SHRI G. S. INSTITUTE OF TECHNOLOGY & SCIENCE, INDORE

Department of Electronics and Instrumentation

B.E- II Year (4YDC) Semester (A)

SUBJECT CODE: EI-27001

SUBJECT NOMENCLATURE: CIRCUIT ANALYSIS AND SYNTHESIS

Course Objectives:

1. To Identify and realizes various electrical circuit topologies.
2. Determine time domain and frequency domain responses.

Course Outcomes: - The student will able to:

CO1: Apply KVL and KCL in Electrical Circuits.

CO2: Identify circuit Topology to reduce complexity.

CO3: Apply Fourier series and Laplace transform for circuit analysis and synthesis.

CO4: Apply various network topologies to analyzes and synthesis of various electrical parameters (2-port/ Hybrid/ T/ π)

CO5: To perform time domain analysis of electrical networks.

CO- PO articulation matrix

Circuit Analysis And Synthesis EI 27001												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	2	1									
CO 2	3	2	2									
CO 3	3	2	3	1								
CO 4	3	2	3	1								
CO 5	3	2	3	1								
Average PO	**3**	**2**	**2.3**	**1**								

Course Outcomes (Practical):

CO-1: KVL and KCL in electrical circuit (EXP -1)

CO-2: EXP (2 & 3) Thevenin's / Norton's Theorem.

CO-3: EXP (4,5 & 6) Superpostion Theorem , Reciprocity Theorem and maximum power transfer Theorem.

CO-4: EXP (7) design and implement integrator / differentiator and verify the functionality of circuits

CO-5: EXP (4,5 & 8,9,10) to obtain frequency response of series and parallel RLC circuit (with step input and sinusoidal input) & calculate its resonant frequency

SUBJECT CODE: EI- 27002
SUBJECT NOMENCLATURE: FUNDAMENTALS OF MEASUREMENT

Course Objective: Student will able to identify and classify various techniques and instruments for measurement and their calibrations strategies.

Course Outcomes: Student will able to:

CO1: To classify measuring instruments and their related errors.
CO2: Illustrate construction and operations of CRO with its measuring application.
CO3: Identify Analog instruments for measuring purpose.
CO4: List & explain measurement techniques for resistance, voltage, current/voltage, phase, frequency, energy& power.
CO5: Classify A.C. bridges for measurement of electrical parameters like inductance, capactance.

CO- PO articulation matrix

Fundamentals of Measurement EI 27002												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	1		2								
CO 2	3	2		2	1							
CO 3	3	1										
CO 4	3	1		1								
CO 5	3	1	2	1								
Average PO	**3**	**1.2**	**2**	**1.5**	**1**							

Course Outcomes (Practical): The student will able to:

CO1: To measure amplitude, phase (lissajous pattern) & frequency of unknown signal with CRO & compare with DSO.
CO2: Construct & operationalize Analog instruments based on PMMC principle.
CO3: Measure unknown resistance using different methodologies.
CO4: Measure unknown Inductance using Maxwell's, Inductance Bridge, Hay's Bridge, Anderson's Bridge, Owen's Bridge.
CO5: Measure unknown capacitance using De- Sauty's Bridge, and Schering's Bridge.

SUBJECTCODE: EI-27003
SUBJECT NOMENCLATURE: ELECTRONIC DEVICES AND CIRCUITS

Course objectives: The student will able to learn and understand the theory of semi-conductor devicesand its modeling & applications.

Course Outcomes: At end of course, the students should

CO1: Able to identify the semiconductor type and explain its working principle.
CO2: Able to discuss the working principle of diodes/BJT and their applications.
CO3: Able to develop the models of diodes & & BJT/FET/MOSFET.
CO4: Able to explain the principle of operation of MOSFET & its circuit design.
CO 5: To discuss fabrication techniques for integrated circuits.

CO- PO articulation matrix

Electronics Devices & Circuits EI 27003												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	2	1									1
CO 2	3	2	1									1
CO 3	3	2	1									
CO 4	3	1	1	2								1
CO 5	3	2										1
Average PO	**3**	**1.8**	**1**	**2**								**1**

Course Outcomes (Practical): At end of lab session, the students should be able to:
CO1: To generate different waveforms using CRO & function generator and measure parameters like amplitude and frequency.
CO2: To determine VI characteristics for diodes (PN Junction, LED & Zener)
CO3: To apply and perform the Hall Effect on semiconductor to identify their types and concentrations.
CO4: To build, test & obtain the characteristics & parameters of BJT from its input /output variations.
CO5: To build the circuit and obtain characteristics of N Channel MOSFET.

SUBJECTCODE: EI-27006/EI27562
SUBJECT NOMENCLATURE: DIGITAL ELECTRONICS

Course Objectives: The student will

1. Understand fundamentals of digital electronics.
2. Realize various digital circuits using gates.

Course Outcomes: Student should be able:

CO1: To perform reduction of logical expressions and implement it using logic gate..
CO2: To develop combinational circuits for given application and verify its operation.
CO3: To gain the knowledge of sequential circuits with their implementations.
CO4: To analyze memory classification and structure.
CO5: To implement asynchronous and synchronous circuits fall under digital electronics.

CO- PO articulation matrix

Digital Electronics EI 27006 / EI 27562												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	3	2	1								1
CO 2	3	3	2	1								1
CO 3	3	3	2	1								1
CO 4	3	2	1	1	2							2
CO 5	3	2	1	3	3							2
Average PO	**3**	**2.6**	**1.6**	**1.4**	**2.5**							**1.4**

Course Outcomes (Practical): The student will able to build, test & realize

CO1: Truth tables of logic gates & implementation of Boolean logic equations.
CO2: Design combinational circuits for given application and verifies its operation. (Adder/subtractor/convertors).
CO3: Design & verify sequential circuits for given application and verifies its operation. (Mux/Demux/Encoder/Decoder/Flip-flops/counters).

SUBJECT CODE: MA-27014
SUBJECT NOMENCLATURE: MATHEMATICS-III

Course Outcomes:-

CO1: Solve linear homogeneous partial differential equation of nth order & their applications.
CO2: Obtain Fourier series expansion of function satisfying Dirichlet condition & FT of elementary fun.
CO3: Apply Laplace Transform to solve second order differential equation involving Dirac delta.
CO4: Solve the problems based on interpolation, numerical differentiation & integration.
CO5: Solve the algebraic, transcendental and simultaneous equation using various numerical methods.

CO- PO articulation matrix

Mathematics-III MA-27014												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	3	3									3
CO 2	3	3	3									3
CO 3	3	3	3									3
CO 4	3	3	3									3
CO5	3	3	3									3
Average PO	**3**	**3**	**3**									**3**

SUBJECTCODE: EI-27498
SUBJECT NOMENCLATURE: ELECTRONIC WORKSHOP LAB

Course Objective: To identify about basic electronic component. To apply colour coding scheme for resistance (Band 4, Band 5 & band 6) To implement methodology for designing PCB (Etching, Drilling & Soldering)

Course Outcomes: Students should be able:

CO1: To identify about basic electronic component.
CO2: To gain knowledge of characteristics of basic electronic component.
CO2: To apply colour coding scheme for resistance (Band 4, Band 5 & band 6)
CO3: To implement methodology for designing PCB (Etching, Drilling & Soldering)
CO4: To design an electronics circuit using basic components like BJT/FET/timers, amplifiers & several IC's.

CO- PO articulation matrix

Electronics Workshop EI 27498												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	2	1				1					1
CO 2	3											
CO 3	3	2	2	1			3					2
CO 4	3	2	2	1					3	3	3	2
Average PO	**3**	**2**	**1.6667**	**1**			**2**		**3**	**3**	**3**	**1.67**

BE- II Year (4YDC) Semester (B)

SUBJECT CODE: EI- 27501
SUBJECT NOMENCLATURE: ANALOG ELECTRONICS

Course Objectives: Student should be able to analyze & design

1. BJT and FET based amplifier for required frequency specifications
2. Power efficient amplifiers
3. Amplifiers for various special mathematical operations using integrated circuits.

Course Outcomes: Student should be able to

CO1: To perform the frequency response & gain calculation of single/double stage amplifiers.
CO2: To explain the principle of feedback amplifier & oscillators.
CO3: To analyze and apply OP-amp fundamentals and descriptive view of Op-amp IC's.
CO4: To classify & demonstrate frequency response of tuned RF voltage amplifiers.
CO5: To describe the role of Multi vibrators & linear wave shaping circuits.

CO- PO articulation matrix

Analog Electronics EI 27501												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	1	1									
CO 2	3	2	1	1								
CO 3	3	2	2	2								1
CO 4	3	1	1									
CO 5	3	2	2	1								1
Average PO	**3**	**1.6**	**1.4**	**1.333**								**1**

Course Outcomes (Practical's): The student will able to design the circuit and analyze:

CO1: The frequency responses of different RC coupled amplifiers & calculate their parameters.
CO2: The frequency response of feedback amplifiers & oscillators.
CO3: Various multi-vibrators & observe their output waveform.
CO4: Operational Amplifiers (with calculation of parameters) & implementing/verifying of different applications of Op-amp.
CO5: Frequency response of Tuned amplifiers.

SUBJECT CODE: EI-27551

SUBJECT NOMENCLATURE: SENSORS& TRANSDUCERS

Course Objectives: The student will able to identify various sensors & transducers for particular applications.

Course Outcomes: - The student will able to:

CO1: To identify role of Sensor and transducers in instrumentation.
CO2: Explain the transducer construction, classification, principle of operation & characteristics.
CO3: Classify transducers for measurement of force, pressure, vacuum measurement.
CO4: To analyze transducers for measurement of temperature.
CO5: To list the transducers for flow and level measurement.

CO- PO articulation matrix

Sensor & Transducer EI 27551												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	2										1
CO 2	3	2		2	1							
CO 3	3	2		2	1							
CO 4	3	2		2	1							
CO 5	3	2		2	1		2					1
Average PO	**3**	**2**		**2**	**1**		**2**					**1**

Course Outcomes (Practical):- the student will able to perform and measure

CO1: Resistive type transducers.
CO2: Temperature using RTD/ Thermistor/Thermocouple.
CO3: Linear range & sensitivity of Strain Gauge.
CO4: behavior & characteristics of LVDT.
CO5: displacement using capacitive type transducers & their sensitivity.

SUBJECT CODE: EI-27504

SUBJECT NOMENCLATURE: CIRCUIT DESIGN USING HDL

Course Objectives:-The student will able to design and simulate digital circuits using hardware descriptive language-VHDL/Verilog.

Course Outcome: The student will able to

CO1: Identify the different features & characteristics of VHDL
CO2: Classify the modeling strategies in VHDL
CO3: Design and simulate various combinational & sequential logic circuits.
CO4: Differentiate the VHDL and Verilog for logic design.
CO5: Classify Programmable logic arrays & devices.

CO- PO articulation matrix

Hardware Descriptive Language EI 27XXX												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	1	1									
CO 2	3	1	1	1								1
CO 3	3	3	2	1								1
CO 4	3	2	2	1								1
CO 5	3	1	1									2
Average PO	**3**	**1.6**	**1.4**	**1**								**1.25**

Course Outcomes (Practical): The student will able to:

CO1: Design and simulate the combinational circuit using VHDL
CO2: Design and simulate the sequential circuit using VHDL

SUBJECT CODE: HU-27005
SUBJECT NOMENCLATURE: ECONOMICS FOR ENGINEERS

Course objectives:-

1. To develop the optimizing skills of technology-use in engineering problems
2. To articulate economic analytical skills so as to contextualize the solutions of engineering problems.
3. To explore the potential of students in economic perspective of engineering professional goals.
4. To make sense of need of entrepreneurship and understand the financial reports of a business.

Course Outcomes:

(Cognitive Level – Understand) – After completion of course, the students will be able to:

CO-1: Explain behaviour of Consumer so as to estimate the demand pattern and demand elasticity for a product.

CO-2: Plan the production; choose appropriate production technology (combination of production factors); and estimate feasible range of production.

CO-3: Analyze the production-cost-profit relation and select the suitable project for investment

CO-4: Estimate price and the equilibrium for a firm/organization in different competitive market situations.

CO-5: Review, summarize and compare the financial statements of an accounting entity and able to Apply financial ratio technique for financial analysis. Co-6: Explain and illustrate the entrepreneurship and phases of start-up.

SUBJECT CODE: MA-27563
SUBJECT NOMENCLATURE: MATHEMATICS-IV

Course Outcomes:-

CO1: Solve engineering problems using complex variable technique such contour integral & trans.
CO2: Apply concept random variables in one and two dimensions and its distribution.
CO3: Apply concepts stochastic process, Markov chain and their applications.
CO4: Apply concept of reliability & maintainability for quality improvement in electronics system.
CO5: Apply concept of graph theory & Solve minimal weight & shortest path problems using algorithms

CO- PO articulation matrix

Mathematics-III MA-27563												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	3	3									3
CO 2	3	3	3									3
CO 3	3	3	3									3
CO 4	3	3	3									3
CO5	3	3	3									3
Average PO	**3**	**3**	**3**									**3**

SUBJECT CODE: EI-279992

SUBJECT NOMENCLATURE: SOFTWARE WORKSHOP LAB

Course Objective: The student will able to simulate the electronic circuits.

Course Outcomes: - The student will able to:

CO1: To implement the MATLAB Desktop, Command window and the Graph Window

CO2: Perform mathematical and logical calculation using MATLAB

CO3: Apply and analyze numerical computations.

CO4: Discuss the tools that are essential in solving engineering problems.

CO- PO articulation matrix

Software Workshop EI 27992												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3	3	2	1	3							
CO 2	3	2	1	1	2							
CO 3	3	2	1	1	2							
CO 4	3	2			3							1
Average PO	**3**	**2.25**	**1.333**	**1**	**2.5**							**1**

SUBJECT CODE: EI-27881

SUBJECT NOMENCLATURE: VALUES, HUMANITIES & PROFESSIONAL ETHICS

Course Objective:

1. To make students understand of his/her social responsibility as an engineer.
2. To create an awareness on Engineering Ethics and Human Values
3. To make students capable of doing self-exploration and recapitulation
4. To make students aware of the global problems

Course Outcomes: - After completion of course, the students will be able to:

1. Explain and elaborate the social institutions through which the society and nation is governed.
2. Describe the kinds of values and ethics and their importance.
3. Contextualize the professional attitude and approaches as per needs of society and values.
4. Explain and illustrate the process of Social, Political and Technological changes in-context to global changes.

SHRI G.S INSTITUTE OF TECHNOLOGY & SCIENCE, INDORE

Department of Electronics and Instrumentation

BE III Year (4 YDC) Semester (A)

SUBJECT CODE: IT37005
SUBJECT NOMENCLATURE: DATA STRUCTURES

Course Objective: Understand data structure stack queues, lists, trees, complexity etc. in detail. Study memory hierarchy, management techniques partitioning, segmentation, paging and comparison of techniques.

Course Outcomes:-

CO1: Define the data structure & solve problems involving stack queues, lists, trees.
CO2: Explain the concept of memory hierarchy, management techniques partitioning, segmentation, paging and comparison of techniques.
CO3: Explain the CPU scheduling and multiprogramming.
CO4: List the file systems and its organization.
CO5: Case studies on MS-DOS, UNIX and WINDOWS NT.

CO-PO Articulation Matrix

Data Structure IT37005												
CO	P0 1	P0 2	P0 3	P0 4	P0 5	P0 6	P0 7	P0 8	P0 9	P0 10	P0 11	P0 12
CO 1	3	2	1	-	-	-	-	-	-	-	-	1
CO 2	3	3	1	2	2	-	-	-	-	-	-	1
CO 3	3	3	2	2	-	-	-	-	-	-	-	1
CO 4	3	2	2	-	-	-	-	-	-	-	-	1
CO 5	3	2	2	-	-	-	-	-	-	-	-	1
Average PO	3	2.4	1.6	2								

SUBJECT CODE: EI-37006
SUBJECT NOMENCLATURE: MICROPROCESSOR SYSTEMS

Course Objective: - Students should be able to: Understand design parameters of microprocessor and microcontroller based circuits. Understand architecture of 16/32 bit microprocessor. Design and analyze various peripherals required for microprocessor circuits.

Course Outcomes:-Student will able to:

CO1: Explain origin of microprocessor family and architecture of 8085 microprocessor.
CO2: Design & implement assembly language programming of 8085 microprocessors.
CO3: Implement I/O device /peripheral sub-systems interfacing with microprocessor.
CO4: Identify basic building blocks of microprocessor and explain the operation of microprocessors – 8086.
CO5: Differentiate basic microprocessor with advance RISC based microprocessors

CO-PO Articulation Matrix

Microprocessor Systems EI 37006												
CO	P0 1	P0 2	P0 3	P0 4	P0 5	P0 6	P0 7	P0 8	P0 9	P0 10	P0 11	P0 12
CO 1	3	1	1									
CO 2	3	2	1	1								
CO 3	3	2	2	2								1
CO 4	3	1	1	1								1
CO 5	3	2	2	1								2
Average PO	3	1.6	1.4	1.25								1.333333

Course Outcomes: Practical: Student will able to:
CO1: **Able to understand and use trainer kit (M85-03).**
CO2: Analyze, design, and simulate program **of 8085 microprocessor in assembly language .**
CO3: Able to identify the features of software**like GNU8085**

SUBJECT CODE: EE-37003
SUBJECT NOMENCLATURE: CONTROL SYSTEM

Course Objectives: Control Engineering plays a fundamental role in modern technological systems. The aim of this course is to serve as an introduction to control system analysis and design .A control system consisting of interconnected components is designed to achieve a desired purpose. Modern control engineering practice includes the use of control design strategies for improving manufacturing processes, the efficiency of energy use, advanced automobile control.

The objectives include equipping students with:

1. Basic understanding of issues related to control systems such as modelling, time and frequency responses of dynamical systems, performance specifications.
2. Techniques for determining stability of systems.
3. Basic design aspects of various controllers and compensators.
4. Dynamical system analysis using state space model.

Course Outcomes After completing the subject student will be able to:
EE37003 (T).1: Understand the dynamic systems and analyze mathematical modelling of physical systems such as Electrical, Mechanical, Thermal and Hydraulic.
EE37003 (T).2: Evaluate the time domain and frequency domain design specifications of the system and error dynamics of first and second order systems with various inputs.
EE37003(T).3:Application of frequency domain analysis for ascertaining stability in time and frequency domain using Routh Hurwitz analysis, Root Locus, Nyquist and Bode Plots.
EE37003(T).4:Designing of Lead, Lag and Lead-Lag compensators for desired frequency domain closed loop performance, Designing of PID Controllers.
EE37003(T).5:Understanding the concept of controllability and Observability by state space analysis, State feedback Controller design with Pole Placement.

CO-PO Articulation Matrix

Control System EE37003												
CO	P0 1	P0 2	P0 3	P0 4	P0 5	P0 6	P0 7	P0 8	P0 9	P0 10	P0 11	P0 12
CO 1	1	3	2	2	1							
CO 2		3	2	2								
CO 3		3	2	2	1							
CO 4			2	2	1							
CO 5		3			1							
Average PO	1	3	2	2								

Laboratory Outcomes:

EE37003(P).1: The student should be able to turn into practice the theoretical concepts of linear control system.

EE37003(P).2: Analyze system performance under the effect of different controllers.

EE37003(P).3: Determine the stability of a well-defined transfer function using simulation tools.

EE37003(P).4: Visualize the performance parameters of LTI system in real life.

SUBJECT CODE: EC-37014

SUBJECT NOMENCLATURE: ANALOG & DIGITAL COMMUNICATION

Course Outcomes:-

CO1: Conceptualize mathematical representation of signals.

CO2: Various transmission schemes used in analog& digital communication.

CO3: Designing a communication system sub parts.

CO4: Performance comparison of various analog& digital communications.

CO5: Realization of digital communication system

PROGRAM ELECTIVE-I

DEPARTMENT OF COMPUTER ENGINEERING

CO37253: ARTIFICIAL INTELLIGENCE

Course Objectives: To enable students to learn basic concepts, theories, applications and techniques of Artificial Intelligence and machine learning.

Course Outcomes: - The student will able to:

CO1: Differentiate between Human and Artificial Intelligence .

CO2: Apply knowledge representation using logic and rules and reasoning.

CO3: Describe the basics of machine learning and performance parameters.

CO4: Elaborate the principle and application of regression and SVM and practice the training using the said method.

CO5: Classify and examine the process of decision trees and dimensionality reduction in Machine learning.

CO-PO Articulation Matrix

Artificial Intelligence CO37253												
CO	P0 1	P0 2	P0 3	P0 4	P0 5	P0 6	P0 7	P0 8	P0 9	P0 10	P0 11	P0 12
CO 1	3	2	1									
CO 2	2	1	2	1								
CO 3	3	2	2	1								1
CO 4	3	2	1	1								1
CO 5	2	2	2	2								1
Average PO	2.6	1.8	1.6	1.25								

SUBJECT CODE: IP-37251 (PROGRAM ELECTIVE-I)
SUBJECT NOMENCLATURE: INDUSTRIAL ENGINEERING & MANAGEMENT

Course Outcomes:-

CO1: Identify the work place design, work measurement tests & technology.
CO2: Apply the concept of operations & organization management.
CO3: Explain operational research, linear programming, transportation models and its applications.
CO4: Apply and learn quality control & its economics.

SUBJECT CODE: EI-37252 (PROGRAM ELECTIVE-I)
SUBJECT NOMENCLATURE: INSTRUMENT SYSTEM DESIGN

Course Outcomes:

CO1: To work on PCB designing software‘s.
CO2: To design Microcontroller based electronic circuit
CO3: To interpret data sheets & specifications of various logic families & IC‘s

SUBJECT CODE: EI-37481
SUBJECT NOMENCLATURE: TEST & CALIBRATION LAB

Course Objective: To learn Different Types Methods for Calibration, Find out Errors in any instrument etc.

Course outcome: Student should able to:

CO1: Calculate & measure static and dynamic characteristic of measurement system
CO2: Discuss concepts of testing of measuring Equipments.
CO3: Analyzing the errors of the electronic equipments.
CO4: Calibrate test equipments.

CO-PO Articulation Matrix

Test & Calibration EI37481												
CO	P0 1	P0 2	P0 3	P0 4	P0 5	P0 6	P0 7	P0 8	P0 9	P0 10	P0 11	P0 12
CO 1	1	3	1									
CO 2	1	1	1	--	--	--	--	--	--	1	2	1
CO 3	--	--	3	3	1	2	--	--	1	2	3	2
CO 4	--	1	1	3	2	3	--	--	3	2	3	2
Average PO	1	1.6667	1.5	3	1.5	2.5			2	1.6667	2.6667	1.6667

SUBJECT CODE: EI-37482
SUBJECT NOMENCLATURE: INTERNSHIP EVALUATION

Course Objective: The student will able to signify the content of theory to the current scenario of industrial works and also find exposure to projects and their handlings.

Course outcome: Student should able to:
CO1: Explore career alternatives prior to graduation.
CO2: Develop work habits and attitudes necessary for job success.
CO3: Identify, write down, and carry out performance objectives
CO4: Develop communication, interpersonal and other critical skills in the job interview process.

CO-PO Articulation Matrix

Internship Evaluation -1 EI37482												
CO	P0 1	P0 2	P0 3	P0 4	P0 5	P0 6	P0 7	P0 8	P0 9	P0 10	P0 11	P0 12
CO 1	1	3	1									
CO 2	1	1	1	--	3	2	--	3	--	1	2	1
CO 3	--	2	3	3	1	2	3	2	1	2	3	2
CO 4	2	1	1	3	2	3	--	--	3	2	3	2
Average PO	**1.3333**	**1.75**	**1.5**	**3**	**2**	**2.3333**	**3**	**2.5**	**2**	**1.6667**	**2.6667**	**1.6667**

BE III Year (4YDC) Semester (B)

SUBJECT CODE: EI-37511
SUBJECT NOMENCLATURE: FILTER DESIGN AND SIMULATION

Course Objective: Student will able to gather the detailed designing & implementation of Various types of filters.

Course Outcomes:-Student will able to:

CO1: Realize various active network elements, filters & Plot frequency response and bode plot using design equations

CO2: Evaluate transfer function of Elliptical, Butterworth and Cauer filters using approximation theory.

CO3: To implement realization of Butterworth filters up-to second order using Op-amp with simulation.

CO4: Analyzing active networks using different approaches & its implementation using matrix

CO5: To realize LC ladder, Kerwins circuit and other passive filter circuits

CO-PO Articulation Matrix

Filter Design & Simulation EI37511												
CO	P0 1	P0 2	P0 3	P0 4	P0 5	P0 6	P0 7	P0 8	P0 9	P0 10	P0 11	P0 12
CO 1	3	2	2	1	1	--	--	--	--	--	--	--
CO 2	2	3	2	2	1	--	--	--	2	--	--	--
CO 3	3	2	3	1	1	--	--	--	1	--	--	--
CO 4	2	2	3	1	1	--	--	--	1	--	--	--
CO5	2	2	1	1	--	--	--	--		--	--	--
Average PO	2.4	2.2	2.2	1.2	1				1.3333			

Course Outcomes (Practical):-Student will able to implement and verify frequency response of

CO-1: Low Pass & High pass filters

CO2: Band Pass & All pass filters

CO3: Second order Low Pass & High pass filters

CO4: Notch and band Reject Filters

CO5: Chebyshev 2nd order Low pass & other various filter topologies.

SUBJECT CODE: EI-37513
SUBJECT NOMENCLATURE: HIGH FREQUENCY ENGINEERING

Course Objectives : Student will be imparted the knowledge so that they can:

1. Discuss and relate the mathematics & modeling of waveguides & transmission lines.
2. Elaborate the working of high frequency devices.

Course Outcomes: The students will able to:

CO 1: To interpret and apply Maxwell's equation & wave equation for RF circuits.
CO 2: To differentiate lossy, lossless and distortion less transmission lines.
CO 3: To apply concept of impedance matching in transmission lines.
CO 4: Classify waveguides and their modes of excitation.
CO5: To discuss working principle and operation of high frequency components like Magnetron, Klystron & TWT.

CO-PO articulation matrix

High frequency Engineering EI37513												
CO	**P0 1**	**P0 2**	**P0 3**	**P0 4**	**P0 5**	**P0 6**	**P0 7**	**P0 8**	**P0 9**	**P0 10**	**P0 11**	**P0 12**
CO 1	3											
CO 2	3		1									
CO 3	3	2	1	1								
CO 4	3	2	1	1								1
CO5	3	2										1
Average PO	**3**	**2**	**1**	**1**								**1**

SUBJECT CODE: EC-37562/37512
SUBJECT NOMENCLATURE: DIGITAL SIGNAL PROCESSING

Course Outcomes:-
After completing this course, the student will be able to:

CO1 Learn characteristics of signals & systems and evaluation of DTFT
CO2 Gain knowledge of Z-transform & analyzing discrete system using Z-transform.
CO3 Evaluation of DFT & FFT and its computation
CO4 Realization and Implementation of digital filters
CO5 Designing digital filters & their implementation.

CO-PO Articulation Matrix

Digital signal Processing EC37562/37512												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	2		-	-	-	1	--	--	--
CO2	3	3	3	3	1	-	-	-	2	--	--	--
CO3	3	3	3	3	1	-	-	-	2	3	2	2
CO4	3	3	3	3	1	-	-	-	2	3	2	2
CO5	3	3	3	3	1	-	-	-	2	3	2	2
Average PO	3	3	2.8	2.8	1	-	-	-	1.8	3	2	2

SUBJECT CODE: ME37502
SUBJECT NOMENCLATURE: MECHANICAL MEASUREMENT

Course Outcomes:
CO1: Learn the types of measurement, errors & their analysis.
CO2: Understand principle of mechanical measurement, electrical, optical etc.
CO3: Measurement of quantities like force, torque, vibration, shock, sound etc.
CO4: Mechanical elements like dampers, flappers, nozzles, valves etc.

SUBJECT CODE: EI37701 (Program Elective-II)
SUBJECT NOMENCLATURE: MICROCONTROLLER & EMBEDDED SYSTEM

Course Objective: The student will be imparted the knowledge so that they can:
Analyze the basic concepts and Architecture associated with different microcontrollers families.
Descriptive view about 8051 family of microcontrollers and designing assembly language programs for Different scenarios and calculations. Illustration of different devices interfacing with 8051 microcontroller.

Course Outcomes: The student will able to:
CO 1: Differentiate between general purpose and application specific processors.
CO2: To draw timing diagrams for execution of particular instruction, interrupt and in different scenarios.
CO3: Illustration applications and design of microcontroller (8051) based system.
CO4: Identify functional units of embedded system, its characteristics and applications.

CO5: To discuss various software architecture of embedded systems &RTOs.

CO-PO Articulation Matrix

Microcontroller & Embedded System (EI37701)												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2										1	
CO2	2	1	2	1	1	1			1	2	2	1
CO3	1	2	3				1			2	1	2
CO4	1	2	1		1		1				1	1
CO5	2	2	3	1	1	1	1		1	2	3	1
Average PO	**1.6**	**1.75**	**2.25**	**1**	**1**	**1**	**1**	**0**	**1**	**2**	**1.6**	**1.25**

SUBJECT CODE: EI-37xxx (Program Elective-II)
SUBJECT NOMENCLATURE: SMART SENSORS

Course Objectives: The student will able to demonstrate & explain the smart sensing elements & devices with applications.

Course Outcomes: Students will be able to:
CO1 Explain the principle of operation of different sensors and their applications
CO2 Identify the recent trends in sensor technologies.
CO3 List and identify sensors for wireless network, home automation and robotics.
CO4 Develop the logics of intelligent sensing system.
CO5 Design and model sensing system and optimize the system

CO-PO articulation Matrix

Smart Cities & Instrumentation Engineering (EI37xxx)												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3		1									
CO2	3	1	1	1								1
CO3	3	1	1	2								1
CO4	3	2	2	1								1
CO5	3	2	1	1								1
Average PO	**3**	**1.5**	**1.2**	**1.25**								**1**

SUBJECT CODE: EI-37991
SUBJECT NOMENCLATURE: MINI PROJECT

Course Objectives: The student will able to implement & verify their functionality the basic and microcontroller based projects.

Course Outcomes: The students will able to:
CO1: Layout Design through PBC Design Software.
CO2: Design Microcontroller based electronic circuit.
CO3: To interpret data sheets & specifications of various logic families & IC‘s.
CO4: Able to Interface sensors with controllers.

CO-PO articulation Matrix

Mini Project EI37991												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	1									
CO2	1	1	1							2	2	1
CO3			1	3	1	1			1	2	3	3
CO4		1	1	3	1	1	2	1	2	2	3	3
Average PO	**1**	**1**	**1**	**3**	**1**	**1**	**2**	**1**	**1.5**	**2**	**2.667**	**2.333**

SHRI G.S INSTITUTE OF TECHNOLOGY & SCIENCE, INDORE
Department of Electronics and Instrumentation
B.E IV Year (4YDC) Semester (A)

SUBJECT CODE: EI-47053
SUBJECT NOMENCLATURE: PROCESS INSTRUMENTATION

Course Objectives: The student will able to analyse and apply various controllers in controlling units. They would be able to realize real world feasibility and applicability of PLC.

Course Outcomes: Student should able to

CO1: To Analyze process control system and evaluation.
CO2: Explain the application of pneumatic, hydraulic & controller in control systems.
CO3: To describe PLC and ladder programming for designing various logics.
CO4: To discuss final control elements.
CO5: To employ PLC and ladder programming to real world scenario.

CO-PO Articulation Matrix

Process Instrumentation EI47053												
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2		**2**			1					1
CO2	3	2	1	**3**	**2**							2
CO3	3	1		2	**1**							2
CO4	3	2	1	1	1							
CO5	3	2	**1**	**2**	**3**		**1**					2
Average PO	**3**	**1.8**	**1**	**2**	**1.75**		**1**					**1.75**

Course Outcomes -Practical: The student will able to
CO1: To analyze Pressure-displacement characteristics.
CO2: Implementation of PID controller in controlling Flow and level systems.
CO3: To employ PLC and ladder programming to real world scenario.

SUBJECT CODE: EI-47055
SUBJECT NOMENCLATURE: VLSI DESIGN

Course Objective: The student will able to design and implement digital circuits & expressions using CMOS.

Course Outcomes:- The student will able to:

CO1: Explain the importance of MOS transistor in designing VLSI circuits.
CO2: To design and analyse CMOS inverter with respect to Speed, Power and area constraints.
CO3: Implement different CMOS logic structures like Domino & Zipper logic.
CO4: To design FSM using Mealy and Moore machines.
CO5: To classify memory systems and differentiate between custom and semi-custom design.

CO-PO Articulation Matrix

VLSI Design EI47055												
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1										
CO2	3	2	2	**2**	**3**							2
CO3	3	3		2	**2**							
CO4	3	2	2	2	3							
CO5	3	3	**2**	**2**	**2**							
Average PO	3	2.2	2	2	2.5							2

Course Outcomes Practical: 1. C. Roth-Logic Design.
2. S. Brown & Z. Vranesic-Fundamentals of Digital Logic with VHDL.
3. D.L.Perry-VHDL Programming by Example.
4. Smith-Application Specific Integrated Circuits.

SUBJECT CODE: EE-47002
SUBJECT NOMENCLATURE: POWER ELECTRONICS (ELECTIVE IV)

COURSE OBJECTIVES:

- To provide students a deep insight in to the operational behavior of practical power switching devices with respect to their static and dynamic characteristics
- To learn the working principle of classified topologies of Thyristor based AC/DC, AC/AC, DC/DC and DC/AC converters.
- To design and analyze the operation of above converters considering their applications.
- To understand design of firing circuits for Thyristor based line commutated converters.

COURSE OUTCOMES:

EE47002(T).1: Acquire knowledge about fundamental concepts and switches used in power electronics
EE47002(T).2: Ability to analyze various single phase and three phase line commutated power converter circuits and understand their applications.
EE47002(T).3: Nurture the ability to identify basic requirements for line commutated converter based design application.
EE47002(T).4: To develop skills to build, and troubleshoot power electronics circuits.
EE47002(T).5: Understand the firing circuit design for line commutated converters

EE47002(T).6: Foster ability to understand the use of line commutated converters in professional engineering.

CO-PO Articulation Matrix

Power Electronics EE47002 (Theory)												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	1	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-
Average PO	**3**	**3**	**3**	**1**								

Practicals: OBJECTIVES: Following are the objective of the course:

1. Show awareness about operating behaviour of various static switches used in converters.
2. Understand the basic requirements in design of power converters.
3. Analyse performance parameters of various power converters.

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LABORATORY OUTCOMES: Students will be able to

EE42007 (P).1: Recognize the functions of CRO, identify and select proper instruments to observe and record performance on different experimental set ups of power electronics laboratory.

EE42007 (P).2: Establish wiring and device connections to assemble experiments of static switches, line commutated, DC-DC converters and record their performances.

EE42007 (P).3: Analyze and compare the performance of various firing pulse generation circuits for triggering and Commutation circuit of SCR .

EE42007 (P).4: Apply professional quality textual and graphical tools to sketch and computing results, incorporating accepted data analysis and synthesis methods, mathematical software, and word-processing tools.

EE42007 (P).5: Ability to work in individual and in group following engineering practices. Ability to interact effectively on a social and interpersonal level, divide up and share task responsibilities to complete assignments.

CO-PO Articulation Matrix (Practical)

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	3	3	-	3	3	2	-	-
CO2	3	-	3	3	3	3	-	3	3		-	-
CO3	3	2	-	3	3	3	-	3	3	2	-	-
CO4	3	2	3	3	3	3	-	3	3	2	-	-
CO5	3	-	-	3	3	3	-	3	3	-	-	-
Average	3	2	3	3	3	3	-	3	3	2	-	-

SUBJECT CODE: EI-47257 (Program Elective I)
SUBJECT NOMENCLATURE: FIBER OPTICS & PHOTONICS

Course Objectives:- The student will able to characterize and realize the applications of fiber optics & concept behind Photonics.

Course Outcomes:- The student will able to:

CO1: To identify modes in optical fibers and define attenuation, dispersion in optical fibers and also identify numerical aperture measurement techniques.
CO2: To classify various Optical sensors for measurement of parameters like temperature and flow etc.
CO3: To design and implement fiber optic communication system for desired BER, link & power budget and time budget.
CO4: To classify optoelectronics materials & their characteristics required for photonics integrated circuits.
CO5: Identify the behavior and functionality of different optoelectronic devices.

CO-PO Articulation Matrix

Fiber Optics & Photonics EI47257												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	--	--	--	--	--	--	--	--	1
CO2	3	2	1	--	--	--	--	--	--	--	--	2
CO3	2	2	3	--	--	--	--	--	--	--	--	3
CO4	2	1	3	--	--	--	--	--	--	--	--	1
CO5	3	1	2									**1**
Average PO	**2.6**	**1.8**	**2.2**									**1.6**

SUBJECT CODE: IT47201 (Program Elective-I)
SUBJECT NOMENCLATURE: DATA STRUCTURES

Course Objective: Understand data structure stack queues, lists, trees, complexity etc. in detail. Study memory hierarchy, management techniques partitioning, segmentation, paging and comparison of techniques.

Course Outcomes:-

CO1: Understand data structure stack queues, lists, trees, complexity etc. in detail.
CO2: Study memory hierarchy, management techniques partitioning, segmentation, paging and comparison of techniques.
CO3: Gain knowledge about CPU scheduling and multiprogramming

CO4: Understand file systems and Input / Output operations.
CO5: Case studies on MS-DOS, UNIX and WINDOWS NT.

CO-PO Articulation Matrix

Data structures (PEC-I) IT47201												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	-	-	-	-	-	-	-	-	1
CO2	3	3	1	2	2	-	-	-	-	-	-	1
CO3	3	3	2	2	-	-	-	-	-	-	-	1
CO4	3	2	2	-	-	-	-	-	-	-	-	1
CO5	3	2	2	-	-	-	-	-	-	-	-	1
Average PO	**3**	**2.4**	**1.6**	**2**	**2**							**1**

SUBJECT CODE: EI-47322 (PROGRAM ELECTIVE-II)
SUBJECT NOMENCLATURE: VLSI TECHNOLOGY

Course Objective:-.

- Understand crystal growth and wafer preparation methods.
- Understand various layering in terms of chip fabrication.
- Understand of various patterning methods. knowledge about memories layout design rules, stick diagrams etc

Course Outcomes:-

CO1: To describe crystal growth and wafer preparation methods.
CO2: To list different layering & oxidation methods in terms of chip fabrication.
CO3: To illustrate various patterning and doping methods.
CO4: To design Floor-planning using EDA tools along with layout design rules checks and stick diagrams.
CO5: To discuss various subsystem design and memories.

CO-PO articulation Matrix

VLSI Technology (PEC-II) EI47322												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2		1								
CO2	3	2					1					1
CO3	3	2					1					1
CO4	3	2	3	1			1					2
CO5	3	3	2	2			1					2
Average PO	**3**		**2.5**	**1.33**			**1**					**1.5**

SUBJECT CODE: EI-47301 (PROGRAM ELECTIVE-II)
SUBJECT NOMENCLATURE: INTELLIGENT INSTRUMENTATION

Course Objectives: The student will able to realise the mechanism of robotics and working with expert system & artificial intelligence.

Course Outcomes:- The student will able to:
CO1: Realization of concepts of robotics, robot mechanism and its functional analysis.
CO2: Designing of smart systems and its study in terms of interfacing and intelligent instrumentation.
CO3: Establishment of real time systems and its scheduling.
CO4: Evaluation of expert system for real time control applications.
CO5: Brief overview of artificial intelligence and its requirement in instrumentation.

CO-PO Articulation Matrix

Intelligent Instrumentation (PEC-II) EI47301												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2										1
CO2	3											1
CO3	3	1										1
CO4	3	3	1									1
CO5	3	3	1	1								2
Average PO	**3**	**2.25**	**1**	**1**								**1.2**

SUBJECT CODE: EI47499 (AB-Group)
SUBJECT NOMENCLATURE: MAJOR PROJECT PHASE-I

Course Objective: The student will able to recognise the problem statements and also carry out the solution for the same.

Course Outcomes:
CO1: Demonstrate a sound technical knowledge of their selected project topic.
CO2: Undertake problem identification, formulation and solution.
CO3: Plan a engineering solutions to complex problems utilizing a systems approach.
CO4: Communicate with engineers and the community at large in written and oral forms.

CO-PO Articulation Matrix

Major Project Phase-I (EI47499)												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	2	2	2							
CO2		3	2	2	2	2	1	1	3	3	3	3
CO3		2	2	1	1	1	1				3	3
CO4	2	2							1	3	3	3
Average PO	**2.5**	**2**	**2**	**1.67**	**1.67**	**1.5**	**1**	**1**	**2**	**3**	**3**	**3**

SUBJECT CODE: BM-47613/ BM47001 (Program Elective-III)
SUBJECT NOMENCLATURE: MEDICAL INSTRUMENTATION

Course Objectives: Student will able to demonstrate knowledge about detection of bio signals and their analysis.

Course Outcomes:- The student will:
CO1: To be able to identify the concepts of Bio signal generation and transduction.
CO2: To be able to discuss the basic concepts of Recording & analysis of physiological signals
CO3: To be able to identify, compare and differentiate between various therapeutic instruments.
CO4: To be able to distinguish between medical imagining modalities
CO5: To be able to report different analytical techniques.

CO-PO Articulation Matrix

Medical Instrumentation (PEC-III) BM47613/47001												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1		1	2	3	3		1			1
CO2	2	2	1		3	3	3		2	1		1
CO3		2	3	1	3	3	3		2		1	2
CO4			3	1	3	3	3		2	2	2	2
CO5	1	2	2		2	3	3		2			1
Average PO	**1.33**	**1.75**	**2.25**	**1**								**1.4**

SUBJECT CODE: EI-47611 (Program Elective-III)
SUBJECT NOMENCLATURE: DIGITAL IMAGE PROCESSING

Course Objectives: The student will able to demonstrate and realize signals/filters & their significance in real worlds.

Course Outcomes: - The student will able to:
CO1: Define the visual perceptions, image sensing and image sampling.
CO2: To apply image transform for 2D image and analyze using DFT, Haar, Hadamard.
CO3: To classify image enhancement techniques and image sharpening filters in image processing.
CO4: To explain different types of image reconstruction process.
CO5: To identify and apply image compression algorithms.

CO-PO Articulation Matrix

Digital Image Processing (PEC-III) EI47611												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3										
CO2	2	3		1								
CO3	2	3	1	1								
CO4	3	3	2	1								1
CO5	3	3	3	1								2
Average PO	**2.6**	**3**	**2**	**1**								**1.5**

SUBJECT CODE: EI-47612 (Program Elective-III)
SUBJECT NOMENCLATURE: COMPUTER NETWORKS

Course Objectives: The student will able to signify the different architectures and topologies in the network system.

Course Outcomes:-

CO 1: Analyze the concepts of networks, types and architectures.
CO2: Identify error free transmission of data and analyze data collision with various protocols.
CO 3: Apply various routing algorithms over a network to provide optimal path.
CO 4: Illustrate the real time applications of networks.
CO 5: Examine the addressing entities of a network with implementation of TCP, UDP protocols.

CO-PO Articulation Matrix

Computer Networks (PEC-III) EI47612												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2										1
CO2	3	1										
CO3	3	2	1									1
CO4	3	2	1									1
CO5	3	1										
Average PO	**3**	**1.6**	**1**									**1**

SUBJECT CODE: EI-47776 (Program Elective-IV)
SUBJECT NOMENCLATURE: AUTOMATION IN INSTRUMENTATION

Course Objective: The student will able to realize significance of sensors used in industries for automation.

Course Outcomes:- At end of course, the students should have

CO1: Define automation, classify its types and application in instrumentation.
CO2: To identify components of data loggers, explain its operation and characteristics, needs for industry.
CO3: Illustrate the concepts of Microcomputer based numerical control system.
CO4: To analyse evolution of electronic system and instrumentation in terms of automation.
CO5: Illustrate the concepts of Virtual instrumentation with a few case studies.

CO-PO Articulation Matrix

Automation in Instrumentation (PEC-IV) EI47776												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	--	--	--	--	--	--	--	--	1
CO2	2	3	2	1	--	--	--	--	--	--	--	2
CO3	2	3	1	1	--	--	--	--	--	--	--	1
CO4	2	3	1	3	--	--	--	--	--	--	--	1
CO5	1	3	3	2	--	--	--	--	--	--	--	3
Average PO	**2**	**2.8**	**1.6**									**1.6**

SUBJECT CODE: EI-47701 (Program Elective-IV)
SUBJECT NOMENCLATURE: DATA ACQUISITION SYSTEMS

Course Objectives: The student will able to signify the design and implementation of acquisition sytem in the industrial aspects.

Course Outcomes:-
CO1: Identify the building blocks of Data Acquisition System.
CO2: Design the signal conditioning circuits for Data Acquisition Systems.
CO3: Analyze the DAQ system for Power Management & Timing.
CO4: Analyze DAQ system using DFT, FFT and DTFT algorithms.
CO5: Design the Data Acquisition Systems for static and dynamic accuracy.

CO-PO Articulation Matrix

Data Acquistion System (PEC-IV) EI47701												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2										
CO2	3	2										
CO3	3	2		1								
CO4	3	2	1	2								
CO5	3	2	1	2								
Average PO	**3**	**2**	**1**	**1.67**								

SUBJECT CODE: EI-47881
SUBJECT NOMENCLATURE: INDUSTRIAL TRAINING/INTERNSHIP/SEMINAR

Course Objective: After completion of the course student will be able to explain and realize the real world working scenario with different aspects of project handlings or hands-on.

Course Outcomes:
CO1**:** Explore career alternatives prior to graduation.
CO2: Develop work habits and attitudes necessary for job success.
CO3: Identify, write down, and carry out performance objectives
CO4: Develop communication, interpersonal and other critical skills in the job interview process.
CO5: Develop Argumentative Skills and Critical Thinking.

CO-PO Articulation Matrix

Industrial Training/Internship/Seminar EI47881												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	3	1									
CO2	1	1	1		3	2		3		1	2	1
CO3		2	3	3	1	2	3	2	1	2	3	2
CO4	2	1	1	3	2	3			3	2	3	2
CO5	3	2	2	1	2	2	1	2	2	3	3	3
Average PO	**1.75**	**1.8**	**1.6**	**2.33**	**2**	**2.25**	**2**	**2.33**	**2**	**2**	**2.75**	**2**

SUBJECT CODE: EI-47999 (AB Group)
SUBJECT NOMENCLATURE: MAJOR PROJECT PHASE-II

Course Objective: The student will able to recognize the problem statements in different domains and carry out the functional solutions to them.

Course Outcomes: after the end of course, student will able to:
CO1: Work in group and develop the leadership qualities.
CO2: Undertake problem identification, formulation and solution.
CO3: Design engineering solutions to complex problems utilizing a systems approach.
CO4: Conduct an engineering project.
CO5: Communicate with engineers and the community at large in written an oral forms
CO6: Demonstrate the knowledge, skills and attitudes of a professional engineer.

CO-PO Articulation Matrix

Major Project Phase-II (EI47999)												
CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	2	2	2							
CO2		3	2	2	2	2	1	1	3	3	3	3
CO3		2	2	1	1	1	1				3	3
CO4	2	2							1	3	3	3
CO5		2	2	3	2	1	1	1	1	2	2	2
CO6	2					2	2	2	2	3	3	3
Average PO	**2.5**	**2**	**2**	**2**	**1.75**	**1.333**	**1**	**1**	**1.67**	**2.67**	**2.75**	**2.75**