Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

III Semester

MBA 301C HUMAN VALUES AND PROFESSIONAL ETHICS

SUBJECT CODE	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
		THEORY			PRACTICAL		L	T	P	CREDITS
		END SEM University Exam	Two Term Exam	Teachers Assessme	END SEM University Exam	Teachers Assessme				
MBAI301C	Human Values and Professional Ethics	60	20	20	-	-	4	-	-	4

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

Course Objective

The objective of the course is to disseminate the theory and practice of moral code of conduct and familiarize the students with the concepts of "right" and "good" in individual, social and professional context

Course Outcomes

1. Help the students to understand right conduct in life.
2. To equip students with understanding of the ethical philosophies, principles, models that directly and indirectly affect personal and professional life.

COURSE CONTENT

Unit I: Inculcating Values at Workplace

1. Values: Concept, Sources, Essence
2. Classification of Values.
3. Values in Indian Culture and Management: Four False Views, Value Tree
4. Eastern and Western Values; Values for Global Managers

Unit II: Professional Ethics

1. Ethics: Concept, Five P's of Ethical Power, Organisational Tools to Cultivate Ethics
2. Theories of Ethics: Teleological and Deontological
3. Benefits of Managing Ethics in an Organisation
4. Ethical Leadership

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Unit III: Indian Ethos and Management Style

1. Indian Ethos and Workplace
2. Emerging Managerial Practices
3. Ethical Considerations in Decision Making and Indian Management Model
4. Core Strategies in Indian Wisdom and Ethical Constraints

Unit IV: Human Behavior – Indian Thoughts

1. Guna Theory
2. Sanskara Theory
3. Nishkama Karma
4. Yoga: Types, Gains; Stress and Yoga

Unit V: Spirituality and Corporate World

1. Spirituality: Concept, Paths to Spirituality
2. Instruments to achieve spirituality
3. Vedantic Approach to Spiritual and Ethical Development
4. Indian Spiritual Tradition.

Suggested Readings

1. Kausahl, Shyam L. (2006). ***Business Ethics – Concepts, Crisis and Solutions***. New Delhi: Deep and Deep Publications Pvt. Limited
2. Murthy, C.S.V. (2012). ***Business Ethics –Text and Cases.*** Himalaya Publishing House: Mumbai
3. Chakraborty, S. K. (1999). ***Values and Ethics for Organizations***. Oxford university press
4. D.Senthil Kumar and A. Senthil Rajan (2008). ***Business Ethics and Values.*** Himalaya Publishing House: Mumbai

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	T	P	CREDITS
BTEI701		Analytical Instrumentation	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):
The course is designed to understand the fundamentals of Analytical Instrumentation and applying the principles of Analytical Instrumentation to carry out the analysis of different samples present in specimen.

Course Outcomes (COs):
After completing the course the students should be able to:
1. Understand the building blocks of analytical Instrumentation
2. Use of various spectroscopy techniques to carry out qualitative and quantitative analysis.
3. Determine various parameters used in analytical Instrumentation.
4. Implement air pollution and water pollution monitoring methods.

Syllabus

UNIT I **8Hrs**

Difference between analytical and other instruments, Gas Analysis: Gas chromatography, Thermal conductivity method, Heat of reaction method. Estimation of oxygen, hydrogen, methane, carbon dioxide, CO, etc. in binary or complex gas mixtures. Zirconia-probe oxygen analyzer. Paramagnetic oxygen meters, Electrochemical reaction method.

UNIT II **7Hrs**

Ultraviolet and visible spectrophotometry : Radiation sources, detectors, read out modules, filters, monochromators. Instruments for absorption photometry. Fundamental laws of photometry. Infrared Spectrophotometry, Basic components of IR spectrophotometers, sample handling, Types of spectrophotometers, Fourier transform infrared spectroscopy.

UNIT III **8Hrs**

Mass spectrometry: Basic mass spectrometer, components of mass spectrometers, types of mass Spectrometers resolution and applications. X-Ray methods. Production of X-Rays & X-Ray spectra, Instrumental units, detectors for the measurement of radiation, direct X-Ray methods, X-

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Ray absorption methods, X-Ray fluorescence methods, X-Ray diffraction, Applications Spectroscopy, ESR Spectroscopy.

UNIT IV **7Hrs**

Chemical composition Analysis: Measurement of Viscosity, turbidity, metes consistency, pH and redox potential, electrical conductivity. Techniques of density measurement Solids, liquids and gases.

UNIT V **8Hrs**

Environmental Pollution Monitoring Instruments Air pollution monitoring instruments carbon monoxide, sulphur dioxide, Nitrogen oxides, Hydrocarbons, Ozone, and Automated wet chemical air analysis. Water pollution monitoring instruments.

Text Books:

1. Gurdeep R. Chatwal, Sham K. Anand, "Instrumental methods of Chemical Analysis", Himalaya Publishing House,2012.
2. Galen W. Ewing, "Instrumental Methods of Chemical Analysis", McGraw-Hill Book Company, Fifth edition.
3. Gillian McMahon, "Analytical Instrumentation: A Guide to Laboratory, Portable and Miniaturized Instruments", John Wiley and Sons, 2007.
4. Douglas A. Skoog, F. James Holler, Stanley R. Crouch, "Principles of Instrumental Analysis", Cengage Learning,2013.

Reference Books:

1. Willard, Merritt, Dean, Settle, "Instrumental Methods of Analysis", CBS Publishers & Distributors, New Delhi, Seventh edition.
2. R. S. Khandpur, "Handbook of Analytical Instruments", Tata McGraw–Hill Publications, 3rd edition,2006

List of Experiments:

1. To determine percentage transmittance and percentage absorbance of a given sample using colorimeter.
2. To determine % transmittance and absorbance using UV-VIS Spectrophotometer.
3. Study of Mass Spectrometer.
4. Study of X-ray Spectrometer.
5. Study of the basic principle of Gas Chromatography and its various parts.
6. To find the turbidity of a given solution using turbidity meter.
7. To determine the pH and ionic concentration of a given sample using pH meter.
8. To determine conductivity of an unknown liquid using conductivity meter.
9. To find the amount of dissolved oxygen in a given solution using DO meter.
10. Study of Flame Photometry.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI702		MEMS and NEMS	60	20	20	0	0	3	0	0	3

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):

The main goal of this course is to make learner gain knowledge of designing and fabrication process which is essential for simulation of nanoelectronic devices.

1. To understand the limitations of silicon electronics and progress of nanoelectronics
2. To study the significance of tunneling effect in nanoelectronic devices
3. To understand the concepts of coulomb blockade and electron transport
4. To emphasize the importance of electronic property of materials in mesoscopic level

Course Outcomes (COs):

After completing the course the students will be able to:

1. Implement the electronic device fabrication techniques.
2. Have practical understanding of the major engineering concepts and demonstrate application of their theoretical knowledge of the concepts and help to get the academic and industrial jobs.
3. Able to interact scientifically with industry both within and outside of a classroom setting.
4. Develop an appreciation of continuing educational and professional development.

Syllabus:

UNIT I **7Hrs**

UNIT I OVERVIEW AND INTRODUCTION

New trends in Engineering and Science: Micro and Nano scale systems Introduction to Design of MEMS and NEMS, Overview of Nano and Micro electromechanical Systems, Applications of Micro and Nano electro mechanical systems, Micro electromechanical systems, devices and structures Definitions, Materials for MEMS: Silicon, silicon compounds, polymers, metals.

UNIT II

MEMS FABRICATION TECHNOLOGIES **8Hrs**

Microsystem fabrication processes: Photolithography, Ion Implantation, Diffusion, Oxidation. Thin film depositions: LPCVD, Sputtering, Evaporation, Electroplating; Etching techniques: Dry and wet etching, electrochemical etching; Micromachining: Bulk Micromachining, Surface

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Micromachining, High Aspect-Ratio (LIGA and LIGA-like) Technology; Packaging: Microsystems packaging, Essential packaging technologies, Selection of packaging materials

UNIT III

MICRO SENSORS **6Hrs**

MEMS Sensors: Design of Acoustic wave sensors, resonant sensor, Vibratory gyroscope, Capacitive and Piezo Resistive Pressure sensors- engineering mechanics behind these Microsensors. Case study: Piezo-resistive pressure sensor

UNIT IV

MICRO ACTUATORS **7Hrs**

Design of Actuators: Actuation using thermal forces, Actuation using shape memory Alloys, Actuation using piezoelectric crystals, Actuation using Electrostatic forces (Parallel plate, Torsion bar, Comb drive actuators), Micromechanical Motors and pumps. Case study: Comb drive actuators.

UNIT V

NANOSYSTEMS AND QUANTUM MECHANICS **7Hrs**

Atomic Structures and Quantum Mechanics, Molecular and Nanostructure Dynamics: Schrodinger Equation and Wave-function Theory, Density Functional Theory, Nanostructures and Molecular Dynamics, Electromagnetic Fields and their quantization, Molecular Wires and Molecular Circuits

Text Books:

1. Marc Madou, "Fundamentals of Micro fabrication", CRC press 1997.
2. Stephen D. Senturia," Micro system Design", Kluwer Academic Publishers, 2001.

Reference Books:

1. Tai Ran Hsu ,"MEMS and Microsystems Design and Manufacture" ,Tata Mcraw Hill, 2002.
2. Chang Liu, "Foundations of MEMS", Pearson education India limited, 2006
3. www.tutorials point.com.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI711		Industrial Automation	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 identify potential areas for automation and justify need for automation.
2. To select suitable major control components required to automate a process or an activity
3. To translate and simulate a real time activity using modern tools and discuss the benefits of automation.
4. To identify suitable automation hardware for the given application.

Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

1. Identify potential areas for automation and justify need for automation.
2. Understand to select suitable major control components required to automate a process or an activity
3. Translate and simulate a real time activity using modern tools and discuss the benefits of automation.
4. Design suitable automation hardware for the given application.
5. Apply appropriate modelling and simulation tool for the given manufacturing application.

Syllabus:

UNIT I **6Hrs**

Introduction: Automation in Production System, Principles and Strategies of Automation, Basic Elements of an Automated System, Advanced Automation Functions, Levels of Automations. Flow lines & Transfer Mechanisms, Fundamentals of Transfer Lines. (SLE: Analysis of Transfer Lines)

UNIT II **7Hrs**

Material handling and Identification Technologies: Overview of Material Handling Systems, Principles and Design Consideration, Material Transport Systems, Storage Systems, Overview of Automatic Identification Methods. (SLE: Material Identification Methods)

UNIT III **8Hrs**

Automated Manufacturing Systems: Components, Classification and Overview of Manufacturing

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Systems, Manufacturing Cells, GT and Cellular Manufacturing, FMS, FMS and its Planning and Implementation. Quality Control Systems: Traditional and Modern Quality Control Methods, SPC Tools, Inspection Principles and Practices, Inspection Technologies. (SLE: Usage of SPC tools using excel or Minitab).

UNIT IV **7Hrs**

Control Technologies in Automation: Industrial Control Systems, Process Industries Versus Discrete-Manufacturing Industries, Continuous Versus Discrete Control, Computer Process and its Forms.(SLE: Sensors, Actuators and other Control System Components)

UNIT V **8Hrs**

Computer Based Industrial Control: Introduction & Automatic Process Control, Building Blocks of Automation Systems: LAN, Analog & Digital I/O Modules, SCADA Systems& RTU. Distributed Control System: Functional Requirements,Configurations & some popular Distributed Control Systems.
(SLE: Display Systems in Process Control Environment.)

Text Books:

1. M. P. Groover ,"Automation, Production Systems and Computer Integrated Manufacturing", Pearson Education.5th edition, 2009.

Reference Books:

1. Krishna Kant ,"Computer Based Industrial Control", EEE-PHI,2nd edition,2010.
2. Tiess Chiu Chang& Richard A. Wysk "An Introduction to Automated Process Planning Systems".
3. Viswanandham,"Performance Modeling of Automated Manufacturing Systems", PHI, 1st edition,2009.

List of Experiments:

1. Demonstration of Mechatronics System Components.
2. Application of Sensors.
3. Application of Actuators.
4. Study of Electrical Basics and Demonstration of Multimeter.
5. Use and Demonstration of PLC Hardware and Software.
6. Interfacing of Input and Output Devices to PLC.
7. PLC Programing Exercises.
8. Mechatronics System Case Study.
9. Use of Data Acquisition System (SCADA)
10. Visit to an Industrial or Process Automation Plant

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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*				
BTEI712		Intelligent Instrumentation and Techniques	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 historical development of intelligent instruments.
2. To study and understand the basic concepts of virtual instrumentation.
3. To get an insight into real time system software tool such as LabVIEW.

Course Outcomes (COs):

The students will be able to:
1. Describe the basics of intelligent instruments and differentiate it with dumb instruments.
2. Design the instrumrnts with. LabVIEW and its implementation in the programming.
3. Interface DAQ card and GPIB buses with the PC.
4. To understand the concept of smart instruments and their features.

Syllabus:

UNIT I **7Hrs**

Introduction: Introduction to intelligent instrumentation, Intelligent versus Dumb instruments, Historical Perspective, Current status, software based instruments, Concepts of Real Time system and its application.

UNIT II **7Hrs**

Virtual Instrumentation: Introduction to graphical programming, data flow & graphical programming techniques, advantage of VI techniques, VI's and sub VI's, loops and charts, arrays, clusters and graphs, case and sequence structure, formula nodes, string and file I/O, Code Interface Nodes and DLL links.

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UNIT III **6Hrs**

Data Acquisition Methods: Analog and Digital IO, Counters, Timers, Basic ADC designs, interfacing methods of DAQ hardware, software structure, use of simple and intermediate Viz. Use of Data Sockets for Networked communication and controls.

UNIT IV **8Hrs**

PC Hardware Review and Instrumentation Buses: Structure, timing, interrupts, DMA, operating system, ISA, PCI, USB, and PCMCIA Buses. IEEE488.1 & 488.2 serial Interfacing - RS 232C, RS422, RS423, RS485, USB, VXI, SCXI, PXI.

UNIT V **7Hrs**

Smart Instruments: Smart/intelligent transducer, comparison with conventional transducers, self-diagnosis and remote calibration features, smart transmitter with HART communicator, Micro Electro Mechanical Systems, sensors, nonlinearity compensation.

Text Books:

1. G.C. Barney, "Intelligent instrumentation: microprocessor applications in measurement and control", Prentice Hall Publication, 1988.
2. Jovitha Jerome, "Virtual Instrumentation using Lab VIEW", PHI Publication, 2010.

Reference Books:

1. Lisa, K. Wells & Jeffery Travis, "LabVIEW For everyone", Prentice Hall, Publication.
2. D. Patranabis, "Principle of Industrial Instrumentation", Tata McGraw Hill Publication,2013.
3. E. O. Doebelin, "Measurement systems", McGraw Hill Publication, 2007.
4. P. Chapman, "Smart Sensors", ISA Publication, 1995.

List of Experiments:

1. To perform basic mathematical operations using LabVIEW.
2. To perform Boolean operations using LabVIEW.
3. To perform looping operations in LabVIEW.
4. To perform VI's and sub VI's, charts, arrays operations in LabVIEW.
5. To perform case and sequence structure in LabVIEW.
6. To input a number and test whether it is even or odd, an LED will blink if the number is even.
7. To generate a signal from a function generator of a reasonable frequency and use an Express VI called DAQ Assistant to input the signal and display it on a Chart.
9. Construct a graphical program that can help achieve a desired temperature for the thermal object. The heater is actuated by a pulse-width modulated (PWM) square wave whose duty cycle d is controllable.
10. To generate a general purpose instrument control template that can be interface to any GPIB instrument.
11. To simulate a CRO using LabVIEW.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI713		Wireless Sensor Networks	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. Understanding of ad hoc networks, design and implementation issues, and available solutions.
2. Knowledge of the 802.15. This includes their designs, operations, plus approaches to interoperability.
3. Use of sensor networks and their characteristics. This includes design of MAC layer protocols, understanding of power management, query processing, and sensor databases.
4. Hands-on experience in designing and implementing ad hoc network functionality using network simulation tools.

Course Outcomes (COs):

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

1. Demonstrate the principles and characteristics of wireless sensor networks (WSNs).
2. Use proactive and reactive routing protocols function and their implications on data transmission delay and bandwidth consumption.
3. Apply hybrid routing protocols function and their ability to balance speed and bandwidth consumption.
4. Solve the issue of broadcast storms and flooding, and how some techniques attempt to reduce them.
5. Demonstrate the limitations of wireless sensor networks and the workarounds needed to develop real-life applications.

Syllabus:

UNIT I **8Hrs**

Characteristics of WSN:

Characteristic requirements for WSN , Challenges for WSNs , WSN vs Adhoc Networks ,Sensor node architecture , Commercially available sensor nodes –Imote, IRIS, Mica Mote, EYES nodes, BTnodes, TelosB, Sunspot -Physical layer and transceiver design considerations in WSNs, Energy usage profile, Choice of modulation scheme, Dynamic modulation scaling, Antenna considerations.

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UNIT II **7Hrs**

Medium Access Control Protocols:

Fundamentals of MAC protocols , Low duty cycle protocols and wakeup concepts , Contention based protocols ,Schedule-based protocols - SMAC ,BMAC , Traffic-adaptive medium access protocol (TRAMA) , The IEEE 802.15.4 MAC protocol, RS 485, MODBUS, CAN BUS.

UNIT III **8Hrs**

Routing and Data Gathering Protocols:

Routing Challenges and Design Issues in Wireless Sensor Networks, Flooding and gossiping , Data centric Routing , SPIN , Directed Diffusion , Energy aware routing ,Gradient-based routing ,Rumor Routing ,COUGAR ,ACQUIRE , Hierarchical Routing - LEACH, PEGASIS ,Location Based Routing – GF, GAF, GEAR, GPSR ,Real Time routing Protocols – TEEN, APTEEN, SPEED, RAP ,Data aggregation ,data aggregation operations, Aggregate Queries in Sensor Networks , Aggregation Techniques ,TAG, Tiny DB.

UNIT IV **8Hrs**

Embedded Operating Systems:

Operating Systems for Wireless Sensor Networks , Introduction - Operating System Design Issues , Examples of Operating Systems , TinyOS , Mate , MagnetOS ,MANTIS , OSPM ,EYES OS ,SenOS ,EMERALDS ,PicOS , Introduction to Tiny OS , NesC , Interfaces and Modules-Configurations and Wiring Generic Components ,Programming in Tiny OS using NesC, Emulator TOSSIM.

UNIT V **7Hrs**

Applications of WSN:

WSN Applications ,Home Control , Building Automation ,Industrial Automation ,Agricultural Applications,Medical Applications , Reconfigurable Sensor Networks , Highway Monitoring , Military Applications , Civil and Environmental Engineering Applications , Wildfire Instrumentation,Habitat Monitoring Nanoscopic Sensor Applications.

Text Books:

1. Kazem Sohraby, Daniel Minoli and Taieb Znati, " Wireless Sensor Networks Technology, Protocols, and Applications", John Wiley & Sons, 2007.
2. Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Ltd, 2005.

Reference Books:

1. K. Akkaya and M. Younis, "A survey of routing protocols in wireless sensor networks",

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Elsevier Ad Hoc Network Journal, Vol. 3, no. 3, pp. 325—349
2. Philip Levis, " TinyOS Programming".
3. Anna Ha c, "Wireless Sensor Network Designs", John Wiley & Sons Ltd,

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.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI721		Process Dynamics and Control	60	20	20	30	20	2	1	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. Expose students to the advanced control methods used in industries and research.
2. Prepares the student to take up such challenges in his profession.

Course Outcomes (COs):

After successfully completing the course students will be able to:

1. Describe dynamics of various processes.
2. Learn and analyze the effect of various controllers tuning.
3. Impart knowledge on the final control elements.
4. Know evaluation criteria and tuning techniques of controllers.
5. Use the concept of multi loop control techniques.

Syllabus:

UNIT I **8Hrs**

Process Dynamics

Introduction to process control,Need for process control & classification of process variables - Degrees of freedom, Elements of Process Dynamics, Types of processes- Dead time, Single & multi capacity, self-Regulating, non self regulating, Interacting, noninteracting, Linear/non linear, and Selection of control action for them. Study of Liquid Processes, Gas Processes, Flow Processes, Thermal Processes in respect to above concepts

UNIT II **7Hrs**

Analysis of control Loop

Steady state gain, Process gain, Valve gain, Process time constant, Variable time Constant, Transmitter gain, Linearising a equal percentage valve, Variable pressure drop. Analysis of Flow Control, Pressure Control, Liquid level Control, Temperature control, SLPC-features, faceplate,

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functions, MLPC- features, faceplate, functions, SLPC and MLPC comparison. Scaling: types of scaling, examples of scaling

UNIT III **8Hrs**

Feeddback Control

Basic principles, Elements of the feedback Loop, Block Diagram, Control Performance Measures for Common Input Changes, Selection of Variables for Control Approach to Process Control. Factors in Controller Tuning, Determining Tuning Constants for Good Control Performance, Correlations for tuning Constants, Fine Tuning of the controller tuning Constants. The performance of feedback Systems, Practical Application of Feedback Control: Equipment Specification, Input Processing, Feedback Control Algorithm, Output Processing.

UNIT IV **7Hrs**

Controller Tuning

Evaluation criteria,IAE, ISE,ITAE and ¼ decay ratio,Tuning:-Process reaction curve method, Continuous cycling method and Damped oscillation method, Determination of optimum settings for mathematically described processes using time response and frequency response approaches, Auto tuning.

UNIT V **7Hrs**

Multi loop Control

Feed=forward control, Ratio control, Cascade control, selective control, override control, Auctioneering control , plant wide control ,Split range and introduction to multi variable control, Examples from distillation column and boiler systems, IMC (Integral Model Controller) ,Model Predictive Control, P&ID diagram.

Text Books:

1. C.D. Johnson, "Process control Instrumentation Technology"Prentice Hall Inc.,2007.
2. Bella G. Liptak,"Process control and Optimization", Instrument Engineers Handbook, volume 2,CRC Press and ISA,2005
3. D.R.Coughanowr,, "Process system analysis and control",Mcgraw-Hill International, Edition 2004.

Reference Books:

1. D.E. Seborg, T.F. Edger, and D.A. Millichamp, "Process Dynamics and Control", John Wiley and Sons, 2nd Edition, 2004.
2. B.W. Bequette, "Process Control: Modeling, Design and Simulation", PHI, 2006.

List of Experiments:-

1. To perform Pressure to Current & Current to Pressure conversion through Trainer kit.
2. To Study the Process Control Training Plant and Compact Flow Control Unit.
3. To use & apply different Pneumatic Valves & Pneumatic Actuator and their working using Advanced Pneumatic Trainer.

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4. To Design of ON/OFF Controller for the Temperature Process.
5. To perform Water Level control on process control trainer plant.
6. To study and analysis of PID controllers.
7. To Study the working of LSM Controller over Conveyor and X-Y Position Table.
8. To perform and analysis Different Hydraulic and Pneumatic operation on H-simulators & P-simulators.
9. To perform operation on Pneumatic double acting and single acting cylinder using ABB PLC programming kit.
10. Design and Implementation of Multi loop PI Controller on the Three tank system.
11. Analysis of Multi input -Multi output system.(Four Tank Systems)
12. To study and analysis of auto tuning of PID controllers in process control plant.

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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*				
BTEI722		Logic Design	60	20	20	30	20	2	1	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 Develop and apply the skill of logic design using latest tools and technology

Course Outcomes (COs):

Student will be able to

1. Describe the basics of logic design.
2. Apply and develop the research work, about the design methods.
3. Use problem solving techniques for controlling logical system.
4. Take awareness of latest technologies and developments.
5. Test the logical system.

Syllabus :

UNITI **6Hrs**

Design Concepts & Logic Circuits

Digital Hardware, Design Process, Design of Digital Hardware Variables & Functions Logic gates & Networks synthesis, SOP, POS forms, Introduction to VHDL.

UNIT II **7Hrs**

Optimized Implementation Of Logic Functions:

Strategy for minimization, incompletely specified functions, Multiple output circuits, Multilevel synthesis & Analysis Building Block of combinational circuits, Multiplexers Decoders, Encoders Code Converters, sequential circuits: flip-flop, registers counters. Subsystem Design: Data-paths; adder, Shift registers ALU, Memory; NVRWM, Flash memories, 6-Transistor RAMs. Latch up in CMOS Circuits.

UNIT III **6Hrs**

Synchronous Sequential Circuits

Basic Design Steps, Mealy state Model, Design of FSM.

UNIT IV **6Hrs**

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Asynchronous Sequential Circuits

Analysis, Synthesis, State Reduction, State Assignment, Hazards.

UNIT V **6Hrs**

Testing of Logic Circuits

Fault Model, Path sensitizing, Random testing, Circuits with Tree Structure.

Text Books:

1. A. Anand Kumar "Fundamental of digital Circuits" Third edition ,PHI,2014.
2. Stephen Browne, Vranesic" Fundamental of digital logic design with VHDL" 2e, McGraw Hill,2017

Reference Books:

1. Richard F. TINDER "Engineering Digital Design"2e, AP 2000.
2. William I. Fletcher "An Engineering Approach to Digital Design", Pearson 2015.
3. M. Morris Mano, Charles Kime "Logic and Computer Design Fundamentals",4e , Pearson ,2013.

List of Experiments

1. Design all gates using VHDL.
2. Write VHDL programs for the following circuits, check the wave forms and the hardware generated a. Half adder b. Full adder
3. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
   a) Multiplexer
   b) Demultiplexer
4. Write VHDL program for encoder and check the wave forms and the hardware generated.
5. Write a VHDL program for a Down counter and check the wave forms and the hardware generated.
6. Write a VHDL program for a BCD to GRAY code converter and check the wave forms and the hardware generated.
7. Implement Half Adder using FPGA & CPLD.
8. Implement Full Adder using FPGA & CPLD.
9. Implement Delay Flip flop using FPGA & CPLD.

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SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	T	P	CREDITS
BTEI723		Automated Control System	60	20	20	30	20	2	1	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 define Automation and Control and explain the differences in the sense of the terms.
2. To explain the relation between Automation and Information Technology.
3. To underline the basic objectives of a manufacturing industry and explain how Automation and control technologies relate to these
4. To introduce the concept of a Product Life Cycle and explain how Automation and Control technologies relate to the various phases of the cycle
5. To classify Manufacturing plants and categorize the different classes of Automation Systems those are appropriate for these.

Course Outcomes (COs):

After completing the course the students will be able to:

1. Describe the major features of an interpolator for a contouring CNC system
2. Apply common multi-tasking architectures of RTOS.
3. Implement the major functions of Production Management Systems.

Syllabus :

UNIT I **7Hrs**

Introduction to Industrial Automation and Control, Architecture of Industrial Automation Systems, Measurement Systems Specifications, Temperature Measurement, Pressure and Force Measurement, Displacement and Speed Flow Measurement, Measurement of Level, Humidity and pH.

UNIT II **7Hrs**

Introduction to Process Control, P-I-D Control ,Controller Tuning, Implementation of P-I-D Controllers, Special Control Structures: Feed-forward and Ratio Control, Predictive Control, Control of Systems with Inverse Response, Cascade, Override and Split Range Control.

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UNIT III **7Hrs**

Introduction to Sequence/Logic Control and Programmable Logic Controllers, The Software Environment and Programming of PLCs, Formal Modeling of Sequence Control Specifications and Structured RLL Programming, The PLC Hardware Environment .

UNIT IV **8Hrs**

Introduction to Computer Numerically Controlled (CNC) Machines, CNC Machines: Interpolation, Control and Drive. Control Valves, Hydraulic Actuation Systems - I: Principle and Components, Directional Control Valves, Switches and Gauges, Industrial Hydraulic Circuits, Pneumatic Control Components, Pneumatic Control Systems.

UNIT V **7Hrs**

Industrial Embedded and Communication Systems, Introduction to Real Time Embedded Systems Real-Time Operating Systems: Introduction and Process Management, Networking of Field Devices via Field bus, Higher Levels of Automation Systems.

Text Books:

1. S. Mukhopadhyay, S. Sen and A. K. Deb, "Industrial Instrumentation, Control and Automation", Jaico Publishing House, 2013
2. George Stephanopoulos, "Chemical Process Control, an Introduction to Theory and Practice", Prentice Hall India, 2012

Reference Books:

1. R. Krishnan ,"Electric Motor Drives, Modeling, Analysis and Control" , Prentice Hall India,2002

List of Experiments:

1. Analysis of process using Process reaction curve (Ziegler Nicholas method).
2. Use of Continuous oscillation method (Method II).
3. Design of controller using Root Locus method.
4. Design of controllers using bode plot.
5. Design of controller using (Polar plot) Nyquist method.
6. Design of controller by Ruth Hurwitz criteria method.
7. To study and analysis of PID controllers.
8. To Study the working of LSM Controller over Conveyor and X-Y Position Table.
9. To perform operation on Pneumatic double acting and single acting cylinder using ABB PLC programming kit.
10. To study and analysis of auto tuning of PID controllers in process control plant.

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