CURRICULUM ESSENTIALS

Department of Applied Electronics & Instrumentation Engineering

Dr. B. C. Roy Engineering College, Durgapur – 713206

(OLD SYLLABUS)

Affiliated to MAKAUT and approved by AICTE

Department of Applied Electronics & Instrumentation Engineering
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VISION OF THE DEPARTMENT

To aspire to be a premiere department; imparting world class technical education and to bridge industry expertise with academic excellence, thereby producing technically competent engineers catering to the needs of the society, environment and the nation.

MISSION OF THE DEPARTMENT

The mission of the Applied Electronics and Instrumentation Engineering Department is to provide

- *foundation in Electronics and Instrumentation, and the underlying mathematics and science*
- *excellent opportunity with strong moral sense of social and ethical responsibilities to promote high standards of professional ethics and accountability*
- *state of the art infrastructure and a facilitating environment to impart quality education*
- *conducive environment for creating networks with alumni, industries, educational institutes and other stake-holders and encourages collaborative research*

in order to build up professionally competent engineers through value-added teaching, learning and research environment.

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PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. Graduates of Applied Electronics and Instrumentation Engineering department are expected to excel in professional career or pursue higher education and research or in entrepreneurship by acquiring sound knowledge in basic science, mathematics and core engineering.

2. Graduates of Applied Electronics and Instrumentation Engineering department are expected to abide by professional code of conduct, following the principles of financial management, possessing sound communication skills and ready to take leadership or have enough tolerance to act as a simple and indispensable member of a multicultural team working on a multi-disciplinary project.

3. Graduates of Applied Electronics and Instrumentation Engineering department are expected to be a good citizen, conscious about the society and environment, respect for professional ethics and values and quality to adapt in the fast changing society through life-long learning.

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PROGRAM OUTCOMES (POs) OF THE DEPARTMENT

On completion of the program, the students will be able to:

PO1 Basic Science and Engineering Knowledge: Apply the knowledge of science and mathematics to learn basic science and engineering science courses and thus enables the students to apply them in learning the Professional core course .i.e. Applied Electronics and Instrumentation Engineering.

PO2 Computation Skills: Acquire analytical thinking, problem solving abilities, review research literature, implement modern computational procedures and analyze complex engineering problems to apply on core electronics and instrumentation field.

PO3 Design and development of Solution: Apply core electronics and instrumentation engineering knowledge to design Electronic circuits, highly sensitive sensor networks for monitoring and control of various physical, chemical, pharmaceutical and Industrial parameters and processes.

PO4 Complex Problem Investigation: Apply core instrumentation knowledge to improve working of existing transducers, sensors, telemetry and remote control devices, and derive solutions to interface with dedicated microcontrollers and high end computers and able to measure and control any industrial processes efficiently.

PO5 Modern Tools Utilization: Apply expertise in the utilization of modern software tools like C, JAVA, TASM, MATLAB/Scilab, PLC programming software, and DCS software, and, modern hardware gadgets like the Digital Storage Oscilloscopes, Function Generators, Spectrum Analyzers, stroboscope, LVDT, PID Controllers, PLC, DCS, and flow, level, pressure, and temperature transmitters.

PO6 Engineers for Society: The students of engineering should be motivated to utilize their Scientific, Technological, Computational and Instrumentation skills for the better addressing the societal needs. Design new sophisticated instruments for the high-end Research and Process Industries, Pharmaceutical, Bio-medical fields. They should utilize their expertise to develop indigenous technologies, instruments, gadgets, and inexpensive healthcare systems affordable by common people.

PO7 Environment and sustainability: Utilize their knowledge to design low power consuming, highly sensitive, low radiating ecofriendly devices compatible with modern interfacing techniques in conformity with the specific standards and norms.

PO8 Ethics: The students are motivated to follow a code of ethics and moral perspectives at the individual level as well as at the professional level to protect the interests of all the stakeholders, with a concern for societal responsibilities.

PO9 Individual and team work: Communication skills, Aptitude development programs, Team activities like NSS, project, Seminar Presentations etc. contribute greatly for the development of individual talents/skills. Involvement in Cultural fest, Technical fest, Sports activities provided in the

institute shall also develop capabilities of a student to mold oneself as an Individual member, Team leader or an Organizer.

PO10 Communication Skills: Utilize basic humanities courses and shall acquire excellent communication skills both orally as well as in writing. They shall be able to transform their innovative ideas into excellent technical reports for presentation/publication in seminars/journals.

PO11 Project Management and Finance: Extend their management concepts for drafting of proposals for projects with thorough understanding of the procurement plans (materials, software, and hardware), project management and financial allocations and management during the execution of the project.

PO12 Life-Long learning: Engage their abilities to learn and implement technological changes through life-long learning and also contribute their expertise for the benefit of the current stake holders and the society.

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FIRST YEAR FIRST SEMESTER

Sl. No.	Code	Paper	Contact hours/Week				Credit Points
			L	T	P	Total	
A. THEORY							
1	HU 101	English Language & Technical Communication	2	0	0	2	2
2	CH 101	Chemistry - I	3	1	0	4	4
3	M 101	Mathematics - I	3	1	0	4	4
4	ES 101	Basic Electrical & Electronic Engineering - I	3	1	0	4	4
5	ME 101	Engineering Mechanics	3	1	0	4	4
		TOTAL OF THEORY				18	18
B. PRACTICAL							
6	CH 191	Chemistry - I	0	0	3	3	2
7	ES 191	Basic Electrical & Electronic Engineering - I	0	0	3	3	2
8	ME 191	Engineering Drawing & Computer Graphics	1	0	3	4	3
		TOTAL OF PRACTICAL				10	7
C. SESSIONAL							
9	HU 181	Language Laboratory	0	0	2	2	1
10	XC 181	Extra-Curricular Activities (NSS/NCC/NSO etc.)	0	0	2	2	1
		TOTAL OF SESSIONAL				4	2
		TOTAL OF SEMESTER				32	27

Department	Basic Science & Humanities (BS & HU)
Course Code	HU 101
Title of Course	English Language and Technical Communication
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	2L + 0T
Total Contact Hours	25
Course Outcomes	**CO1:** Ability to communicate technical matters. **CO2:** Ability to communicate fluently and confidently on all spheres of everyday matters.

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Department	Basic Science & Humanities (BS & HU)
Course Code	CH-101
Title of Course	Chemistry-1
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	42
Course Outcomes	**CO1:** Ability to apply concept of Chemical Thermodynamic system with associated laws. **CO2:** Ability to understand Reaction Dynamics & Solid state Chemistry for detection of defects in metals and role of semiconductor. **CO3:** Ability to understand Electrochemistry, Structure and reactivity of Organic molecule. **CO4:** Ability to understand the Industrial Chemistry and its applicability. **CO5:** List major chemical reactions that are used in the synthesis of molecules.

Department	Basic Science & Humanities (BS & HU)
Course Code	M-101
Title of Course	Mathematics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Ability to explain the Knowledge of Matrix, Eigen value problems. **CO2:** Ability to determine the solutions for differential equations which are useful in the Study of Circuit theory and oscillatory systems. **CO3:** Ability to understand Calculus of Functions of Several Variables Partial derivatives, Total differential equations for Electro- magnetic theory, Transmission lines and Vibrating membranes. **CO4:** Ability to use the convergence and Divergence of infinite series in the study of communication systems. **CO5:** Ability to understand Vector Algebra and Vector Calculus.

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Department	Applied Electronics & Instrumentation Engineering + Electrical Engineering
Course Code	ES-101
Title of Course	Basic Electrical & Electronics Engineering - I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Ability to learn & analysis of Network theorems. **CO2:** Ability to learn Electromagnetism with associated theorem. **CO3:** Ability to learn AC fundamentals & study AC response in the various circuits. **CO4:** Ability to learn the basic knowledge of semiconductor materials and develop skill in the analysis and design of electronic circuits like diode, transistor and op amplifier. **CO5:** Ability to learn DC Network theorem, Electromagnetism and AC fundamental.

Department	Mechanical Engineering (ME)
Course Code	ME-101
Title of Course	Engineering Mechanics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** To Understand Particle and Rigid Body; types of forces, moment and Vector algebra. **CO2:** Construct free bodies diagrams and calculate the reactions necessary to ensure static equilibrium. **CO3:** Apply and Analyse problems associated with frictional forces. Centre of gravity and moment of inertia and their applications. **CO4:** To know the basic concept of stress strain behaviour of material and its applications. **CO5:** Analyse D'Alembert's principle for dynamic equilibrium. And application of work energy principle.

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Department	Basic Science & Humanities (BS & HU)
Course Code	CH-191
Title of Course	Chemistry-1 Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	21
Course Outcomes	**CO1:** Ability to apply concept of Solvent Extraction Procedure. **CO2:** Ability to understand Ph metric and conductometric method of determination for acidity and alkalinity of a solution. **CO3:** Ability to understand various parameter for the water analysis. **CO4:** Ability to understand the viscometric method for determination of solution.

Department	Applied Electronics & Instrumentation Engineering + Electrical Engineering
Course Code	ES-191
Title of Course	Basic Electrical & Electronic Engineering – 1
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	
Course Outcomes	**CO1:** Ability to learn the basic knowledge of passive and active electronic components and electronic devices and also develop skill in the analysis and design of electronic circuits like diode, transistor. **CO2:** Ability to study and verification of Network Theorems **CO3:** Ability to be familiar circuit response of R-L-C circuits.

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Department	Mechanical Engineering (ME)
Course Code	ME-191
Title of Course	Engineering Drawing & Computer Graphics
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:1-0-3
Total Contact Hours	40
Course Outcomes	**CO1:** Understanding and drawing of lines, lettering, dimensioning, scales and geometrical construction of curves. **CO2:** Learn projection of points, lines and surfaces and solids like cube, pyramid, prism, cylinder and cone. **CO3:** Drawing isometric view from orthogonal/sectional views of simple solid objects. **CO4:** Understand and draw full and half sectional views of solids and develop the cut surfaces of prism, cylinder and cone. **CO5:** To learn Computer Aided Drafting using AUTO-CAD.

Department	Basic Science & Humanities (BS & HU)
Course Code	HU 181
Title of Course	Language Laboratory
Nature of Course	Compulsory
Type of Course	Sessional
Contact Hours	L-T-P:0-0-2
Total Contact Hours	19
Course Outcomes	**CO1:** Ability to develop skills of technical communication in English through Language Lab practice sessions. **CO2:** Ability to communicate confidently and competently in English in all spheres.

Department	Basic Science & Humanities (BS & HU)
Course Code	XC 181
Title of Course	Extra-Curricular Activities (NSS/NCC/NSO etc.)
Nature of Course	Compulsory
Type of Course	Sessional
Contact Hours	L-T-P:0-0-2
Total Contact Hours	24
Course Outcomes	-

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FIRST YEAR SECOND SEMESTER

Sl. No.	Field	Theory	Contact Hours/Week				Credit Points
			L	T	P	Total	
A.	**THEORY**						
1	**CS201**	Basic Computation & Principles of Computer Programming	3	1	0	4	4
2	**PH201**	Physics - 1	3	1	0	4	4
3	**M201**	Mathematics-2	3	1	0	4	4
4	**ES201**	Basic Electrical & Electronic Engineering-II	3	1	0	4	4
5	**ME201**	Engineering Thermodynamics & Fluid Mechanics	3	1	0	4	4
Total of Theory						**20**	**20**
B.	**PRACTICAL**						
7	**CS291**	Basic Computation & Principles of Computer Programming	0	0	3	3	2
8	**PH291**	Physics – 1	0	0	3	3	2
9	**ES291**	Basic Electrical & Electronic Engineering- II	0	0	3	3	2
10	**ME291**	Workshop Practice (Gr-B)	1	0	3	4	3
Total of Practical						**13**	**9**
Total of Semester						**32**	**29**

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FIRST YEAR SECOND SEMESTER

Department	Computer Science & Engineering/Information Technology
Course Code	CS 201
Title of Course	Basic Computation & Principles of Computer Programming
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	25
Course Outcomes	**CO1:** To formulate simple algorithms for arithmetic and logical problems. **CO2:** To translate the algorithms to programs (in C language). **CO3:** To test and execute the programs and correct syntax and logical errors. **CO4:** To implement conditional branching, iteration and recursion. **CO5:** To decompose a problem into functions and synthesize a complete program using divide and conquer approach. **CO6:** To use arrays, pointers and structures to formulate algorithms and programs. **CO7:** To apply programming to solve matrix addition and multiplication problems and searching and sorting problems. **CO8:** To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Department	Basic Science & Humanities (BS & HU)
Course Code	PH-201
Title of Course	Physics-I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	42
Course Outcomes	**CO1:** Ability to understand the general property of matters and the Oscillation property. **CO2:** Ability to know optics property. **CO3:** Ability to learn basics of Quantum Physics. **CO4:** Ability to understand Crystallography and get the idea of crystal structure and understand the property and behaviour of X-Ray.

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FIRST YEAR SECOND SEMESTER

Department	Basic Science & Humanities (BS & HU)
Course Code	M-201
Title of Course	Mathematics-II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Ability to learn Ordinary differential equations with higher order and first degree. **CO2:** Ability to learn Basics of Graph Theory which are useful in the Study of Circuit theory. **CO3:** Ability to learn Laplace Transform which is useful in the study of communication systems.

Department	Applied Electronics & Instrumentation Engineering + Electrical Engineering
Course Code	ES-201
Title of Course	Basic Electrical & Electronic Engineering – II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Ability to learn the basic of electrostatics DC Machines and Single phase transformer. **CO2:** Ability to understand 3 phase induction motor & three phase system. **CO3:** Ability to know the basic concept of FET and feedback amplifier and oscillators. **CO4:** Ability to analyze the different OPAMP circuits and apply the knowledge of network theory. **CO5:** Ability to acquire the proficiency to express binary numbers.

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FIRST YEAR SECOND SEMESTER

Department	Mechanical Engineering (ME)
Course Code	ME-201
Title of Course	Engineering Thermodynamics & Fluid Mechanics
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	3L + 1T
Total Contact Hours	40
Course Outcomes	**CO1:** To know the basic Concepts of Thermodynamics: Applications of Heat and work transferred for various thermodynamic processes. **CO2:** Understanding Properties of Pure Substances. Introduction to steam table, Mollier diagram and its application. **CO3:** Analysis of 1st Law of Thermodynamics and 2nd Law of Thermodynamics and their applications. **CO4:** Understanding Air standard Cycles for IC engines: Otto cycle; Diesel cycle and their applications. **CO5:** Study of fluid mechanics, Fluid Kinematics, dynamics of fluids, Bernoulli's equation & its Applications.

Department	Computer Science & Engineering (CSE)/Information Technology (IT)
Course Code	CS 291
Title of Course	Basic Computation & Principles of Computer Programming
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	44
Course Outcomes	**CO1:** To formulate the algorithms for simple problems. **CO2:** To translate given algorithms to a working and correct program. **CO3:** To be able to correct syntax errors as reported by the compilers. **CO4:** To be able to identify and correct logical errors encountered at run time. **CO5:** To be able to write iterative as well as recursive programs. **CO6:** To be able to represent data in arrays, strings and structures and manipulate them through a program. **CO7:** To be able to declare pointers of different types and use them in defining self-referential structures. **CO8:** To be able to create, read and write to and from simple text files.

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FIRST YEAR SECOND SEMESTER

Department	Basic Science & Humanities (BS & HU)
Course Code	PH-291
Title of Course	Physics Practical-I
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	30
Course Outcomes	**CO1:** Ability to understand the general property of matters like viscosity, Young's Modulus and Modulus of Rigidity. **CO2:** Ability to know optical property. **CO3:** Ability to learn electrical property. **CO4:** Ability to understand thermal conductivity.

Department	Applied Electronics & Instrumentation Engineering + Electrical Engineering
Course Code	ES-291
Title of Course	Basic Electrical & Electronic Engineering – II
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	40
Course Outcomes	**CO1:** Ability to learn the basic of electrostatics DC Machines and Single phase transformer **CO2:** Ability to understand 3 phase induction motor & three phase system. **CO3:** Ability to study of I-V characteristics of FET. **CO4:** Ability to study of characteristic curves for CB, CE, CC mode of transistor. **CO5:** Ability to analyse the different OPAMP circuits and apply the knowledge of network theory. **CO6:** Ability to study of logic gates and realization of Boolean function using logic gates.

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FIRST YEAR SECOND SEMESTER

Department	Mechanical Engineering (ME)
Course Code	ME-291
Title of Course	Workshop Practice
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:1-0-3
Total Contact Hours	60
Course Outcomes	**CO1:** Concept of Engineering materials and its physical, chemical and mechanical properties & applications. **CO2:** Understand different conventional manufacturing processes mainly covering basic principles, different methods and general applications. **CO3:** Basic Concept of forming/ shaping and casting. **CO4:** Understanding various aspects of welding processes and its applications. **CO5:** Practices of elementary machining operations- Facing, Centring, Turning, Threading, Drilling, Boring, Shaping and Milling.

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SECOND YEAR THIRD SEMESTER

Sl. No.	Code	Paper	Contact Hours/Week				Credit Points
			L	T	P	Total	
	A. Theory						
1	**M(CS) 301**	Numerical Methods	2	1	0	3	2
2	**M 302**	Mathematics – III	3	1	0	4	4
3	**EC(EI) 301**	Digital Electronic Circuits	3	0	0	3	3
4	**EC(EI) 302**	Analog Electronic Circuits	3	0	0	3	3
5	**EE(EI) 301**	Circuit Theory and Networks	3	1	0	4	4
6	**EI 301**	Electrical Measurement & Instrumentation	3	1	0	4	4
Total Theory						**21**	**20**
	B. Practical						
7	**M(CS) 391**	Numerical Methods Lab	0	0	2	2	1
8	**EC(EI) 391**	Digital Electronic Circuits Lab	0	0	3	3	2
9	**EC(EI) 392**	Analog Electronic Circuits Lab	0	0	3	3	2
10	**EE(EI) 391**	Circuits and Networks Lab	0	0	3	3	2
Total Practical						**11**	**7**
Total of Semester						**32**	**27**

Department	Basic Science and Humanities (BS & HU)
Course Code	M(CS) 301
Title of Course	Numerical Methods
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:2-1-0
Total Contact Hours	28
Course Outcomes	**CO1**: Ability to analyse error and to understand numerical computation & Interpolation. **CO2**: Ability to learn Numerical integration & solution of linear equations. **CO3**: Ability to solve Numerical solution of Algebraic, transcendental equations & ordinary differential equations.

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Department	Basic Science and Humanities (BS & HU)
Course Code	M 302
Title of Course	Numerical Methods
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	28
Course Outcomes	**CO1**: Ability to understand Fourier Series & Fourier Transform. **CO2**: Ability to learn Calculus of Complex Variable. **CO3**: Ability to understand Probability. **CO4**: Ability to solve Partial Differential Equations and Ordinary Differential Equations.

Department	Applied Electronics & Instrumentation Engineering (AEIE)
Course Code	EC(EI) 301
Title of Course	Digital Electronic Circuits
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	28
Course Outcomes	**CO1:** It will help to understand digital computer system, digital instruments and data acquisition systems **CO2:** Develop basic idea of number system, digital logic and integrated circuit design. **CO3:** Apply circuit minimization techniques to design cost-effective digital systems. **CO4:** Understand, formulate, design, and justify techniques for providing innovative digital solutions for industrial/ consumer applications.

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Department	Applied Electronics & Instrumentation Engineering (AEIE)
Course Code	EC(EI) 302
Title of Course	Analog Electronic Circuits
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Design various analog signal processing modules, DC power supplies and periodic signal generators using integrated circuits, as per design specification. **CO2:** Develop insight into the concept of negative feedback in amplifier design, and compare and contrast the analog design trade-offs. **CO3:** Apply the basic concept of oscillator circuits in appropriate areas of application. **CO4:** Design analog circuits using Op-Amps

Department	Electrical Engineering (EE)
Course Code	EE(EI) 301
Title of Course	Circuit Theory & Networks
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	30
Course Outcomes	**CO1:** Identify and employ techniques for modeling, analyzing and solving various linear active and passive electrical / electronic networks and systems. **CO2:** Design complex circuits required for electronics and instrumentation system. **CO3:** Develop mathematical acumen in signal processing applications as well as problem solving ability in subject of relevance.

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Department	Electrical Engineering (EE)
Course Code	EI 301
Title of Course	Electrical Measurements and Instruments
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Identify and employ techniques for modeling, analyzing and solving various linear active and passive electrical / electronic networks and systems. **CO2:** Design complex circuits required for electronics and instrumentation system. **CO3:** Develop mathematical acumen in signal processing applications as well as problem solving ability in subject of relevance.

Department	Basic Science and Humanities (BS & HU)
Course Code	M(CS) 391
Title of Course	Numerical Methods Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	24
Course Outcomes	**CO1**: Ability to analyse error and to understand numerical computation & Interpolation. **CO2**: Ability to learn Numerical integration & solution of linear equations. **CO3**: Ability to solve Numerical solution of Algebraic, transcendental equations & ordinary differential equations.

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Department	Applied Electronics & Instrumentation Engineering (AEIE)
Course Code	EC(EI) 391
Title of Course	Digital Electronic Circuits Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	36
Course Outcomes	**CO1:** Specify, design, and justify techniques employed to build digital systems using ICs. **CO2:** Employ troubleshooting techniques as part of physical testing scheme.

Department	Applied Electronics & Instrumentation Engineering (AEIE)
Course Code	EC(EI) 302
Title of Course	Analog Electronic Circuits Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	33
Course Outcomes	**CO1:** Design various analog signal processing modules, DC power supplies and periodic signal generators using discrete components and integrated circuits as per specification. **CO2:** Employ troubleshooting techniques as part of physical testing scheme.

Department	Electrical Engineering (EE)
Course Code	EE(EI) 391
Title of Course	Circuits & Networks Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	30
Course Outcomes	**CO1:** Study of time and frequency response of linear circuits and systems using MATLAB tools. **CO2:** Develop skills to convert algorithms/steps into optimal code using a programming platform/language.

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Sl. No.	Code	Paper	Contact Hours/Week				Credit Point
			L	T	P	Total	
A. Theory							
1	**HU 401**	Values & Ethics in Profession	3	0	0	3	3
2	**PH(EE) 401**	Physics – II	3	1	0	4	4
3	**CH 401**	Basic Environmental Engineering & Elementary Biology	3	0	0	3	3
4	**EI 401**	Sensors and Transducers	3	1	0	4	4
5	**EI 402**	Microprocessors and Computer Architecture	3	1	0	4	4
6	**EE 402(EI)**	Field theory	3	0	0	3	3
Total Theory						**20**	**21**
B. Practical							
7	**HU 481**	Technical report writing & language laboratory practice	0	0	3	3	2
8	**PH(EE) 491**	Physics –II Lab	0	0	3	3	2
9	**EI 491**	Electrical Measurement & Instrumentation Lab	0	0	3	3	2
10	**EI 492**	Microprocessor Lab	0	0	3	3	2
Total Practical						**12**	**8**
Total of Semester						**32**	**29**
Total of Year							**56**

Department	Basic Science and Humanities
Course Code	HU 401
Title of Course	Values & Ethics in Profession
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	36
Course Outcomes	**CO1**: Ability to understand effects of Technological Growth with its limitation. **CO2**: Ability to learn ethics of Profession in Engineering field. **CO3**: Ability to understand Profession and recognize Human Values

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Department	Basic Science and Humanities
Course Code	PH(EE) 401
Title of Course	Physics – II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	41
Course Outcomes	**CO1**: Ability to learn Dielectric properties and magnetic properties of solids. **CO2**: Ability to understand free electron theory of metals **CO3:** Elaborate the concept of quantum mechanics introduction to Schrodinger wave equation. **CO4:** Understand the basic concept of Statistical mechanics.

Department	Basic Science and Humanities
Course Code	CH 401
Title of Course	Basic Environmental Engineering & Elementary Biology
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	40
Course Outcomes	**CO1:** Ability to understand Basic ideas of environment, Ecology. **CO2:** Ability to learn Air, Water, Land, & Noise pollution and control. **CO3:** Ability to gain knowledge about the Environmental Management which includes Environmental impact assessment, Environmental Audit, laws and protection act of India, Different international environmental treaty/agreement/ protocol.

Department	AEIE
Course Code	EI 401
Title of Course	Sensors and Transducers
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Describe the physics behind the behavior of various sensors employed in process applications. **CO2:** Use different types of thermal, mechanical, electrical, electro-mechanical, magnetic sensors to measure various process parameters. **CO3:** Compare, contrast and justify selection (based on certain constraints) of a particular sensor for a specific application.

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Department	AEIE
Course Code	EI 402
Title of Course	Microprocessors and Computer Architecture
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Know the basic concepts/aspects of internal architecture of a microprocessor, a microcomputer, and assembly language programming of a specific processor viz. Intel 8085, to cope with other microprocessors. **CO2:** Analyse the internal working of a computer to efficiently understand any technological area related to computers like high level programming language **CO3:** Appraise the use of microprocessor to incorporate flexibility into the system so that small change in the behaviour of the system can be achieved by changing the software instead of using a new hardware.

Department	AEIE
Course Code	EE 402(EI)
Title of Course	Field Theory
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	28
Course Outcomes	**CO1:** Analyse the behaviour of electric and magnetic fields, and employ them in electrical and magnetic characterization of sensor materials. **CO2:** Calculate transmission line parameters to correct signal losses incurred in data transmission from the control room to field, and vice-versa, in process plants.

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Department	Basic Science and Humanities
Course Code	HU 481
Title of Course	Technical report writing & language laboratory practice
Nature of Course	Compulsory
Type of Course	Lecture + Practical
Contact Hours	L-T-P:1-0-2
Total Contact Hours	28
Course Outcomes	**CO1:** Enhance English communication (both written and verbal), and presentation skills. **CO2:** Compose various types of reports-commercial, organizational, and technical.

Department	Basic Science and Humanities
Course Code	PH(EE) 491
Title of Course	Physics – II Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	41
Course Outcomes	**CO1:** Employ, interpret and justify methods to measure and analyze various physical /optical parameters used in measurement systems and process applications.

Department	AEIE
Course Code	EI 491
Title of Course	Electrical Measurement & Instrumentation Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	24
Course Outcomes	**CO1:** Measure various electrical parameters using analogue meters and bridges. **CO2:** Employ calibration practices to standardize the measuring instrument.

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Department	AEIE
Course Code	EI 492
Title of Course	Microprocessor Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	40
Course Outcomes	**CO1:** Devise algorithms and construct optimized codes based on a low level programming language (assembly language). **CO2:** Employ an 8-bit microprocessor for implementing designs for industrial/consumer.

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THIRD YEAR FIFTH SEMESTER

Sl. No.	Code	Paper	Contact Hours/Week				Credit Points
			L	T	P	Total	
A. THEORY							
1	HU 501	Economics for Engineers	3	0	0	3	3
2	EI 501	Industrial Instrumentation	3	1	0	4	4
3	EI 502	Control Theory	3	1	0	4	4
4	EI 503A EI 503B	Optoelectronics & Fibre Optics Advanced Sensors	3	0	0	3	3
5	EI 504A EI 504B EI 504C	Data Structures & Algorithms (CSE) Data Base Management System (CSE) Software Engineering (IT)	3	0	0	3	3
Total Theory						**17**	**17**
B. PRACTICAL							
6	EI 591	Industrial Instrumentation Lab	0	0	3	3	2
7	EI 592	Sensors and Transducers Lab	0	0	3	3	2
8	EI 593(EE)	Control Engineering Lab	0	0	3	3	2
9	EI 594A EI 594B EI 594C	Data Structures & Algorithms Lab (CSE) Data Base Management System Lab (CSE) Software Engineering Lab (IT)	0	0	3	3	2
Total Practical						**12**	**8**
Total of Semester						**29**	**25**

Department	Basic Science and Humanities
Course Code	HU 501
Title of Course	Economics for Engineers
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	36
Course Outcomes	**CO1:** Ability to understand Economic Decisions Making and considering that students will learn to find out Engineering Costs & Estimation. **CO2:** Ability to learn Cash Flow and also able to calculate Rate of Return Analysis. **CO3:** Ability to know Inflation and Price Change, Present Worth Analysis. **CO4:** Ability to learn depreciation and able to analysis the requirement of replacement.

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Department	AEIE
Course Code	EI 501
Title of Course	Industrial Instrumentation
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Express, compare, and contrast the field instrumentation involved in the level 0 structure in the plant control and automation pyramid. **CO2:** Demonstrate the techniques and appreciate the role of instrumentation in implementing process plant safety norms. **CO3:** Explain and justify field instrumentation installation techniques employed.

Department	AEIE
Course Code	EI 502
Title of Course	Control Theory
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Utilize mathematical tools (Laplace Transform, Matrix Analysis) to model LTI systems. **CO2:** Evaluate stability and various performance criteria by analyzing time and frequency domain characteristics. **CO3:** Employ, compare, and justify techniques to design compensators and controllers based upon system specifications.

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Department	AEIE
Course Code	EI 503A
Title of Course	Optoelectronics & Fibre Optics
Nature of Course	**Elective -1A** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Know the construction, operating principle, and role of Fibre-optic sensors in industrial applications. **CO2:** Discuss the operating principle of various photo-sensors (photodiodes, LDRs and photovoltaic cells) and implement in analog and digital devices. **CO3:** Describe the optical sources: LEDs and LASERS.

Department	AEIE
Course Code	EI 503B
Title of Course	Advanced Sensors
Nature of Course	**Elective -1B** Session 2015-16 No. of Students Opted: 57 Session 2016-17 No. of Students Opted: 18 Session 2017-18 No. of Students Opted: 38 Session 2018-19 No. of Students Opted: 39 Session 2019-20 No. of Students Opted: 18
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Design and fabricate of micro-sensors by using photolithography **CO2:** Develop thick and thin film sensors to use them as gas and ion sensor **CO3:** Discuss and express micro-machining technique, ceramics and oxides sensor materials and their application, smart sensors and its present trends, environmental monitoring sensors.

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Department	CSE
Course Code	EI 504A
Title of Course	Data Structures & Algorithm
Nature of Course	**Elective -2A** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** CO1: Differentiate how the choices of data structure & algorithm methods impact the performance of program. **CO2:** CO2: Solve problems based upon different data structure & also write programs. **CO3:** CO3: Identify appropriate data structure & algorithmic methods in solving problem. **CO4:** CO4: Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing. **CO5:** CO5: Compare and contrast the benefits of dynamic and static data structures implementations.

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Department	CSE
Course Code	EI 504B
Title of Course	Data Base Management System
Nature of Course	**Elective -2B** Session 2015-16 No. of Students Opted: 57 Session 2016-17 No. of Students Opted: 18 Session 2017-18 No. of Students Opted: 38 Session 2018-19 No. of Students Opted: 39 Session 2019-20 No. of Students Opted: 18
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** For a given query write relational algebra expressions for that query and optimize the developed expressions **CO2:** For a given specification of the requirement design the databases using E R method and normalization. **CO3:** For a given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2. **CO4:** For a given query optimize its execution using Query optimization algorithms **CO5:** For a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability. **CO6:** Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

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Department	IT
Course Code	EI 504C
Title of Course	Software Engineering
Nature of Course	**Elective -2C** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Define Software Engineering and explain in detail and thereafter state the necessity/importance of the fundamental concepts of SDLC, COCOMO Model, Context diagram, DFD, System design, Decision tree, Decision table ,coding & documentation, Structured and Object Oriented programming, Testing ,validation and verification metrics ,software project management and object oriented design in UML. **CO2:** Directly apply the fundamental concepts of Software Engineering to solve (implement) the most elementary/simplest model problems, and thereafter Design & develop the software projects .Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using Software Engineering. **CO3:** Analyze and Identify requirements and prepare models using different SDLC. Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of Software Engineering for an organization/institute. **CO4:** Compare and contrast in details between the fundamental concepts of Software Engineering and thereafter describe an overview level interconnected map of concepts/terminologies of Software Engineering. **CO5:** Identify risks, manage the change to assure quality in software projects and explain where and how the Models are utilized in large scale real world systems, and thereafter Design the schematics for typical components of large scale known real world systems using the concept of Software Engineering. **CO6:** Identify unsolved but necessary real world problems of Software Engineering and thereafter demonstrate and evaluate real time projects with respect to software engineering principles.

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Department	AEIE
Course Code	EI 591
Title of Course	Industrial Instrumentation Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	40
Course Outcomes	**CO1:** Determine, compare and contrast the merits/demerits of instruments/transducers used to measure process parameters such as temperature, flow, level, moisture, viscosity. **CO2:** Employ standard techniques for calibrating measuring instruments.

Department	AEIE
Course Code	EI 592
Title of Course	Sensors & Transducers Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	24
Course Outcomes	**CO1:** Employ various types of sensors and transducers to measure the physical parameters: temperature, displacement, speed, pressure, torque, weight. **CO2:** Analyze the characteristics of an optical sensor (e.g. LDR).

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Department	AEIE
Course Code	EI 593(EE)
Title of Course	Control Engineering Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	24
Course Outcomes	**CO1:** Analyze system response of first and second order systems in time and frequency domain using MATLAB toolbox and SIMULINK. **CO2:** Design PID controllers and justify parameter selection of the controller based upon system specifications using MATLAB (Case Study Approach).

Department	CSE
Course Code	EI 594A
Title of Course	Data Structures & Algorithm Lab
Nature of Course	**Elective -2A Lab** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:0-0-3
Total Contact Hours	30
Course Outcomes	**CO1:** Differentiate how the choices of data structure & algorithm methods impact the performance of program. **CO2:** Solve problems based upon different data structure & also write programs. **CO3:** Identify appropriate data structure & algorithmic methods in solving problem. **CO4:** Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing. **CO5:** Compare and contrast the benefits of dynamic and static data structures implementations.

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Department	CSE
Course Code	EI 594B
Title of Course	Data Base Management System Lab
Nature of Course	**Elective -2B Lab** Session 2015-16 No. of Students Opted: 57 Session 2016-17 No. of Students Opted: 18 Session 2017-18 No. of Students Opted: 38 Session 2018-19 No. of Students Opted: 39 Session 2019-20 No. of Students Opted: 18
Type of Course	Lecture
Contact Hours	L-T-P:0-0-3
Total Contact Hours	30
Course Outcomes	**CO1:** To create database, perform basic operation like insertion, deletion, and updation. **CO2:** To retrieve data from the database through query languages like SQL. **CO3:** To configure a database at the background of a high level program using front end tools and forms.

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Department	IT
Course Code	EI 594C
Title of Course	Software Engineering Lab
Nature of Course	**Elective -2C Lab** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:0-0-3
Total Contact Hours	30
Course Outcomes	**CO1:** Define Software Engineering and explain in detail and thereafter state the necessity/importance of the fundamental concepts of SDLC, COCOMO Model, Context diagram, DFD, System design, Decision tree, Decision table ,coding & documentation, Structured and Object Oriented programming, Testing ,validation and verification metrics ,software project management and object oriented design in UML. **CO2:** Directly apply the fundamental concepts of Software Engineering to solve (implement) the most elementary/simplest model problems, and thereafter Design & develop the software projects .Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using Software Engineering. **CO3:** Analyze and Identify requirements and prepare models using different SDLC. Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of Software Engineering for an organization/institute. **CO4:** Compare and contrast in details between the fundamental concepts of Software Engineering and thereafter describe an overview level interconnected map of concepts/terminologies of Software Engineering. **CO5:** Identify risks, manage the change to assure quality in software projects and explain where and how the Models are utilized in large scale real world systems, and thereafter Design the schematics for typical components of large scale known real world systems using the concept of Software Engineering. **CO6:** Identify unsolved but necessary real world problems of Software Engineering and thereafter demonstrate and evaluate real time projects with respect to software engineering principles.

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A. Theory								
Sl. No.	**Field**	**Code**	**Paper**	**Contact Hours/Week**				**Credit Points**
				L	**T**	**P**	**Total**	
1	**HU**	**HU 601**	Principles of Management	2	0	0	2	2
2	**PC**	**EI 601**	Process Control-I	3	1	0	4	4
3	**PC**	**EI 602**	Electronic Instrumentation and	3	1	0	4	4
4	**PC**	**EI 603**	Advanced Microprocessors & Microcontrollers	3	1	0	4	4
5	**PE**	**EI 604A / EI 604B / EI 604C**	Bio Medical Instrumentation/ Soft Computing/ Non Destructive Testing & Ultrasonic Instrumentation	3	0	0	3	3
6	**FE**	**EI 605A / EI 605B/ EI 605C/ EI605D**	Digital Signal Processing(EC)/ Microwave Engineering(EC)/ Antenna Theory & Propagation(EC) Non-Conventional Energy Sources	3	0	0	3	3
Total Theory							**20**	**20**
B. Practical								
7	**PC**	**EI 691**	Process Control Lab	0	0	3	3	2
8	**PC**	**EI 692**	Electronic Instrumentation and Measurement	0	0	3	3	2
9	**PC**	**EI 693**	Advanced Microprocessors & Microcontrollers Lab	0	0	3	3	2
10		**EI 681**	Seminar	0	0	3	3	2
Total Practical							**12**	**8**
Total of Semester							**32**	**28**

Department	Basic Science and Humanities
Course Code	HU 601
Title of Course	Principles of Management
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:2-0-0
Total Contact Hours	24
Course Outcomes	**CO1:** Ability to know the basic concepts of management, function of management including Planning, Society and People Management. **CO2:** Ability to know the Leadership quality; Decision making, Economic, Financial & Quantitative Analysis. **CO3:** Ability to understand Customer Management, Operations & Technology Management

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Department	AEIE
Course Code	EI 601
Title of Course	Process Control - I
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Develop process model and perform process parameter characterization. **CO2:** Know selection criteria for various final control elements and controllers along with different controller tuning techniques. **CO3:** Explain, analyze and justify different complex control strategies (Ratio, Cascade, Feed-forward and Multivariable). **CO4:** Explain the hardware of PLC, and devise algorithms and construct optimized codes for programming PLCs for industrial applications.

Department	AEIE
Course Code	EI 602
Title of Course	Electronic Instrumentation & Measurement
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	38
Course Outcomes	**CO1:** Know constructional details and operating principle of analog and digital instruments for measurement of electrical parameters in time and frequency domain. **CO2:** Design, implement and perform error analysis of digital frequency meters. **CO3:** Explain spectrum analyzer and interpret the spectrum of any signal. **CO4:** Know the latest trends in measurement systems (e.g. Virtual Instrumentation).

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Department	AEIE
Course Code	EI 603
Title of Course	Advanced Microprocessors & Microcontrollers
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	36
Course Outcomes	**CO1:** Explain the architectural details of x86 family of processors, viz. Intel 8086/8088. **CO2:** Understand the advanced concepts like instruction pipelining, memory segmentation, multitasking found in advanced microprocessors. **CO3:** Apply knowledge of 8051microcontroller to understand recent microcontroller families like PIC, ARM used in embedded applications. **CO4:** Design and develop microprocessor/ microcontroller based instruments and process controllers.

Department	AEIE
Course Code	EI 604A
Title of Course	Biomedical Instrumentation
Nature of Course	**Elective -1A** Session 2015-16 No. of Students Opted: 57 Session 2016-17 No. of Students Opted: 18 Session 2017-18 No. of Students Opted: 38 Session 2018-19 No. of Students Opted: 39 Session 2019-20 No. of Students Opted: 18
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Explain the physiology of cardiac, nervous, muscular, and respiratory systems. **CO2:** Compare, contrast, and justify selection of transducers and electrodes for biomedical applications. **CO3:** Demonstrate the operation and interpret data from ECG, EMG, and EEG. **CO4:** Outline research applications of IR and Ultrasound Imaging techniques, and design biotelemetry system.

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Department	AEIE
Course Code	EI 604B
Title of Course	Soft Computing
Nature of Course	**Elective -1B** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Illustrate the concepts of Fuzzy Logic as a decision-making tool and Genetic Algorithms (GA) as an optimization tool. **CO2:** Apply GA, Fuzzy and hybrid soft computing algorithms to design controllers for process industries.

Department	AEIE
Course Code	EI 604C
Title of Course	Non-Destructive Testing & Ultrasonic Instrumentation
Nature of Course	**Elective -1C** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Discuss the basic elements and importance of non-destructive testing (NDT). **CO2:** Outline and explain the working principle of ultrasonic instruments in NDT and surface inspection features. **CO3:** Compare and contrast ultrasonic methods for measurement in biomedical application.

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Department	AEIE
Course Code	EI 605A
Title of Course	Digital Signal Processing
Nature of Course	**Elective -2A** Session 2015-16 No. of Students Opted: 57 Session 2016-17 No. of Students Opted: 18 Session 2017-18 No. of Students Opted: 38 Session 2018-19 No. of Students Opted: 39 Session 2019-20 No. of Students Opted: 18
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	36
Course Outcomes	**CO1:** Analyze discrete signals in temporal/ spatial and frequency domain to extract information about the system generating signal. **CO2:** Explain the concept of signal digitization and reconstruction. **CO3:** Design digital filters employing different transform techniques and convolution. **CO4:** Know the architecture of a digital signal processor (TMS320C6713) and implement the corresponding optimized code.

Department	AEIE
Course Code	EI 605B
Title of Course	Microwave Engineering
Nature of Course	**Elective -2B** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	39
Course Outcomes	**CO1:** Ability to understand the fundamentals of Transmission lines and waveguides and waveguide resonator. **CO2:** Ability to apply the knowledge to understand various Microwave components **CO3:** Ability to have knowledge the microwave tube s and semiconductor microwave devices and their application. **CO4:** Ability to understand microwave amplifier design and microwave measurement.

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Department	AEIE
Course Code	EI 605C
Title of Course	Antenna Theory and Propagation
Nature of Course	**Elective -2C** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	36
Course Outcomes	**CO1:** Ability to study radiation of E.M waves and also learn Antenna fundamentals and its different properties like Antenna Characteristics, Radiation fields etc. **CO2:** Ability to learn Antenna Arrays and their types with calculations of different parameters. **CO3:** Ability to learn characteristics and properties of different types of Antenna. **CO4:** Ability to understand methods of Propagation & Physical (Medium) effects on Radio wave Propagation.

Department	AEIE
Course Code	EI 605D
Title of Course	Non-Conventional Energy Sources
Nature of Course	**Elective -2D** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Apply non-conventional energy over the conventional one and study its impact on environment and economy. **CO2:** Know the design aspects and constructional features employed in harvesting solar, wind, tidal, geothermal, wave, and bio energy. **CO3:** Appraise the role of energy conservation and audit.

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Department	AEIE
Course Code	EI 691
Title of Course	Process Control – I Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	27
Course Outcomes	**CO1:** Develop process model and perform process parameter characterization and its control with PID through DCS. **CO2:** Ability to monitor PLC logic in ladder diagram format.

Department	AEIE
Course Code	EI 692
Title of Course	Electronic Instrumentation & Measurement Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	24
Course Outcomes	**CO1:** Analyze, interpret, and justify results obtained from experimental study of static and dynamic characteristics of measurement system. **CO2:** Employ statistical techniques for error analysis of measurement systems. **CO3:** Plan, design, and implement electronic converters like V/I and I/V for analog signal processing applications. **CO4:** Study and analyze the hardware and software aspects of a Data Acquisition System (DAS).

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Department	AEIE
Course Code	EI 693
Title of Course	Advanced Microprocessors & Microcontrollers Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	36
Course Outcomes	**CO1:** Devise optimized assembly language codes for implementing process control and display applications using 8086 microprocessor kit. **CO2:** Devise optimized assembly language codes for implementing process control and display applications using 8051 microprocessor kit.

Department	AEIE
Course Code	EI 681
Title of Course	Seminar
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	30
Course Outcomes	**CO1:** Explain with the methodology of the engineering subjects and interact with the upcoming trends. **CO2:** Develop presentation skill by delivering technical aspect of different engineering fields. **CO3:** Enhance the coordination ability among the members of group.

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FORTH YEAR SEVENTH SEMESTER

A. Theory								
Sl. No.	**Field**	**Code**	**Paper**	**Contact Hours/Week**				**Credit Points**
				L	**T**	**P**	**Total**	
1	**PC**	**EI 701**	Telemetry and Remote Control	3	1	0	4	4
2	**PC**	**EI 702**	Analytical Instrumentation	3	1	0	4	4
3	**PC**	**EI 703**	Process Control-II	3	1	0	4	4
4	**PE**	**EI 704A** **EI 704B** **EI 704C**	Communication Theory Microelectronics & VLSI Technology FPGA & Reconfigurable Computing	3	0	0	3	3
5	**FE**	**EI 705A(CS)** **EI 705B(IT)** **EI 705C(IT)**	Computer Networking/ Multimedia/ Internet Technology	3	0	0	3	3
Total Theory							**18**	**18**
B. Practical								
6	**PC**	**EI 791**	Telemetry and Remote Control Lab	0	0	3	3	2
7	**PE**	**EI 794A** **EI 794B** **EI 794C**	Communication Lab Microelectronics & VLSI Technology FPGA & Reconfigurable Computing Lab	0	0	3	3	2
8	**FE**	**EI 795A(CS)** **EI795B(IT)** **EI 795C(IT)**	Computer Networking Lab/ Multimedia Lab/ Internet Technology Lab	0	0	3	3	2
9		**EI 781**	Industrial Training Evaluation	4 wks during 6^{th} -7^{th} Sem-break				2
10		**EI 792**	Project-1	0	0	6	6	2
Total Practical							**15**	**10**
Total of Semester							**33**	**28**

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Department	AEIE
Course Code	EI 701
Title of Course	Telemetry & Remote Control
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	38
Course Outcomes	**CO1:** Employ different coding and digital modulation techniques for message signal. **CO2:** Explain quantization error and bit rate error, and quantitatively express effect of noise and interference on telemetry systems. **CO3:** Compare fiber-optic communication vs. other process data transfer techniques, and explain the role and features of satellite communication in astronomical instrumentation. **CO4:** Distinguish different industrial applications of remote control telemetry.

Department	AEIE
Course Code	EI 702
Title of Course	Analytical Instrumentation
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Compare and contrast techniques and analyzers employed for measurement of process parameters (e.g. humidity, moisture, viscosity, density, gas and oxygen). **CO2:** Identify the contents of an unknown sample by analyzing the output of liquid or gas chromatography. **CO3:** Estimate the internal molecular structure of a sample using suitable methods of spectroscopy. **CO4:** Design the circuits for pH and conductivity meter for a given specification.

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Department	AEIE
Course Code	EI 703
Title of Course	Process Control - II
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:3-1-0
Total Contact Hours	40
Course Outcomes	**CO1:** Characterize and analyze different physical systems by utilizing various Digital Modeling techniques **CO2:** Assess the reliability and stability of different process models and subsequently design processes based on the reliability/stability studies. **CO3:** Outline and express architecture, networking and communication aspects of Distributed Control Systems. **CO4:** Evaluate real-world processes with pre-selected design parameters.

Department	AEIE
Course Code	EI 704A
Title of Course	Communication Theory
Nature of Course	**Elective -1A** Session 2015-16 No. of Students Opted: 19 Session 2016-17 No. of Students Opted: 30 Session 2017-18 No. of Students Opted: 09 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	40
Course Outcomes	**CO1:** Ability to learn concept of analog modulation and its classification. **CO2:** Ability to identify the type of modulation & know different types of associated the calculation. **CO3:** Ability to learn the importance of Multiplexing, find out their application areas. **CO4:** Ability to study random signals and noise in communication system. **CO5:** Ability to develop fundamental understanding of Digital Communication system. **CO6:** Ability to develop concept of analog digitization using techniques as PCM, digital Modulation and demodulation techniques in presence of noise. **CO7:** Ability to understand Digital communication system using error probability.

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Department	AEIE
Course Code	EI 704B
Title of Course	Microelectronics & VLSI Technology
Nature of Course	**Elective -1B** Session 2015-16 No. of Students Opted: 18 Session 2016-17 No. of Students Opted: 27 Session 2017-18 No. of Students Opted: 09 Session 2018-19 No. of Students Opted: 36 Session 2019-20 No. of Students Opted: 41
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	40
Course Outcomes	**CO1:** Know the basic idea of VLSI design concept and scale of integration. **CO2:** Know the principle of operation and fabrication techniques for different MOSFETs along with its scaling process. **CO3:** Design and layout logic gates in the transistor level by using CMOS. **CO4:** Devise optimized Hardware Description Language (VHDL/Verilog) codes for implementing digital circuits.

Department	AEIE
Course Code	EI 704C
Title of Course	FPGA & Reconfigurable Computing
Nature of Course	**Elective -1C** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	32
Course Outcomes	**CO1:** Develop the basic concept of reconfigurable computing (RC). **CO2:** Develop concept for algorithm to solve complex problems related to computer aided system design. **CO3:** Write test bench for high and low level synthesis for FPGA by using VHDL (RC).

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Department	CSE
Course Code	EI 705A
Title of Course	Computer Networking
Nature of Course	**Elective -2A** Session 2015-16 No. of Students Opted: 37 Session 2016-17 No. of Students Opted: 57 Session 2017-18 No. of Students Opted: 18 Session 2018-19 No. of Students Opted: 36 Session 2019-20 No. of Students Opted: 41
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	40
Course Outcomes	**CO1:** a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Layers, switching, active components, multiplexing, multiple access, data transmission, Digital, Optical, Satellite and mobile communications **CO2:** Analyze MAC layer protocols and LAN technologies **CO3:** Design applications using internet protocols **CO4:** Implement routing and congestion control algorithms **CO5:** Develop application layer protocols

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Department	IT
Course Code	EI 705B
Title of Course	Multimedia
Nature of Course	**Elective -2B** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	43
Course Outcomes	**CO1:** a) Define, b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Multimedia Technology. **CO2:** a) Directly apply the fundamental concepts of Multimedia Technology to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using Text, Audio, Image and Video. **CO3:** a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of Multimedia Technology. **CO4:** a) Compare and contrast in details between the fundamental concepts of Text, Audio, Image and Video and thereafter b) describe an overview level interconnected map of concepts/terminologies of Multimedia Technology. **CO5:** a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of Storage and Access Techniques, Multimedia Database, Document Architecture and Content Management Techniques. **CO6:** a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Multimedia Technology.

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Department	IT
Course Code	EI 705C
Title of Course	Internet Technology
Nature of Course	**Elective -2C** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	34
Course Outcomes	**CO1:** Define and explain in detail and thereafter state the necessity/importance of the fundamental concepts of WWW, TCP/IP, IP subnetting and addressing, routing protocols, firewall, HTTP, SMTP in Internet Technology. **CO2:** Directly apply the fundamental concepts of Internet Technology to solve (implement) the most elementary/simplest model problems, and thereafter identify and illustrate the working principles of Components, techniques, protocols, and performance metrics in Internet Technology. **CO3:** Analyze the simple internet technology working aspects. Identify appropriate components and plan the desired network design which will leads to troubleshoot errors in Internet Technology. **CO4:** Compare and contrast in details between the fundamental concepts of Internet Technology and thereafter describe an overview level interconnected map of concepts/terminologies of Internet Technology. **CO5:** Be able to devise a given problem into independent modules/layers and identify appropriate Internet Technology Protocols/Components and then to setup the networking system by integrating the modules/Layers/Protocols by providing appropriate interfaces. **CO6:** Identify unsolved but necessary real world problems of Internet technology and thereafter estimate, design and implement appropriate optical network components/devices/protocols for setting up optical network in an Unknown site/organization in Internet Technology.

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Department	AEIE
Course Code	EI 791
Title of Course	Telemetry & Remote Control Lab
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:0-0-3
Total Contact Hours	24
Course Outcomes	**CO1:** Assess the different land line telemetry systems. **CO2:** Analyze the different multiplexing technique for multi-carrier communication systems. **CO3:** Evaluate the pulse code modulation (PCM) technique. **CO4:** Know different types of wireless telemetry systems in specific applications.

Department	AEIE
Course Code	EI 794A
Title of Course	Communication Lab
Nature of Course	**Elective -1A Lab** Session 2015-16 No. of Students Opted: 19 Session 2016-17 No. of Students Opted: 30 Session 2017-18 No. of Students Opted: 09 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	27
Course Outcomes	**CO1:** Ability to learn concept of analog modulation and Demodulation technique. **CO2:** Ability to know different types of associated the calculation. **CO3:** Ability to learn different application areas of analog communication. **CO4:** Ability to develop fundamental understanding of Digital Communication system. **CO5:** Ability to develop concept of analog digitization using techniques as PCM, digital modulation and demodulation. **CO6:** Ability to develop the design of digital modulation and de modulation such as ASK, FSK, and PSK.

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Department	AEIE
Course Code	EI 794B
Title of Course	Microelectronics & VLSI Technology Lab
Nature of Course	**Elective -1B Lab** Session 2015-16 No. of Students Opted: 18 Session 2016-17 No. of Students Opted: 27 Session 2017-18 No. of Students Opted: 09 Session 2018-19 No. of Students Opted: 36 Session 2019-20 No. of Students Opted: 41
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	21
Course Outcomes	**CO1:** Use VHDL for simulation and synthesis of the digital designs (8 bit synchronous counter, 8 bit bidirectional register and 12 bit CPU) with Xilinx software and Spartan-3 FPGA kits

Department	AEIE
Course Code	EI 794C
Title of Course	FPGA & Reconfigurable Computing Lab
Nature of Course	**Elective -1C Lab** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	21
Course Outcomes	**CO1:** Use VHDL for simulation and synthesis of real and non-real time digital systems (combinational logic devices, signal processing systems, ALU, traffic light controller) with Xilinx software and Spartan-3 FPGA kits.

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Department	CSE
Course Code	EI 795A
Title of Course	Computer Networking Lab
Nature of Course	**Elective -2A Lab** Session 2015-16 No. of Students Opted: 37 Session 2016-17 No. of Students Opted: 57 Session 2017-18 No. of Students Opted: 18 Session 2018-19 No. of Students Opted: 36 Session 2019-20 No. of Students Opted: 41
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	33
Course Outcomes	**CO1:** Understand and apply different network commands **CO2:** Develop programs for client-server applications **CO3:** Perform packet sniffing and analyze packets in network traffic. **CO4:** Implement error detecting and correcting codes

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Department	IT
Course Code	EI 795B
Title of Course	Multimedia Lab
Nature of Course	**Elective -2B Lab** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	21
Course Outcomes	**CO1:** a) Define ,b) explain in detail, and thereafter c) state the necessity/importance of the fundamental concepts of Sound editing, Photo editing, Video editing, Animation Tools. **CO2:** a) Directly apply the fundamental concepts of Multimedia to solve (implement) the most elementary/simplest model problems, and thereafter b) Directly combine the fundamental concepts to solve (design and implement) elementary model problems on the idealistic components of real-world systems using different multimedia tools. **CO3:** a) Analyze (identify parts, their interconnections and flow of information) the design and implementation of idealistic components of real world systems, and thereafter b) Compute the output of given model subsystems (and also identify errors in the design and implementation of given model subsystems using the concept of Multimedia. **CO4:** a) Compare and contrast in details between the fundamental concepts of Text, Audio, Image and Video and thereafter b) describe an overview level interconnected map of concepts/terminologies of Multimedia Technology. **CO5:** a) Identify and thematically explain where and how the terminologies are utilized in large scale real world systems, and thereafter b) Design the schematics for typical components of large scale known real world systems using the concept of Multimedia tools and Web Page design. **CO6:** a) Identify unsolved but necessary real world problems and thereafter b) generate pragmatic detailed ideas for creation/synthesis of innovative socially necessary products and services to solve such problems in Multimedia.

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Department	IT
Course Code	EI 795C
Title of Course	Internet Technology Lab
Nature of Course	**Elective -2C Lab** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Practical
Contact Hours	L-T-P:0-0-3
Total Contact Hours	30
Course Outcomes	**CO1:** CO1: Define and explain in detail and thereafter state the necessity/importance of the fundamental concepts of Applet, HTML, JavaScript, Perl, Client Server programming, XML in Internet Technology. **CO2:** Directly apply the fundamental concepts of Applet, HTML, JavaScript, Perl, Client Server programming, XML to create banner, webpage, server/client program, socket program and Hyperlink. **CO3:** Analyse the simple internet technology working aspects. Identify appropriate components and plan the desired network design which will leads to troubleshoot errors in Internet Technology. **CO4:** Compare and contrast in details between the fundamental concepts of Internet Technology and thereafter describe an overview level interconnected map of concepts/terminologies of Internet Technology. **CO5:** Be able to devise a given problem like Web page designing into independent modules/layers and identify appropriate Internet Technology Protocols/Components and then to setup the networking system by integrating the modules/ Layers /Protocols by providing appropriate interfaces. **CO6:** Identify unsolved but necessary real world problems of Internet technology and thereafter estimate, design and implement appropriate optical network components/devices/protocols for setting up optical network in an Unknown site / organisation in Internet Technology.

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Department	AEIE
Course Code	EI 781
Title of Course	Industrial Training Evaluation
Nature of Course	Compulsory
Type of Course	Training during Inter-Semester Break between Sixth & Seventh Semester
Contact Hours	NA
Total Contact Hours	NA
Course Outcomes	**CO1:** Accustom with industrial ambiance. **CO2:** Identify different measuring and controlling devices used in process industry. **CO3:** Develop confidence for troubleshooting process related problems and errors encountered in the measuring devices and loops.

Department	AEIE
Course Code	EI 781
Title of Course	Project - I
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-6
Total Contact Hours	60
Course Outcomes	**CO1:** Develop fellow feeling attitude individually or as team member. **CO2:** Inspire to explore new avenues to apply their knowledge technically.

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A. Theory								
Sl. No.	**Field**	**Code**	**Paper**	**Contact Hours/Week**				**Credit Point**
				L	**T**	**P**	**Total**	
1	**HSS**	HU 801A	Organisational Behavior	2	0	0	2	2
2	**PE**	EI 801A EI 801B EI 801C	Power Electronics Industrial Drives Power Plant Instrumentation	3	0	0	3	3
3	**FE**	EI 802A(EC) EI 802B(EC) EI 802C(EC) EI 802D(CH)	Mobile Communication Embedded Systems Digital Image Processing Plant Automation	3	0	0	3	3
Total Theory							**8**	**8**
B. Practical								
4	**PE**	EI 891A(EE) EI 891B(EE) EI 891C(EE)	Power Electronics Lab Industrial Drives Lab Power Plant Instrumentation Lab	0	0	3	3	2
5		EI 892	Instrumentation and Control Design	0	0	6	6	4
6		EI 893	Project - 2	0	0	12	12	6
7		EI 894	Grand Viva					3
Total Practical							**21**	**15**
Total of Semester							**29**	**23**

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Department	Basic Science & Humanities
Course Code	HU 801A
Title of Course	Organisational Behaviour
Nature of Course	Compulsory
Type of Course	Lecture
Contact Hours	L-T-P:2-0-0
Total Contact Hours	24
Course Outcomes	**CO1:** Ability to know the fundamental and structure of an organization. **CO2:** Ability to understand organizational behavior. **CO3:** Ability to understand the key elements of a successful organization and also have the knowledge of man power requirement and judge the qualification for proper utilization of man power.

Department	EE
Course Code	EI 801A
Title of Course	Power Electronics
Nature of Course	**Elective -1A** Session 2015-16 No. of Students Opted: 37 Session 2016-17 No. of Students Opted: 27 Session 2017-18 No. of Students Opted: 08 Session 2018-19 No. of Students Opted: 36 Session 2019-20 No. of Students Opted: 41
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Know the principle of operation of various power semiconductor devices, passive components and switching circuits. **CO2:** Analyze and design of AC/DC rectifier circuits, DC/DC converter circuits and DC/AC inverter circuits. **CO3:** Know the role power electronics play in the improvement of energy usage efficiency and the development of renewable energy technologies.

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Department	EE
Course Code	EI 801B
Title of Course	Industrial Drives
Nature of Course	**Elective -1B** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Ability to analyze and explain the concept, classification, and advantages of electric drive. **CO2:** Ability to analyze the motor power rating for thermal model of motor for heating and cooling, determination of motor rating for continuous, short time and intermitted duty. **CO3:** Ability to analyze different types of starting and braking of electric drives. **CO4:** Ability to explain different types of electric drive like DC motor drive, induction motor drive, synchronous motor drive and their applications in industries.

Department	AEIE
Course Code	EI 801C
Title of Course	Power Plant Instrumentation
Nature of Course	**Elective -1C** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 30 Session 2017-18 No. of Students Opted: 10 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Develop the concepts of different types of power plants and their associated instrumentation. **CO2:** Know the different control loops, safety interlocking and alarm management systems of Boiler. **CO3:** Design power plant layout and analyze process data.

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Department	ECE
Course Code	EI 802A(EC)
Title of Course	Mobile Communication
Nature of Course	**Elective -2A** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 57 Session 2017-18 No. of Students Opted: 10 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	46
Course Outcomes	**CO1:** Know the infrastructure to develop cellular radio concepts such as frequency reuse, hands off and ad-hoc networks. **CO2:** Develop the concept of coding, channel models, diversity, equalization and channel estimation techniques in presence of fading environment. **CO3:** Design analytical and empirical models using wireless links using license-free band (wireless PAN, Bluetooth, Wi-Fi etc.) **CO4:** Describe current and emerging cellular communication systems (GSM, IS-95, WCDMA/3G)

Department	ECE
Course Code	EI 802B(EC)
Title of Course	Embedded Systems
Nature of Course	**Elective -2B** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	38
Course Outcomes	**CO1:** Develop the concepts of hardware and software of real-time embedded system. **CO2:** Know the various Real Time Operating Systems and its compatibility for different applications. **CO3:** Analyze and design various real time embedded systems

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Department	ECE
Course Code	EI 802C(EC)
Title of Course	Digital Image Processing
Nature of Course	**Elective -2C** Session 2015-16 No. of Students Opted: 37 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 08 Session 2018-19 No. of Students Opted: 36 Session 2019-20 No. of Students Opted: 41
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	36
Course Outcomes	**CO1:** Depict any 2-D or 3-D data in visual format i.e. as an image. **CO2:** Analyze image both in spatial ad frequency domain to enhance, extract features, store, and transmit or to provide security. **CO3:** Apply contextual knowledge in imaging or video processing system, remote sensing, medical imaging or other allied fields

Department	CHE
Course Code	EI 802D(CH)
Title of Course	Plant Automation
Nature of Course	**Elective -2D** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Lecture
Contact Hours	L-T-P:3-0-0
Total Contact Hours	32
Course Outcomes	**CO1:** Know PAS which involves computer technology and software engineering to operate industries safely and efficiently **CO2:** Use PAS as a network to interconnect sensors, controllers, actuators and operator terminals. **CO3:** Ability to control and automate processes such as petrochemical, paper and pulp factories

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Department	EE
Course Code	EI 891A(EE)
Title of Course	Power Electronics Lab
Nature of Course	**Elective -1A Lab** Session 2015-16 No. of Students Opted: 37 Session 2016-17 No. of Students Opted: 27 Session 2017-18 No. of Students Opted: 08 Session 2018-19 No. of Students Opted: 36 Session 2019-20 No. of Students Opted: 41
Type of Course	Practical
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Know the V-I characteristics of SCR, TRIAC and different triggering circuits. **CO2:** Construct fully controlled bridge converter with free-wheeling diode, step-down chopper, PWM bridge inverter using IGBT, single phase AC regulator using PSIM. **CO3:** Design self-commutation circuits for SCR and control circuits for stepper motor.

Department	EE
Course Code	EI 891B(EE)
Title of Course	Industrial Drives Lab
Nature of Course	**Elective -1B Lab** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 0 Session 2017-18 No. of Students Opted: 0 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Practical
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Ability to perform Thyristor Controlled DC drive. **CO2:** Ability to perform AC Single phase motor-speed control using TRIAC. **CO3:** Ability to perform V/f control operation of 3phase induction motor drive. **CO4:** Ability to perform PWM Inverter fed 3phase induction motor control using Software. **CO5:** Ability to perform the speed control of 3phase induction motor using PLC. **CO6:** Ability to perform traffic light control using PLC. **CO7:** Ability to perform speed control of DC motor with 1 phase or 3phase fully controlled rectifier using software.

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Department	AEIE
Course Code	EI 891C
Title of Course	Power Plant Instrumentation Lab
Nature of Course	**Elective -1C Lab** Session 2015-16 No. of Students Opted: 0 Session 2016-17 No. of Students Opted: 30 Session 2017-18 No. of Students Opted: 10 Session 2018-19 No. of Students Opted: 0 Session 2019-20 No. of Students Opted: 0
Type of Course	Practical
Contact Hours	L-T-P:3-0-0
Total Contact Hours	30
Course Outcomes	**CO1:** Conduct single or three element drum level control, combustion and steam temperature control of boilers. **CO2:** Demonstrate Boiler Management System and Boiler start-up.

Department	AEIE
Course Code	EI 892
Title of Course	Instrumentation & Control Design Lab
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-6
Total Contact Hours	60
Course Outcomes	**CO1:** Justify compromise between design target and product quality and marketability. **CO2:** Design and develop thermal conductivity analyzer and piezo-electric accelerometer. **CO3:** Design and program digital controllers for processes with dead time. **CO4:** Design and implement specified amplifiers, high speed counters and signal to data converters.

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Department	AEIE
Course Code	EI 893
Title of Course	Project - II
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	L-T-P:0-0-6
Total Contact Hours	60
Course Outcomes	**CO1:** Implement the knowledge gained through the various courses in designing a novel model for societal and environmental benefits. **CO2:** Develop a sense of team working spirit.

Department	AEIE
Course Code	EI 894
Title of Course	Grand Viva
Nature of Course	Compulsory
Type of Course	Practical
Contact Hours	Not Applicable
Total Contact Hours	Not Applicable
Course Outcomes	**CO1:** Display self-esteem to excel in professional career or pursue higher education and research.