dudelyt, A. Pease and John T. Pippenger, "Basic Fluid Power", Prentice Hall, 1987.

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.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

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

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav VidyapeethVishwavidyalaya, Indore

Six Year Dual Degree (B.Tech.+M.Tech.)-Mechatronics

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	T h	T	P	CREDITS
BTEI402		Sensors and Transducers	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):

1. Student will be able to understand the structural and functional principles of sensors and transducers used for various physical and nonelectric quantities.
2. Explain the principles of operation of the sensor.
3. Interpretation of the measurement results by using transducers.
4. Development of measurement schemes for different non electrical quantities
5. Assimilating knowledge about the implementation of sensors and transducers into a control system structure.

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. To apply knowledge of sensors and transducer.
2. To identify, formulate, and solve engineering problems
3. Demonstrate various types of force transducer and their analysis.
4. Demonstrate various types of pressure transducer and their analysis.

Syllabus

Unit-I **10hr.**

Motional and Dimensional measurement:

Introduction, Aim of measurement, Roll of sensors in engineering, classification of transducers, Fundamental Standards, units , Resistive Potentiometers, stain gauge, LVDT, Hall Effect sensors, magnetostricitive, magnetoresisitive, Optical displacement sensor fiber optic sensor, Ultrasonic distance Sensor, Piezoresistive, Linear encoder, Proximity sensors RVDT, DC tachometer, AC tachometer , eddy current , drag cup type tachometer, magnetic, gyroscope.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav VidyapeethVishwavidyalaya, Indore

UNIT -II **12hr.**

Force, Torque measurement:

Standards and Calibration, Strain gauge: basic principal, gauge factor, types of strain gauge, materials and their properties, bonding material compensation techniques, bridge configuration, Rosettes, Tactile sensors, Piezoelectric sensors, LVDT as secondary sensor

Torque: Flat Spiral Spring, Magenetostrictive Torsion Transducer, Dynamometers.

UNIT -III **12hr.**

Pressure Measurement

Standards and calibration Units and relations. Positive Pressure Sensors

Pressure and sound measurement: Moderate pressure Bourdon tube, Bellows &diaphragms, High pressure measurement, Piezo electric, Electric resistance, Low pressure measurement, Mcleod gauge, Knudsen gauge, Viscosity gauge, Thermal conductivity, Ionization gauge, Dead weight gauge, sound level measurement using different types of microphone

UNIT -IV **10hr.**

Flow measurement: Obstruction meter: Orifice, Nozzle, venturi, Pitot tube,

Annubar tubes, Target, rotameter, Turbine, Electromagnetic, Vortex, Positive displacement, Anemometers, Weirs & flumes, Laser Doppler, Anemometer, Ultrasonic flow meter, fluidic oscillator, Mass flow meter, Flow visualization, Level measurement: Visual level indicators, Ordinary float type, Purge method, Buoyancy method, resistance, Capacitance and inductive Probes, Ultrasonic, Laser, Optical fiber. Thermal, Radar radiation.

UNIT -V **08hr**

Temperature measurement: Bimetallic thermometers, Liquid in glass, Pressure thermometer, thermocouples, RTD, Thermistors, Semiconductor sensors, Digital thermometers, Pyrometers, Miscellaneous Measurement: Humidity, Dew point, Viscosity, Thermal and nuclear radiation measurements.

Text Books:

1. *H.N. Norton "Handbook of transduc*ers".
2. E.O. Doebelin "Measurement systems applications and design"

Reference Books:

1. DVS Murthy "Transducers and instrumentation".
2. Nakra and Chaudhry "Instrumentation measurement and analysis *& Co.*

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav VidyapeethVishwavidyalaya, Indore

List of experiments

1. Calibration of pressure gauge using dead weight pressure tester and preparation of report for the same.
2. Characterization of strain gauge indicator and weight measurement using load cell.
3. Measurement of displacement using LVDT.
4. Study of linear and rotary encoder as displacement sensor.
5. Measurement of Pressure using Bellows, Bourdon gauge, Diaphragm.
6. Calibration of vacuum gauge using vacuum gauge tester and preparation of the report.
7. Characterization of Thermocouples (J/T/K/R/S)
8. Characterization of RTD.
9. To study characteristics of thermistor.
10. Calibration of Rotameter.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav Vidhyapeeth Vishwavidhyalaya, Indore

(Session 2018-19)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRAC-TICAL		Th	T	P	CREDITS
			End Sem University Exam	Two Term Exam	Teachers Assessent*	End Sem University Exam	Teachers Assesment*				
BTEE502		Power Electronics	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 on following components: Quiz/Assignment/ Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Educational Objectives (CEOs):
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 (COs): 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 **[10 Hrs]**

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. SCRs, Static and dynamic characteristics-Two transistor analogy. GTO, DIAC, TRIAC, UJT, IGCT Characteristics.

UNIT-II **[8 Hrs]**

Turn on and turn off mechanism of BJT. Power MOSFET, IGBTs SCR trigger circuits-R, RC and UJT triggering circuits. Triggering circuits for single phase bridge rectifier and Choppers. Driver Circuits of MOSFET IGBT & BJT- Various commutation methods of SCRs- Protection of SCRs.

UNIT-III **[7 Hrs]**

AC-DC Converter: Principles of controlled rectification—Study of single phase and three phase half

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

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

UNIT-IV **[8 Hrs]**

DC-DC Converter: Classification of Choppers: A, B, C, D & E- Switching mode regulators - Study of Buck, Boost and 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 **[8 Hrs]**

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- Introduction to Multilevel 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 (M.P.)

ShriVaishnavVidhyapeethVishvavidhyalaya, Indore

(Session 2018-19)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	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; Q/A Quiz/Assignment/Attendance, MST Mid Sem Test.

Credit Hrs 40

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 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 1 **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 2 **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 3 **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 4 **8 Hrs**

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
INDORE (M.P.)

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

Unit 5 **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.

TEXTBOOK

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

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., 4th Edition 2000 .

List of Experiments

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 (M.P.)

Shri Vaishnav Vidyapeeth Vishwavidyalaya
Bachelor of Technology (Computer Science and Engineering)
Choice Based Credit System (CBCS)

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	Th	T	P	CREDITS
BTCS403		Data Structure & Algorithms	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 OBJECTIVES
1. To teach 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 teach the concept of protection and management of data.

COURSE OUTCOMES
Upon completion of the subject, 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, Algorithms. Characteristic of Array, One Dimensional Array, Operation with Array, Two Dimensional Arrays, Three or Multi-Dimensional Arrays. Strings, Array of Structures, Drawbacks of linear arrays, Pointer and Arrays, Pointers and Two Dimensional Arrays, Array of Pointers, Pointers and Strings.

Chairperson
Board of Studies
(Computer Science & Engineering,
Information Technology & Computer Applications)
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

UNIT–II

The Stack as an ADT, Stack operation, Array Representation of Stack, Link Representation of Stack, Application of stack – Recursion, Polish Notation .

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

UNIT–III

Linked List as an ADT, Linked List Vs. Arrays, Memory Allocation & De-allocation for a Linked List, Linked List operations, Types of Linked List, Implementation of Linked List, Application of Linked List polynomial.

UNIT–IV

Definitions and Concepts, Binary trees, operations on binary trees, Binary tree and tree traversal algorithms, operations on binary trees, List, representation of Tree. Graph Representation, Graph traversal (DFS & BFS).

UNIT–V

Sort Concept, Shell Sort, Radix sort, Insertion Sort, Quick Sort, Merge Sort,Heap Sort, List Search, Linear Index Search, Index Sequential Search Hashed List Search, Hashing Methods , Collision Resolution.

TEXT BOOKS:

1. Ashok N. Kamthane, "Introduction to Data structures", Pearson Education India.
2. Tremblay & Sorenson, "Introduction to Data- Structure with applications", Tata Mc- Graw Hill.
3. Bhagat Singh & Thomas Naps, "Introduction to Data structure", Tata Mc- Graw Hill.
4. Robert Kruse, "Data Structures and Program Design", PHI.
5. Aaron M. Tenenbaum& Moshe J. Augenstein, "Data Structure using PASCAL", PHI.

REFERENCES:

1. Data Structures Using C & C++, Rajesh K. Shukla, Wiley- India.
2. Data Structures Using C, ISRD Group, Second Edition, Tata McGraw-Hill.
3. Data Structure Using C, Balagurusamy.
4. C & Data Structures, Prof. P.S. Deshpande, Prof. O.G. Kakde, Dreamtech press.
5. Data Structures, Adapted by: GAV PAI, Schaum's Outlines.

LIST OF EXPERIMENTS:

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 develop an algorithm that implements push and pop stack operations and implement the same using array.
4. To perform an algorithm that can insert and delete elements in queue and implement the same using array.

Chairperson
Board of Studies
(Computer Science & Engineering, Information Technology & Computer Applications)
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

5. To implement an algorithm for insert and delete operations of circular queue and implement the same using array.
6. To develop an algorithm for binary tree operations and implement the same.
7. To design an algorithm for sequential search, implement and test it.
8. To develop an algorithm for binary search and perform the same.
9. To implement an algorithm for Insertion sort method.
10. To develop an algorithm that sorts number of elements using bubble sort method.
11. To design an algorithm for Merge sort method and implement the same.

Chairperson
Board of Studies
(Computer Science & Engineering,
Information Technology & Computer Applications)
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Six Year Dual Degree (B.Tech.+M.Tech.)-Mechatronics

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC515	EC	Data Communication	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 Objectives:
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:
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
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
OSI reference model, TCP/IP reference model, DTE-DCE interface, interface standards, modems, cable modem, X.21 Modem, FDDI, IPV4 and IPV6.

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

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Unit IV

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

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 Books:

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

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Six Year Dual Degree (B.Tech.+M.Tech.)-Mechatronics

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	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;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objective:

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

Course Outcomes:

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, Hybrid DCS with reference to automation pyramid, 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), third party interface, concept of OPC , HART Protocol: Introduction, frame structure, programming, implementation examples, benefits, advantages and limitation. Foundation Fieldbus H1: Introduction, frame structure, programming, 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.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

UNIT-IV **8hr**

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

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 and PLC systems, 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

Reference Books:

1. N.E. Bhttiha,The management of control system: Justification and Technical Auditing,
2. ISA, New print
3. Gary Dunning, 'Introduction to Programmable logic Controllers',(Delmar Publisher),2011
4. Krishna Kant,Computer Based Process control, PHI, 2011.
5. 4. Samuel Herb, Understanding Distributed Process Systems For Control, ISA, New print.
6. Ppovik Bhatkar, Distributed computer control for industrial automation, Dekkar Pub.1990.

List of Experiments:

Automation Lab:

1. Design and implementation of ladder Logic with PLC.

2. Design a ladder logic for sequential batch process control system using PLC.

3. Study hardware and software platforms for DCS

4. Simulate analog and digital function blocks

5. Study, understand and perform experiments on timers and counters

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

6. Logic implementation for traffic Control Application.

7. Logic implementation for Bottle Filling Application

8. Tune PID controller for heat exchanger using DCS

9. To control single acting,double acting cyllinderical valve using PLC.

10.To control X-Y position table through PLC programming.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

Shri Vaishnav VidyapeethVishwavidyalaya, Indore

Six Year Dual Degree (B.Tech.+M.Tech.)-Mechatronics

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	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;

***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 introduce the fundamentals of electrical and electronic instruments
3. To educate on the comparison between various measurement techniques
4. To introduce various types of control panel and its design.
5. To introduce various transducers and signal conditioning methods.

Course Outcomes (COs):

After completion of this course the students are able to-

12. To apply knowledge of measurement system.
13. To identify, formulate, and solve the fundamentals of designing
14. Demonstrate 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

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

instruments.Chromatography: Classification, Gas chromatography: principle, constructional details, GC detectors, Estimation of oxygen, hydrogen, methane, carbon dioxide, CO, etc. in binary or complex gas mixtures. 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.

UNIT -III **10 hr**

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, particle counting, 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, double focusing, 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)

Reference Books :

1. Instrumental Methods of Chemical Analysis, Galen W. Ewing, McGraw-Hill Book Company, Fifth edition.(20112)
2. Introduction to Instrumental Analysis, Robert D. Braun, McGraw-Hill Book Company(2008)

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore

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 EXPERIMENT

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. Study of Differactometer,
10. Study of Densitometer.

Chairperson
Board of Studies
Shri Vaishnav Vidyapeeth Vishwavidyalaya
Indore

Joint Registrar
Shri Vaishnav Vidyapeeth
Vishwavidyalaya, Indore