SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE)
VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	Course Title	Course Code	Credits - 4			Theory Paper
			L	T	P	Max.Marks-70
DC	Power Electronics	EI-1851	3	-	2	Min.Marks-22 Duration-3 Hrs.

Sub. Code	Subject Name & Title	Maximum Marks Allotted					Total Marks
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz/ Assignment	End Sem.	Lab Work/ Assignment	
EI-1851	Power Electronics	70	20	10	30	20	150

Course Objectives	Study of this subject provides the following course objectives: 1. To impart knowledge about various power semiconductor devices. 2. Prepare the students to analyze and design different power converter circuits. 3. Prepare the students to apply power semiconductor devices in different Industrial and Home appliances.
Prerequisite Knowledge	Basic Electrical Engg., Analog Electronics and Network analysis.
Course Description	Describe the role of Power Electronics as an enabling technology in various applications such as flexible energy conversion, renewable energy, etc. Design the switching power-pole using the available power semiconductor devices, their drive circuitry and heat sinks. Learn the role of Power Electronics in utility-related applications which are becoming extremely important.
Course Outcomes	*This course primarily contributes to EI program outcomes that develop students abilities to:* **CO1**- Acquire fundamental concepts of semiconductor switches. **CO2**-Understand operation and applications of different power electronics converters **CO3**-Identify basic requirements for power electronics based design application. **CO4**-Comprehend operation of inverters, choppers, controllers and cycloconverters. **CO5**-Apply power converters to develop commercial and industrial applications.

04.08.19

Syllabus.

Unit I

Power, Semiconductor Devices: Classification of Power semiconductor devices, characteristics, construction, application and theory of operation of power diode, power transistor, thyristors. Device specifications and ratings, working of Diac, Triac, IGBT, GTO and other power semiconductor devices. Turn-on / turn-off methods and their circuits.

Unit II

Rectifiers: Review of uncontrolled rectification an its limitations, controlled rectifiers, half wave, Full wave configurations, multiphase rectification system, use of flywheel diode in controlled rectifier configurations for different types of load.

Unit III

Inverters and Choppers: Classification of inverters, Transistor inverters, Thyristor inverters, Voltage and Current Communicated inverters, PWM inverters, Principle of Chopper, Chopper classification and their working, Regulators.

Unit IV

A. C. Voltage Controllers and Cycloconverters: Classification and operation of a.c. voltage controllers and cycloconverters, their circuit analysis for different types of load.

Unit V

Industrial Applications: Solid-state switching circuits, Relays, Electronic Timer, Battery charger, Sawtooth generator, Applications in Industrial process control, Motor drive applications, Electronic regulators, etc., Induction heating, Dielectric Heating, Resistance welding and welding cycle.

Suggested Text Books

1. Power electronics, converters, applications & design - Need Mohan et.al., Wiley
2. Power Electronics Circuits, devices & applications - M.H. Rashid, PHI.
3. Power Electronics - P.C.Sen, TMH
4. Power Electronics: Devices, Circuits & MATLAB Simulations, Alok Jain, Penram Int. Publication.
5. Semiconductor Power Electronics- CM Pauddar

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE) VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	Course Title	Course Code	Credits -4			Theory Paper
			L	T	P	
DC	Process Instrumentation-II	EI-1852	3	-	2	Max.Marks-70 Min.Marks-22 Duration-3 Hrs.

Sub. Code	Subject Name & Title	Maximum Marks Allotted					Total Marks
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz/ Assignment	End Sem.	Lab Work/ Assignment	
EI-1852	Process Instrumentation-II	70	20	10	30	20	150

Course Description	This course introduces the concepts of modern sensors and actuators which are used for the measurement of physical variables in industries. The subject aims are to explain some of the most important physical principles applied in sensors and actuators & to highlight performance limitations which arise in the installation of these devices.
Prerequisite Knowledge	Basic of fundamentals of Instrumentation & Transducers
Course Objectives	Upon completion of this course, the student will be able to: 1. To understand the working principle and construction of contact & non-c0ntact type temperature sensors 2. To understand the working principle and construction of various pressure sensors,gauges & devices. 3. To understand the working principle and construction of quantity flow meters, area flow meters, mass flow meters 4. To understand the various methods of level measurement. 5. To understand the various methods of humidity and moisture measurement
Course Outcomes	This course primarily contributes to EI program outcomes that develop students abilities to: **CO1** Analyze & measure Industrial Temperature, Pressure, Flow, and Liquid Level with different transducers. **CO2** Analyze & Calibrate variety of electronic instruments, troubleshoot instrument problems and provide proper maintenance. **CO3** Describe safety standards of Industry sensors, devices and controls

07.08.19

Syllabus

Unit-I

Temperature Measurement:-Temperature scales,, temperature calibrators and simulators. Different types of thermometers: liquid in glass, bimetal, filled system, thermocouple, RTD, thermistors, IC temperature sensors, radiation thermometers, temperature switches, and thermostats.

Unit-II

Pressure Scale and Standards: - Manometers: U-tube, well type, inclined tube, ring balance and digital manometer. Elastic pressure sensors: Bellows, bourdon tubes, diaphragm, (types, materials, range, construction, resonant frequency, advantages and limitations). Sensitivity, Secondary pressure sensors, Differential pressure measurements: Force balance type, ring balance, Knudsen Gauge. High-pressure sensors: Dead weight tester,. Vacuum sensors: McLeod gauge, thermal conductivity (Pirani, Thermocouple gage) ionization types,

Unit-III

Flow Measurement: - Fluid properties, turbulent & laminar flow, Reynolds number, velocity profile, flow conditioners, influence of pressure & temperature on volume flow-rate,. Different flow measurement techniques: differential pressure flow meters, variable area flow meters, magnetic flow meter, vortex shedding flow meter, positive displacement flow meter, turbine flow meter, ultrasonic flow meter, target flow meter, Criteria for selection of flow meters.

Unit-IV

Level Measurement: - Review of different level measurement methods and application considerations. Various level measurement devices: gauge glass, float & displacer type level sensors, D/P type level sensors, capacitive level sensors, ultrasonic & microwave level sensors, tape level gauges, servo level gauges,conductivity level sensors, radiation level sensors, vibrating level switches.

Unit-V

Measurement of Humidity And Moisture:- Humidity terms – dry and wet bulb psychrometers – hot wire electrode type hygrometer – dew cell – electrolysis type hygrometer – commercial type dew point meter – moisture terms – different methods of moisture measurement – moisture measurement in granular materials, solid penetrable materials like wood, web type material. Suitable signal conditioner.

Textbooks:

1. H.N. Norton-Handbook of Transducers, Prentice Hall; Facsimile Edition
2. D. Patranabis -Principle of industrial Instrumentation, McGraw Hill Education; 3 Edition
3. E.O. Doebelin-Measurement Systems Applications and Design, Tata McGraw Hill Education; 5th Edition
4. Nakra and Chaudhary-Instrumentation Measurement and Analysis, McGraw Hill Education India Private Limited; Fourth edition.
5. A. K. Sawhney -Electronic Instruments & Measurement, Dhanpat Rai Publications.

04.06.19

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE) VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	Course Title	Course Code	Credits - 4			Theory Paper
			L	T	P	
DC	Microprocessors & Interfacing	EI -1853	3	-	2	Max.Marks-70 Min.Marks-22 Duration-3 Hrs.

Sub. Code	Subject Name & Title	Maximum Marks Allotted					Total Marks
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz/ Assignment	End Sem.	Lab Work/ Assignment	
EI -1853	Microprocessors and Interfacing	70	20	10	30	20	150

Course Objectives	1. To develop an in-depth understanding of the operation of microprocessors. 2. To develop programming skill in low level assembly Language. 3. To develop Interfacing Techniques.
Prerequisite Knowledge	The students should have good background on digital circuits.
Course Description	This course is intended as a first level course for microcontroller and embedded system design. Designer of an embedded system must have a thorough understanding of hardware, software and system integration. In view of this, various aspects of hardware design, such as interfacing of memory and different types of I/O devices, will be covered in details. As it is customary to write software in machine or assembly language laboratory assignments will be on assembly language programming of 8085 and 8086.
Course Outcomes	This course primarily contributes to program outcomes that develop students abilities to: **CO-1** Understanding of 8085 & 8086 Microprocessors - Hardware overview: CPU, Memory, Address, Data and Control buses, Ports. **CO-2** Express and recognize Timing Diagram, Instruction cycle and infer it. **CO-3** Define Instruction Sets and apply them to write assembly language Programs. **CO-4** Extend Interrupts, Data transfer scheme and Interfacing. **CO-5** Compare the architectural features of 8085 & 8086 and assess their performance with the help of instruction sets, able to construct assembly language programs.

04.06.19

Syllabus

Unit I

Introduction to Microprocessor – Architecture of typical 8 bit microprocessor- Intel 8085, Study of Functional units, Function & generation of various control signals, Timing Diagrams, Memory Interfacing, Peripheral mapped I/O, Memory Mapped I/O techniques, Interrupts in 8085.

Unit-II

Introduction to the 16-bit 8086 family of microprocessors: Architecture Overview, Memory Organization, Minimum and Maximum mode operation of 8086, Interrupts in 8086.

Unit-III

Instruction set of 8085 and 8086, Types of Instructions, Addressing modes, Programming Techniques, 16 bit data operations, etc., Assembler Directives and Operators, Elementary 8086 programming.

Unit-IV

Interfacing to general purpose programmable peripheral devices - Programmable peripheral interface (PPI) 8255, Programmable interval timer 8253/8254, Programmable interrupt controller 8259A, DMA controller 8257.

Unit-V

Interfacing with keyboards, LEDS, ADC, DAC, motors, and stepper motors. Serial I/O & Data communication, USART (8251), RS 232C, Modems and various bus standards.

Text Books:

1. Gaonkar R., Microprocessor Architecture, Programming, and Applications with the 8085, Penram Int. Publishing, Mumbai.
2. A.K.Ray and K.M.Bhurchundi, Advanced Microprocessors and Peripherals, TMH.
3. Soumitra Kumar Mandal, Microprocessors and Microcontrollers: Architecture, Programming and Interfacing using 8085, 8086 and 8051, TMH.
4. K.J. Ayala, The 8086 Microprocessor: Programming and Interfacing The PC, Penram Int. Publishing, Mumbai.
5. Yu-cheng Liu, Glenn A. Gibson, Microcomputer Systems: The 8086/8088 Family (Architecture, Programming, and Design), PHI.

04.06.19

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE) VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	Course Title	Course Code	Credits – 4			Theory Paper
			L	T	P	
DC	Digital Signal Processing	EI -1854	3	1	-	Max.Marks-70 Min.Marks-22 Duration-3 Hrs.

Sub. Code	Subject Name & Title	Maximum Marks Allotted					Total Marks
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz/ Assignment	End Sem.	Lab Work/ Assignment	
EI-1854	Digital Signal Processing	70	20	10	-	-	100

Course Description	The course presents the basic concepts and techniques for processing signals on a computer. By the end of the course, students will be familiar with digital filter design, effects of finite register length, application of the subject to one-dimensional signals, transform-domain processing and importance of Signal Processors. The course focuses equally on the understanding and practical implementations of the theoretical concepts.
Prerequisite Knowledge	Basic Algebra, Trigonometry, Complex Arithmetic, Geometry, Overview of Signals and Systems, Laplace transform, z-transform.
Course Objectives	Digital Signal Processing is an introduction to signal processing, a topic that forms an integral part of engineering systems in many diverse areas, including seismic data processing, communications, speech processing, image processing, defense electronics, consumer electronics, and consumer products. The subject aims to introduce the basic principles, methods, and applications of digital signal processing, to explore its algorithmic, computational, and programming aspects. The focus is also on establishing a mathematical formalism for analyzing, modeling, and simulating electrical systems in the time and frequency domains.

04.06.19

Syllabus

UNIT I

The Discrete Fourier Transform: Introduction to DSP, Discrete Fourier series, Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Properties of DFT, Circular convolution, linear convolution using the DFT.

UNIT II

Computation of the Discrete Fourier Transform: Goertzel algorithm, FFT algorithm: Decimation in time (DIT), FFT algorithm: Decimation in frequency (DIF), N-radix computations of FFT, Comparison of DIT and DIF algorithms, Computational advantages of FFT Algorithms

UNIT III

FIR filter Design: Introduction to Digital filters, Types of digital filters: FIR and IIR filters, FIR filter design: Window method, FIR filter design: Frequency Sampling method, FIR filter design: Optimal filter design method, Realization structures for FIR filters and Finite word length effects in FIR filters.

UNIT IV

IIR filter Design: Comparison of IIR and FIR digital filters, IIR filter specifications, IIR filter design method: Impulse Invariant method, IIR filter design method: Bilinear Transformation method, IIR filter design method: Matched Z-Transform method, Realization structures for IIR filters, Finite word length effects in IIR filters.

UNIT V

Discrete Random Signals & Power Spectrum Estimation: Introduction to discrete time random process, Spectrum representations of infinite energy signals, Response of linear system to random signals, Introduction to spectrum estimation, Estimates of the auto covariance, power spectrum, Estimates of cross covariance and cross spectrum.

Text Books:

1. Digital Signal Processing: Salivahanan, Vallavraj, Gnanapriya, TMH
2. Digital Signal Processing: Principles, Algorithms and Applications: Prokais, Manolakis, Pearson.
3. Discrete Time Signal Processing: Oppenheim, Schafer, Buck, Pearson
4. Digital Signal Processing: A. Nagoor Kani, Mc Graw Hill.
5. Digital Signal Processing: P. Ramesh Babu, Scitech.

04.06.19

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE) VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	Course Title	Course Code	Credits - 3			Theory Paper
			L	T	P	
DC	Analog & Digital Communication	EI-1855	3	-	-	Max.Marks-70 Min.Marks-22 Duration-3 Hrs.

Sub. Code	Subject Name & Title	Maximum Marks Allotted					Total Marks
		Theory Paper			Practical		
		End Sem.	Mid Sem. MST	Quiz, Assignment	End Sem.	Lab Work/ Assignment	
EI-1855	**Analog & Digital Communication**	**70**	**20**	**10**	-	-	**100**

Course Objectives:

Course Outcomes:

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

Course Objectives	1. To understand the basic structure of a communication chain and its components: sources of messages, modulation, channel, and demodulation. 2. To learn the concepts of analog and digital modulation. 3. To classify and discuss different types of transmitters and receivers as applicable to analog communication systems.
Prerequisite Knowledge	Basic Electrical & Electronics and Network analysis.
Course Description	This course provide a thorough introduction to the basic principles and techniques used in analog and digital communication.
Course Outcomes	*This course primarily contributes to EI program outcomes that develop students abilities to:* **CO-1** Understand the need for modulation and the basic elements of a communication system. **CO-2** Understand the basic concepts of digital communications with an insight into practical applications. **CO-3** Compare and contrast ASK, FSK, PSK digital carrier

04.08.19

	modulation schemes in terms of occupied bandwidth, complexity etc., and extend these into QPSK, MPSK, QAM for improved spectral efficiency. **CO-4** Apply the basics of information theory to calculate channel capacity and other measures. **CO-5** Competent to work as engineers in the field of Analog and Digital Communications, e.g., in research or development groups in industry, as consultants, team members, or leaders in projects.

Syllabus

Unit I

Time domain and frequency domain representation of signal, Fourier Transform and its properties, Transform of Gate, Periodic gate, Impulse periodic impulse sine and cosine wave, energy and power Signals, spectral density and persevalls theorem for energy of power signals, Convention, Signal Transmission though linear systems, signal distortion in transmission, Bandwidth and rise time, Hilbert transform representation of band pass signal

Unit II

Base band signal, Need of modulation, Introduction of modulations techniques, Amplitude modulation, Equation and its frequency domain representation, Bandwidth, power distribution. AM suppressed carrier, waveform equation and frequency domain representation, Generation (Balance/Chopper modulation) and synchronous detection, errors in synchronous, SSB, DSB-SC, VSB, Angle modulation, Definitions and relationship between PM and FM frequency deviation, NBFM and WBFM.

Unit III

Sampling of signal, Sampling theorem for low pass and Band pass signal, type of sampling, Instantaneous, Natural and flat top, pulse amplitude modulation (PAM), Introduction to pulse position and pulse duration modulation, Quantization, Pulse Code Modulation (PCM), Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), and Adaptive Delta modulation (ADM), comparison of various system, Signal to Noise Ratio (SNR).

Unit IV

Digital Modulation Techniques, Generation, detection, equation and Bandwidth of Amplitude Shift Keying (ASK), Binary Phase Shift Keying (BPSK), Differential Phase Shift Keying (DPSK), offset and non -offset Quadrature Phase Shift Keying (QPSK), M- Ary PSK, Binary Frequency Shift Keying (BFSK), M- Ary FSK, Quadrature Amplitude Modulation, Introduction to probability of error.

04.06.19

Unit V

Unit of information, Entropies, Joint and conditional entropy, Mutual information, Channel capacity efficiency of noise free channel Binary Symmetric Channel (BSC), Binary Erasure Channel (BEC), Cascaded Channels, Shannon's Theorem, Shannon-Hartley theorem, bandwidth - SIN ratio trade-off, Shannon - Fanon code, Huffman code, Channel coding, Block code, Cyclic code, Convolution code.

Reference Books:

1. Communication System, Simon Haykin,3rd edition, John Wiley & Sons
2. Principle of Communication Taub Schilling, 3rd edition, Tata McGraw-Hill Education
3. Modern Analog & Digital Communication System, B.P. Lathi, 2nd edition, Oxford University Press.
4. Communication Systems (Analog & Digital Communication), R. P. Singh and S. D. Sapre, 2nd edition, Tata McGraw-Hill Education.

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE (DEGREE) VIDISHA (M.P)

ELECTRONICS & INSTRUMENTATION DEPARTMENT

Category of Course	Course Title	Course Code	Credits - 1			Theory Paper
			L	T	P	
DLC	LabVIEW Programming	EI-1856	-	-	2	-

Sub. Code	Subject Name & Title	Maximum Marks Allotted					Total Marks
		Theory Paper			Practical Slot		
		End Sem.	Mid Sem. MST	Quiz/ Assignment	End Sem.	Lab Work/ Assignment	
EI-1856	LabVIEW Programming	-	-	-	30	20	50

Course Objectives	To impart adequate knowledge on Virtual Instrumentation for acquisition and analysis of real time application
Prerequisite Knowledge	Basic Knowledge of Programming,
Course Outcomes	After completion of the course students will be able to 1. To educate about the Basic concepts of VI 2. To make them understand the programming concepts of VI. 3. To Configure and interface various data acquisition hardware like DAQ, NI-ELVIS-II and Sensors. 4. To provide an insight to various Common Instrument Interface. 5. To impart Engineering knowledge on various analysis tools of LabVIEW

SYLLABUS

LIST OF EXPERIMENTS

1. Study of LabVIEW and its Environment:
   i. Front Panel Window, Block Diagram and Connector Pane
   ii. Menus and Palettes
   iii. Basic Operations and Configuration Options
   iv. Data Types
2. Study of Arithmetic Operators and creating VIs using Basic Arithmetic Operations.
3. Study of Logical Operators and creating VIs using Logical Operation.
4. Study of Comparative Operators and creating VIs using Comparative Operation.
5. Study of Arrays and their basic operations and developing VIs using these Arrays.
6. Study of Control Structures using:
   i. For Loop and While Loop
   ii. Shift Register and Tunnel
   iii. Case and Sequence Structure
7. Study of Data Plotting:
   i. Waveform Graph
   ii. Waveform Chart
   iii. XY Graph

04.06.19

8. Study of NI ELVIS-II Proto Type Board:
    i. Instrument Control
    ii. Introduction of Oscilloscope
    iii. Function Generator and Power Supply
    iv. Digital Multimeter
    v. Digital Reader and Writer
    vi. Dynamic Signal Analyzer
9. Measure the Passive Components values using NI ELVIS-II Proto Type Board.
10. Data Acquisition using LabVIEW
11. Analyze the Characteristic of Active Components using NI ELVIS-II Proto Type Board.
12. Design a Voltage Divider Circuit on the NI ELVIS-II Proto Type Board.
13. Design and testing the RC Circuit with Function Generator and Oscilloscope using NI ELVIS-II Proto Type Board.
14. Plot the Frequency Response of basic 741 Op-Amp circuit using NI ELVIS-II Proto Type Board.

Text Books:

1. Jovitha Jerome, Virtual Instrumentation Using LabVIEW, PHI Publication, India, 2010.
2. Gary Jonson, LabVIEW Graphical Programming, 2nd ed., McGraw Hill, New York, 1997
3. Lisa K. wells & Jeffrey Travis, LabVIEW for everyone, Prentice Hall Inc., NJ; 1997
4. S. Gupta, J.P: Gupta, PC interfacing for Data Acquisition & Process Control, 2nd ed., Instrument Society of America, 1994
5. Technical Manuals for DAS Modules of Advantech and National Instruments.

04.06.19