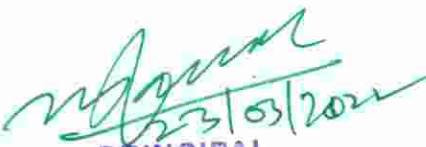


MUFFAKHAM JAH COLLEGE OF ENGINEERING AND TECHNOLOGY

Course outcomes of I and II semester

I SEMESTER

S. No	Course Code	Course Name	COs Code	COs
1	MC 106 EG	Engineering English	EG 106.1	Recognize the role of communication and clarify its different forms.
			EG 106.2	Write grammatically correct English.
			EG 106.3	Write efficiently for a variety of professional and social situations using appropriate writing styles.
			EG 106.4	Enrich their vocabulary.
			EG 106.5	Comprehend texts efficiently
2	BS 101 MT	Engineering Mathematics - I	MT 101.1	Examine the convergence and divergence of an infinite series by various methods like P test, Ratio test, and Root test.
			MT 101.2	Using limits, continuity and differentiability of a single variable to classify the mean value theorems and calculate Radius of curvature, envelope, evolutes and trace the curves.
			MT 101.3	Use partial derivatives to calculate maxima and minima of function of several variables and multiple integrals.
			MT 101.4	Compute line, surface, volume integrals and illustrate Green's, Gauss, and Stokes theorems.
			MT 101.5	Perform row and column operation to find rank and hence obtain the solution of system of simultaneous linear equations, Basis and dimension of vector spaces.
			MT 101.6	Apply Cayley Hamilton Theorem to find the inverse and powers of the Matrix. and converting Quadratic equation to canonical form.
3	BS 102 PH	Engineering Physics - I	PH 102.1	To apply the principles of Optics to calculate the wavelength of monochromatic and polychromatic light.
			PH 102.2	Using basic principles of statistical mechanics students can able to understand the materials and their properties.
			PH 102.3	Ability to understand the basic characteristics and design the semiconductor devices by using band theory of solids.
			PH 102.4	Ability to understand the arrangement of atoms and predict the defects in the crystals.
			PH 102.5	Ability to identify, distinguish and characterize the materials and their properties related to Dielectric, Magnetic, Nano and Superconductors.
4	BS 103 CH	Engineering Chemistry - I	CH 103.1	Apply the concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries.
			CH 103.2	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
			CH 103.3	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment.
			CH 103.4	Explain the influence of chemical structure on properties of materials and their choice in engineering applications..
			CH 103.5	Relate the concept of green chemistry for design of and manufacturing of engineering materials.
			CH 103.6	Classify chemical fuels and grade them through qualitative analysis.


  
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5	ES 105 CS	Computer Programming and P	CS 105.1	Identify the basic components of computer and outline the domain of problem solving
			CS 105.2	Demonstrate the applications of structured data
			CS 105.3	Incorporate the concepts of modular programming, explicit memory management & Preprocessor into C programs
			CS 105.4	Practice to organize information using several processes and store it permanently
			CS 105.5	Apply the basic features of object oriented programming in order to strengthen problem solving
6	ES 104 CE	Engineering Mechanics -I	CE 104.1	Analyze the effect of a coplanar and non- coplanar system of forces on a body.
			CE 104.2	Analyze the static equilibrium of bodies in 2D and 3D.
			CE 104.3	Analyze the trusses & frames using different methods.
			CE 104.4	Determine the effect of friction and its governing laws on simple and connected systems.
			CE 104.5	Determine the Centroid of lines, areas and volumes of revolution. Compute the Area Moment of Inertia & Product of Inertia of different areas.
			CE 104.6	Compute the Area Moment of Inertia & Product of Inertia of different areas.
7	ES 153 CE	Engineering Graphics Lab -I	CE 153.1	Understand Basics of Engg drawing, simple shapes and basic commands of auto cad.
			CE 153.2	Draw the construction of Scales, Understand and describe the concepts of projections
			CE 153.3	Draw the projection of straight lines and its traces
			CE 153.4	construction of perpendicular planes, Oblique planes and Traces of planes.
			CE 153.5	construction of solids with axis inclined to one or both the reference planes
8	BS 151 PH	Engineering Physics Laboratory	PH 132.1	Conduct experiments, take measurements and analyze the data through hands-on experience in order to demonstrate understanding of the theoretical concepts of applied physics, while working in small groups.
			PH 132.2	Demonstrate writing skills through clear laboratory reports.
			PH 132.3	Interpret the principles of optics and determine the properties of materials graphically
			PH 132.4	Compare the experimental results with those introduced in lecture, draw relevant conclusions and substantiate them satisfactorily.
			PH 132.5	Transfer group experience to individual performance of experiments and demonstrate effective oral communication skills.
9	BS 152 CH	Engineering Chemistry Laboratory	CH 152.1	Apply the concept of electrode potential in identifying feasibility of electrochemical reaction;
			CH 152.2	Illustrate electro analytical techniques and working of batteries
			CH 152.3	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
			CH 152.4	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment.
			CH 152.5	Explain the influence of chemical structure on properties of materials and their choice in engineering applications..
			CH 152.6	Classify chemical fuels and grade them through qualitative analysis
10	ES 155 ME	Engineering Workshop -I	ME 155.1	Use proper tools and prepare the work piece in wooden material.
			ME 155.2	Use proper tools for marking, measuring, cutting and finishing the work piece on metal plate.
			ME 155.3	Prepare various types of joints by Arc welding process
			ME 155.4	Use suitable tools to make plumbing joint assembly for water supply.
			ME 155.5	Prepare layout of electrical circuits and testing the circuits.
11	ES 154 CS	Computer Programming Laboratory	CS 154.1	Apply the design concepts for development of process and interpret data.
			CS 154.2	Demonstrate knowledge of programming environment, compiling, debugging, linking and executing variety of programs
			CS 154.3	Demonstrate documentation and presentation of the algorithms / flowcharts / programs in a record form
			CS 154.4	Validate the process using known input-output parameters
12	MC 156 EG	Engineering English Laboratory	MC 156.1	Acquire listening competence
			MC 156.2	Enhance speaking skills through Phonetics and Interactive activities
			MC 156.3	Improve reading & PPT preparation skills using various sources of reading materials.
			MC 156.4	Develop writing skills

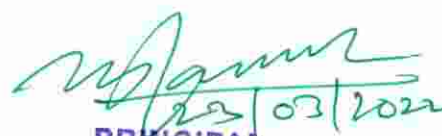
  
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II SEMESTER				
1	BS 201 MT	Mathematics -II	MT 201.1	Distinguish between Ordinary and Partial Differential Equation & solve Linear, Non-Linear, Exact and Non-Exact Differential Equation of First Order.
			MT 201.2	Solve basic Application problems on Orthogonal Trajectory, L-R, L-C-R Circuits, Newtons law of Cooling, Growth and Decay explain by first order Differential Equations
			MT 201.3	Recognize a second & higher order differential equation and solve Homogenous and Non Homogenous second and higher order equation with constant and variable coefficient.
			MT 201.4	Find the Laplace Transform of the Elementary functions and their derivatives to solve differential equation for initial value problems, periodic functions and use to find Inverse Laplace transform.
			MT 201.5	Solve nonsingular differential equation by the power series method and identify the singular points and ordinary points.
			MT 201.6	To demonstrate the ability to use Legendre's, Bessel's and Use of Beta-Gamma Functions to evaluate fractional calculus in approximating D.E.
2	BS 202 PH	Engineering Physics - II	PH 202.1	To apply the principles of Optics to calculate the wavelength of monochromatic and polychromatic light.
			PH 202.2	Using basic principles of statistical mechanics students can able to understand the materials and their properties.
			PH 202.3	Ability to understand the basic characteristics and design the semiconductor devices by using band theory of solids.
			PH 202.4	Ability to understand the arrangement of atoms and predict the defects in the crystals.
			PH 202.5	Ability to identify, distinguish and characterize the materials and their properties related to Dielectric, Magnetic, Nano and Superconductors.
3	BS 203 CH	Engineering Chemistry - II	CH 203.1	Apply the concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries.
			CH 203.2	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
			CH 203.3	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment.
			CH 203.4	Explain the influence of chemical structure on properties of materials and their choice in engineering applications..
			CH 203.5	Relate the concept of green chemistry for design of and manufacturing of engineering materials.
			CH 203.6	Classify chemical fuels and grade them through qualitative analysis.
4	HS 204 EG	Business Communication and Presentation Skills	HS 253.1	recognize the importance of business communication and its different aspects
			HS 253.2	demonstrate awareness of different models of interpersonal communication and use the skills for personality development
			HS 253.3	apply appropriate writing styles for a variety of academic and professional requirements
			HS 253.4	compose career oriented written communication
			HS 253.5	demonstrate group discussion and interview skills
5	ES 205 CE	Engineering Mechanics -II	CE 205.1	Determine the Center of gravity and Mass moment of inertia of solid and composite bodies. Extracting information regarding hidden variables or unknown in a system using Principle of Virtual work.
			CE 205.2	Apply the laws of motion to study the kinematic parameters of rigid body motion and its analysis in a plane. (Apply the knowledge of engineering fundamentals to the solution of complex engineering problems.
			CE 205.3	Solve the problems involving translation and rotation of particle & rigid bodies by applying principles of kinetics.
			CE 205.4	Apply the Principles of work- energy, its applications to bodies in Translation and in connected systems.
			CE 205.5	Analyze and solve impact problems using principles of impulse momentum.
6	BS 251 PH	Engineering Physics Laboratory -II	PH 251.1	Conduct experiments, take measurements and analyze the data through hands-on experience in order to demonstrate understanding of the theoretical concepts of applied physics, while working in small groups.
			PH 251.2	Demonstrate writing skills through clear laboratory reports.
			PH 251.3	Interpret the principles of optics and determine the properties of materials graphically
			PH 251.4	Compare the experimental results with those introduced in lecture, draw relevant conclusions and substantiate them satisfactorily.
			PH 251.5	Transfer group experience to individual performance of experiments and demonstrate effective oral communication skills.

  
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7	BS 252 CH	Engineering Chemistry Laboratory-II	CH 252.1	Apply the concept of electrode potential in identifying feasibility of electrochemical reaction;
			CH 252.2	<b>Illustrate</b> electro analytical techniques and working of batteries
			CH 252.3	Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
			CH 252.4	Estimate the physical & chemical parameters of quality of water and explain the process of water treatment.
			CH 252.5	Explain the influence of chemical structure on properties of materials and their choice in engineering applications..
			CH 252.6	
			CH 252.7	Classify chemical fuels and grade them through qualitative analysis
8	ES 155 ME	Engineering Workshop -I	ME 155.1	Use proper tools and prepare the work piece in wooden material.
			ME 155.2	Use proper tools for marking, measuring, cutting and finishing the work piece on metal plate.
			ME 155.3	Prepare various types of joints by Arc welding process
			ME 155.4	Use suitable tools to make plumbing joint assembly for water supply.
			ME 155.5	Prepare layout of electrical circuits and testing the circuits.
			ME 155.6	
9	ES 930 CS	Computer Skill Lab	CS 930.1	Apply the design concepts for development of process and interpret data.
			CS 930.2	Demonstrate knowledge of programming environment, compiling, debugging, linking and executing variety of programs
			CS 930.3	Demonstrate documentation and presentation of the algorithms / flowcharts / programs in a record form
			CS 930.4	Validate the process using known input-output parameters
10	HS 253 EG	Communication Skill Lab	EG 253.1	Acquire listening competence.
			EG 253.2	Enhance speaking skills with appropriate body language, through interactive activities.
			EG 253.3	Improve reading skills using various sources of reading materials.
			EG 253.4	Develop writing skills.
11	ES 254 CE	Engineering Graphics Lab -II	CE 254.1	Draw the true shape of solids, sections of solids & 3D models using AutoCAD.
			CE 254.2	Demonstrate & draw the Development of surfaces.
			CE 254.3	Draw the Intersection of surfaces.
			CE 254.4	Draw the isometric projections of the simple & combined solids.
			CE 254.5	Draw the Perspective views of straight lines, plane figures and simple solids.
12	PC 255 CE	Building Drawing	CE 255.1	Aquire basic concepts of Building Drawing
			CE 255.2	Aquire knowledge about application of different sign in building drawing
			CE 255.3	Aquire the principles of Planning of Building

  
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**MUFFAKHAM JAH COLLEGE OF ENGINEERING & TECHNOLOGY**  
CO-PO MAPPING OF I & II SEMESTERS  
CIVIL ENGINEERING DEPARTMENT

ROLL NO	I SEMESTER												II SEMESTER										
	ENGINEERING MATHEMATICS-I	ENGINEERING PHYSICS-I	ENGINEERING CHEMISTRY-I	ENGINEERING MECHANICS-I	COMPUTER PROGRAMMING & PROBLEM SOLVING	ENGINEERING ENGLISH	ENGINEERING PHYSICS LAB - I	ENGINEERING CHEMISTRY LAB-I	ENGINEERING GRAPHICS-I	COMPUTER PROGRAMMING LAB	ENGINEERING WORKSHOP-I	ENGINEERING ENGLISH LAB-I	ENGINEERING MATHEMATICS-II	ENGINEERING PHYSICS-II	ENGINEERING CHEMISTRY-II	BUSINESS COMMUNICATIONS & PRESENTATION	ENGINEERING MECHANICS-II	ENGINEERING PHYSICS LAB-II	ENGINEERING CHEMISTRY LAB-II	COMPUTER SKILLS LAB	COMMUNICATION SKILLS LAB	ENGINEERING GRAPHICS LAB-II	BUILDING DRAWING
1604-17-732-001	A	A	A	C	D	C	S	S	S	A	S	S	D	B	D	B	A	S	S	A	A	S	B
1604-17-732-002	C	S	A	C	D	B	S	S	A	A	A	S	C	A	A	B	B	S	S	A	A	S	B
1604-17-732-003	C	A	B	B	E	B	S	S	S	A	A	S	D	B	C	A	B	S	S	S	S	S	S
1604-17-732-004	B	S	B	C	D	C	S	S	B	A	S	S	D	S	C	A	C	S	A	S	A	A	A
1604-17-732-006	E	D	E	C	E	D	A	B	D	C	A	A	E	C	D	C	E	S	B	A	A	D	D
1604-17-732-007	B	B	D	E	D	D	A	A	A	S	S	A	E	D	C	C	D	B	S	S	A	S	B
1604-17-732-008	B	B	B	C	E	D	S	S	B	A	S	S	E	D	C	C	D	B	S	S	A	S	B
1604-17-732-009	C	B	D	E	E	D	S	A	C	B	S	A	E	D	D	C	B	A	A	A	A	B	A
1604-17-732-010	B	S	C	C	E	C	S	A	S	B	A	S	D	B	C	B	A	S	S	A	A	C	B
1604-17-732-011	C	S	B	C	D	C	S	S	A	S	S	S	E	A	A	B	C	S	S	S	S	S	A
1604-17-732-012	A	A	B	B	E	C	S	S	S	S	S	S	D	C	B	B	A	S	S	A	S	A	A
1604-17-732-013	S	S	S	C	C	B	S	S	S	S	S	S	D	C	B	B	A	S	S	A	S	A	A
1604-17-732-014	A	S	A	B	C	C	S	S	S	S	S	S	C	A	S	B	A	S	S	S	S	A	A
1604-17-732-015	E	B	D	E	E	E	S	B	D	A	A	S	E	E	E	D	D	A	A	A	A	D	C
1604-17-732-016	B	S	A	C	E	C	S	A	S	A	A	S	C	B	B	C	C	S	S	S	S	A	B
1604-17-732-017	B	S	A	B	D	C	S	S	A	S	S	S	D	A	C	B	A	S	S	S	S	S	A
1604-17-732-018	E	D	E	E	E	C	S	B	C	C	A	A	E	D	E	B	E	A	A	B	A	D	D
1604-17-732-019	A	S	A	C	E	C	S	S	S	S	S	S	E	C	C	B	C	A	A	S	S	S	S
1604-17-732-020	C	A	D	E	E	D	A	A	C	B	A	A	D	C	E	C	D	A	A	A	A	B	B
1604-17-732-021	D	D	E	E	C	D	A	B	D	C	C	A	E	E	E	E	D	B	A	B	A	C	D
1604-17-732-022	B	A	A	A	E	D	S	A	B	S	A	S	C	B	C	D	C	S	S	B	S	A	B
1604-17-732-023	A	C	A	C	E	C	S	S	A	S	S	A	E	B	E	C	B	S	S	A	A	S	A
1604-17-732-025	D	D	C	D	E	D	S	A	C	A	B	S	E	D	E	D	D	A	B	A	S	B	C
1604-17-732-026	D	E	D	E	E	D	A	B	B	A	S	A	D	E	E	C	E	B	A	A	A	B	B
1604-17-732-028	B	A	A	B	E	C	S	A	A	S	A	S	D	A	B	B	C	S	S	A	S	S	B

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1604-17-732-029	C	D	D	D	E	C	A	A	A	S	S	S	E	C	D	B	E	S	A	A	A	S	A
1604-17-732-030	D	B	B	B	E	C	A	A	B	A	A	S	D	C	B	A	C	A	A	A	A	S	A
1604-17-732-032	C	B	A	D	C	D	S	B	B	A	A	A	D	C	E	B	D	A	A	A	A	A	B
1604-17-732-033	C	E	C	D	D	C	A	B	B	S	S	S	C	C	D	B	D	A	S	A	S	A	B
1604-17-732-034	D	D	D	E	E	C	A	A	B	A	A	A	E	E	E	C	D	A	A	B	A	A	D
1604-17-732-035	D	D	C	E	C	D	A	B	B	A	A	B	E	C	D	B	D	A	B	B	S	B	D
1604-17-732-036	D	E	D	E	E	D	A	A	B	A	A	A	E	E	E	E	B	D	A	A	A	A	A
1604-17-732-037	D	E	E	E	E	B	B	B	B	B	B	B	E	E	D	C	E	A	C	B	B	C	D
1604-17-732-038	D	D	D	E	E	C	A	A	B	C	A	A	E	D	E	B	D	B	A	B	S	A	C
1604-17-732-043	E	E	E	E	D	D	A	A	B	C	A	A	E	D	E	C	E	S	B	A	A	A	C
1604-17-732-044	D	C	B	D	E	D	S	A	B	A	S	A	E	D	D	B	E	B	B	A	A	A	C
1604-17-732-046	D	E	D	E	D	D	A	B	B	S	C	A	E	E	D	B	E	A	A	B	A	C	C
1604-17-732-047	A	A	C	C	E	C	S	A	A	S	A	A	C	B	C	B	D	A	A	A	A	A	C
1604-17-732-048	D	E	E	E	E	D	S	A	B	B	C	A	E	C	D	B	E	A	A	A	S	B	A
1604-17-732-049	E	E	D	E	E	E	A	A	B	S	A	A	E	D	E	C	D	B	A	A	S	C	C
1604-17-732-050	E	E	E	E	E	D	A	A	A	S	B	A	D	D	E	B	E	A	C	B	S	A	C
1604-17-732-051	D	E	C	D	E	D	A	C	C	C	C	A	D	C	D	B	D	B	A	C	A	D	B
1604-17-732-055	A	B	C	C	E	D	S	A	B	A	S	A	E	C	D	A	B	S	A	C	A	C	D
1604-17-732-057	E	E	E	E	E	E	A	B	C	C	B	A	E	E	E	C	E	B	A	C	A	C	B
1604-17-732-058	D	E	C	E	E	D	A	B	C	C	B	A	C	C	C	B	C	B	B	B	S	B	B
1604-17-732-061	A	A	A	C	D	C	S	S	B	S	S	S	B	B	B	B	S	S	S	A	S	S	A
1604-17-732-062	D	E	D	D	D	C	A	A	B	A	S	A	E	C	E	D	E	B	A	B	A	B	B
1604-17-732-063	B	B	B	D	D	C	S	S	S	S	A	S	D	A	D	C	B	A	A	B	S	S	C
1604-17-732-064	A	B	A	C	D	C	S	S	A	A	A	A	C	A	D	C	A	S	S	B	S	S	S
1604-17-732-065	B	C	B	C	D	D	S	A	A	A	A	A	E	D	E	D	E	A	A	B	S	A	A
1604-17-732-066	C	C	C	D	D	C	A	B	A	B	A	A	D	D	E	C	D	B	A	B	A	B	B
1604-17-732-067	B	C	C	D	E	D	S	A	C	A	B	A	C	C	C	D	C	A	C	B	B	C	D
1604-17-732-068	C	C	C	C	D	D	S	A	S	S	S	S	D	B	C	B	C	A	S	B	S	S	A
1604-17-732-071	A	B	S	B	D	C	S	A	A	S	S	S	C	C	D	C	S	S	C	A	S	A	A
1604-17-732-073	B	C	C	C	D	C	S	A	B	A	A	S	D	C	D	D	B	A	B	C	A	B	D

*M. J. Khan*  
23/03/2022

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1604-17-732-074	C	E	E	E	D	C	S	A	B	S	S	S	E	E	E	D	D	B	A	C	A	B	D
1604-17-732-077	D	C	C	D	C	D	A	A	C	S	A	S	E	C	C	D	D	A	A	B	S	S	A
1604-17-732-080	B	C	D	D	D	D	A	A	D	B	S	A	E	D	C	D	C	A	A	B	S	B	C
1604-17-732-081	S	B	B	C	C	C	S	A	S	S	S	S	D	A	B	C	A	S	S	B	S	S	S
1604-17-732-083	E	D	E	E	E	D	A	C	C	C	S	A	E	E	B	D	D	B	B	C	A	B	A
1604-17-732-084	B	B	C	C	E	C	A	A	A	A	A	A	E	C	D	C	C	A	A	B	S	B	A
1604-17-732-086	B	S	C	D	E	C	S	B	A	B	S	A	D	A	C	D	C	S	A	C	A	C	A
1604-17-732-087	B	E	D	C	E	D	A	A	B	A	A	A	E	C	C	C	E	A	A	C	S	A	D
1604-17-732-088	D	C	D	D	E	D	A	A	B	A	A	A	E	B	B	C	E	S	A	C	S	A	A
1604-17-732-090	E	D	D	D	E	D	B	S	A	A	A	A	D	E	C	E	E	B	A	B	S	A	B
1604-17-732-091	A	A	B	B	E	C	S	S	S	S	S	A	D	B	C	C	B	A	S	B	S	S	S
1604-17-732-092	C	C	D	D	E	D	B	A	A	A	A	A	E	B	D	D	D	A	A	C	S	A	C
1604-17-732-093	E	B	D	E	E	D	S	A	A	A	S	S	D	C	C	C	E	S	S	C	S	S	A
1604-17-732-094	B	A	B	D	E	C	S	A	A	S	A	S	E	A	B	B	A	A	S	B	S	B	A
1604-17-732-097	D	D	E	E	E	D	A	A	A	C	S	A	E	D	D	E	D	B	A	C	A	A	A
1604-17-732-103	A	A	B	B	B	D	S	A	S	S	S	A	A	S	A	C	C	S	A	D	S	S	S
1604-17-732-104	E	E	E	E	D	E	A	A	D	C	S	A	E	E	D	E	E	A	A	B	A	C	A
1604-17-732-105	E	E	E	E	E	E	A	B	D	A	B	A	D	E	D	C	D	S	B	B	S	C	C
1604-17-732-106	D	C	C	D	E	D	S	A	A	B	S	A	E	C	E	C	E	B	S	B	A	A	A
1604-17-732-109	D	C	D	C	E	C	S	B	C	C	A	A	E	C	D	C	E	A	B	B	S	B	B
1604-17-732-110	E	D	D	E	E	E	S	B	C	C	A	B	E	E	E	D	E	B	B	B	B	B	A
1604-17-732-112	D	D	D	E	E	D	S	B	B	C	A	A	E	D	E	C	E	A	S	B	S	B	S
1604-17-732-113	B	C	C	E	E	D	S	S	B	B	S	A	E	B	D	D	D	A	A	B	S	S	A
1604-17-732-115	C	E	D	D	E	D	B	A	C	A	S	A	E	D	D	D	D	B	B	B	A	C	C
1604-17-732-116	C	C	D	D	D	D	S	B	D	C	A	A	E	D	E	C	E	B	A	C	A	C	A
1604-17-732-117	E	D	D	E	C	E	C	B	C	B	B	A	E	E	E	E	E	B	B	B	A	C	C

  
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## COURSE OUTCOMES AND PROGRAM OUTCOMES

**Establish the correlation between the courses and program outcomes (POs) and Program Specific Outcomes (PSOs)**

The Program outcomes and Program Specific outcomes are listed here for ready reference.

**PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2: Problem analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

**PO3: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.


**PO4: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

**PO6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

  
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**PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO 12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **Program Specific Outcomes (PSOs)**

**PSO1: VLSI Design:** The ECE Graduates will acquire state of art analysis and design skills in the area of digital and analog VLSI design using modern CAD tools.

**PSO2: Embedded System Design:** The ECE Graduates will develop preliminary skills and capabilities necessary for embedded system design and demonstrate understanding of its societal impact.

**PSO3: Communication and Signal Processing:** The ECE Graduates will obtain the knowledge of the working principles of modern communication systems and be able to develop simulation models of components of a communication system.

**PSO4: Software Design Engineering:** The ECE Graduates will develop soft skills, aptitude and programming skills to be employable in IT sector.



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**Course Outcomes (COs) (SAR should include one course from each semester of study, however, COs should be prepared for all courses and made available as evidence, if asked)**

**Course outcomes of one course from each semester**

<b>Course Name – PC221EC – Electronic Devices</b>	
<b>Year of Study – 2020 – 21 Second Year Semester III</b>	
PC221EC .1	Obtain the characteristics of diode in forward and reverse bias and perform mathematical modeling of diode as a resistor and capacitor.
PC221EC .2	Perform analysis and design of a complete AC to DC converter(Eg: Mobile Charger) consisting of Rectifiers, Filters and regulators
PC221EC .3	Describe the construction and working of a Bipolar Junction Transistor in various modes (CE, CB, CC) and design circuits for stabilization and compensation of a BJT.
PC221EC .4	Convert the BJT into its equivalent h parameter model and perform exact and approximate analysis of BJT Amplifiers in low, mid and high frequencies for all modes of operation.
PC221EC .5	Describe the construction and working of various JFET and MOSFET and design FET based amplifiers
<b>Course Name – PC231EC– Analog Electronic Circuits</b>	
<b>Year of Study 2020 -- 21 Second Year Semester IV</b>	
PC231EC.1	Identify the components that effect the frequency response and analyze the single and multi stage amplifiers
PC231EC.2	Recognize the type of feedback and analyze its effect on amplifier characteristics
PC231EC.3	Calculate the frequency of oscillation for different types of oscillator circuits suited for various applications using Barkhausen's criterion
PC231EC.4	Identify the importance of power amplifiers and calculate the efficiencies of class –A, B, AB and examine the effect on distortion
PC231EC.5	Describe the working of tuned amplifiers and distinguish various types and analyze the effect of quality factor on its performance.

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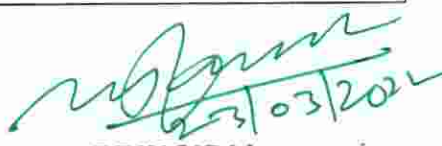
<b>Course Name – PC505EC– Microprocessors and Microcontrollers</b>	
<b>Year of Study – 2020 -- 21 Third Year Semester V</b>	
PC505EC. 1	Describe the fundamental concept of an advanced microprocessor 8086 and its architecture.
PC505EC. 2	Demonstrate program proficiency by writing efficient programs in assembly level language using various addressing modes and instruction set of 8086.
PC505EC. 3	Identify functions of various programmable peripheral IC's in a microprocessors based system and make aware of the different techniques of interfacing between the processor and peripheral devices.
PC505EC. 4	Distinguish between a microprocessor and microcontroller and describe the architecture and instruction and programming of 8051 microcontroller.
PC505EC. 5	Apply the design concepts to interface a microcontroller based system to the real world.
<b>Course Name – PC502EC – Digital Signal Processing</b>	
<b>Year of Study – 2020 -- 21 Third Year Semester VI</b>	
PC502EC .1	Compute the Discrete Fourier transform (DFT), and develop the DIT-FFT, DIF-FFT algorithm and evaluate their computational efficiency.
PC502EC .2	Design FIR filter using different windowing techniques and explain finite word length effects.
PC502EC .3	Design Butterworth and Chebyshev filters using Impulse Invariant Technique (IIT) and Bilinear transformation techniques, compare FIR and IIR filters
PC502EC .4	Formulate multistage implementation of sampling rate conversion and illustrate the process of interpolation and decimation
PC502EC .5	Explain the architectures of DSP processor TMS320C54XX and Analyze their instruction sets and addressing modes.

  
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<b>Course Name – PC702EC – VLSI Design</b>	
<b>Year of Study – 2020 -- 21 4<sup>th</sup> Year Semester VII</b>	
PC702EC. 1	Apply the knowledge of Verilog HDL data types, system tasks and compiler directives to write gate level and data flow level modeling programs
PC702EC. 2	Write verilog programs for logic blocks using behavioural modeling and switch level modeling by applying concepts of Tasks and Functions and also model a system using Mealy and Moore state machines.
PC702EC. 3	Describe Basic MOS Transistor action: and Basic electrical properties of MOS. Infer MOS inverters with different loads, Basic Logic Gates with CMOS and Transmission gate logic circuits, BiCMOS inverter.
PC702EC. 4	Design basic CMOS logic gates at circuit level and obtain its stick and layout diagram using concept of CMOS fabrication and design rules.
PC702EC. 5	Compare the architectural difference between Combinational and Sequential Logic.
<b>Course Name – PW961 EC – Project</b>	
<b>Year of Study – 2020 -- 21 4<sup>th</sup> Year Semester VIII</b>	
PW961 EC.1	Demonstrate an in-depth knowledge of one or more areas of Electronics and Communication Engineering and integration of knowledge gained through several courses, by developing veritable solution to a complex problem.
PW961 EC.2	<del>Technical Communication Contribution</del> a formatted report with proper layout, grammar, spelling, cross-referencing of figures, tables and references to previous works. (Report Writing)
PW961 EC.3	Develop and present project plan making use of management tools like PERT, CPM, and UML diagrams by dividing the project work into suitable packages and identify resources for completion of the packages. (Project Planning)
PW961 EC.4	Present results clearly making use of appropriate latest IT tools in the form of graphs, tables, drawing or text, analyze the results and state appropriate conclusions. (Results)
PW961 EC.5	Exhibit a sound knowledge of the problem, its solutions and results through detailed presentation of the material and oral responses to the questions based on the work. (University viva-voce Examination)

  
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CO-PO matrices of courses selected in 3.1.1(Six matrices to be mentioned, one per semester from 3<sup>rd</sup> to 8<sup>th</sup> Semester)

CO-PO matrices of courses selected in

Courses	Program Outcomes											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
PC221EC – Electronic Devices Second Year Semester I	3	2	3	3	2	-	-	-	-	-	-	-
PC221EC .1: Obtain the characteristics of diode in forward and reverse bias and perform mathematical modeling of diode as a resistor and capacitor.	3	2	-	1	2	-	-	-	-	-	-	-
PC221EC .2: Perform analysis and design of a complete AC to DC converter (Eg: Mobile Charger) consisting of Rectifiers, Filters and regulators	-	2	3	3	-	-	-	-	-	-	-	-
PC221EC .3: Describe the construction and working of a	-	-	-	3	2	-	-	-	-	-	-	-

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Bipolar Junction Transistor in various modes(CE,CB,CC) and design circuits for stabilization and compensation of a BJT.												
<b>PC221EC .4:</b> Convert the BJT into its equivalent h parameter model and perform exact and approximate analysis of BJT Amplifiers in low, mid and high frequencies for all modes of operation	-	1	2	-	-	-	-	-	-	-	-	-
<b>PC221EC .5:</b> Describe the construction and working of various JFET and MOSFET and design FET based amplifiers	3	2	-	3	-	-	-	-	-	-	-	-
<b>PC231EC -</b> <b>Analog Electronic Circuits Second Year Semester II</b>	3	3	3	3	-	-	-	-	-	-	-	-
<b>PC231EC.1:</b> Identify the components that effect the frequency response and analyze the	3	3	3	-	-	-	-	-	-	-	-	-


  
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single and multi stage amplifiers												
<b>PC231EC.2:</b> Recognize the type of feedback and analyze its effect on amplifier's characteristics	-	3	-	3	-	-	-	-	-	-	-	-
<b>PC231EC.3:</b> Calculate the frequency of oscillation for different types of oscillator circuits suited for various applications using Barkhausen's criterion	3	-	3	3	-	-	-	-	-	-	-	-
<b>PC231EC.4:</b> Identify the importance of power amplifiers and calculate the efficiencies of class -A, B, AB and examine the effect on distortion	-	3	2	-	-	-	-	-	-	-	-	-
<b>PC231EC.5:</b> Describe the working of tuned amplifiers and distinguish various types, analyze the effect of neutralization	-	2	-	3	-	-	-	-	-	-	-	-

  
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techniques to improve the stability.													
<b>EC 305 – Microprocessors and Microcontrollers Third Year Semester I</b>	3	2	2	2	2	-	-	-	-	-	-	-	-
<b>PC505EC.1:</b> Describe the fundamental concept of an advanced microprocessor 8086 and its architecture.	1	2	-	2	-	-	-	-	-	-	-	-	-
<b>PC505EC.2:</b> Demonstrate program proficiency by writing efficient programs in assembly language using various addressing modes and instruction set of 8086.	3	2	-	2	2	-	-	-	-	-	-	-	-
<b>PC505EC.3:</b> Identify functions of various programmable peripheral ICs in a	3	-	2	2	2	-	-	-	-	-	-	-	-



microprocessor based system and make aware of the different techniques of interfacing between the processor and peripheral devices.												
<b>PC505EC.4:</b> Distinguish between a microprocessor and microcontroller and describe the architecture, instruction and programming of 8051 microcontroller.	3	2	2	2	2	-	-	-	-	-	-	-
<b>PC505EC.5:</b> Apply the design concepts to interface a microcontroller based system to the real world,	3	2	3	2	2	-	-	-	-	-	-	-
<b>EC 352 – Digital Signal Processing</b> <b>Third Year Semester II</b>	3	2	3	2	-	-	-	-	-	-	-	-
<b>PC502EC .1:</b> Compute the Discrete Fourier transform (DFT),	3	2	-	2	-	-	-	-	-	-	-	-

  
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and develop the DIT-FFT, DIF-FFT algorithm and evaluate their computational efficiency.												
<b>PC502EC</b> .2:Design FIR filter using different windowing techniques and explain finite word length effects.	-	3	3	-	-	-	-	-	-	-	-	-
<b>PC502EC</b> .3:Design Butterworth and Chebyshev filters using Impulse Invariant Technique (IIT) and Bilinear transformation techniques, compare FIR and IIR filters	-	3	3	1	-	-	-	-	-	-	-	-
<b>PC502EC</b> .4:Formulate multistage implementation of sampling rate conversion and illustrate the process of	3	3	-	-	-	-	-	-	-	-	-	-

  
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interpolation and decimation.												
<b>PC502EC</b> .5: Explain the architectures of DSP processor TMS320C54XX and Analyze their instruction sets and addressing modes.	-	2	2	1	-	-	-	-	-	-	-	-
<b>EC 402 – VLSI Design</b> <b>Final Year</b> <b>Semester I</b>	3	2	2	2	-	-	-	-	-	-	-	-
PC702EC.1: Apply the knowledge of Verilog HDL data types, system tasks and compiler directives to write gate level and data flow level modeling programs	3	-	2	2	-	-	-	-	-	-	-	-
PC702EC.2: Write verilog programs for logic blocks using behavioral modeling and switch level modeling by applying concepts of Tasks and Functions and also	3	2	2	2	-	-	-	-	-	-	-	-

  
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model a system using Mealy and Moore state machines.												
PC702EC.3: Describe Basic MOS Transistor action: and Basic electrical properties of MOS. Infer MOS inverters with different loads, Basic Logic Gates with CMOS and Transmission gate logic circuits, BiCMOS inverter.	3	2	2	-	-	-	-	-	-	-	-	-
PC702EC.4: Design basic CMOS logic gates at circuit level and obtain its stick and layout diagram using concept of CMOS fabrication and design rules.	2	3	2	-	-	-	-	-	-	-	-	-
PC702EC.5: Compare the architectural difference between Combinational and Sequential Logic.	2	3	3	1	-	-	-	-	--	-	-	-
EC 482 –	3	3	3	3	3	2	2	2	3	3	2	3

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ProjectFinal Year Semester II												
PW961 EC.1: Demonstrate an in- depth knowledge of one or more areas of Electronics and Communication Engineering and integration of knowledge gained through several courses, by developing veritable solution to a complex problem. (Technical Content and Contribution)	3	3	3	3	3	2	2	-	2	-	-	3
PW961 EC.2: Demonstrate the ability to produce a formatted report with proper layout, grammar, spelling, cross-referencing of figures, tables and references to previous works. (Report Writing)	-	-	-	-	-	-	-	2	3	3	-	-
PW961 EC.3: Develop and present project plan making use of	-	-	-	-	-	-	-	-	-	2	3	2

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management tools like PERT, CPM, and UML diagrams by dividing the project work into suitable packages and identify resources for completion of the packages. (Project Planning)												
PW961 EC.4: Present results clearly making use of appropriate latest IT tools in the form of graphs, tables, drawing or text, analyze the results and state appropriate conclusions. (Results)	2	3	3	3	3	-	-	-	3	3	-	2
PW961 EC.5: Exhibit a sound knowledge of the problem, its solutions and results through detailed presentation of the material and oral responses to the questions based on the work. (University viva-voce Examination)	3	2	3	2	2	2	2	2	3	3	2	2

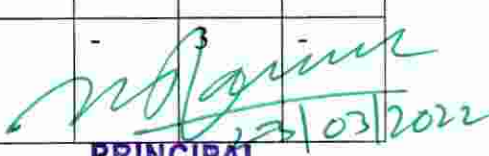
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frequency response and analyze the single and multi stage amplifiers				
<b>PC231EC.2:</b> Recognize the type of feedback and analyze its effect on amplifier's characteristics	3	1	-	-
<b>PC231EC.3:</b> Calculate the frequency of oscillation for different types of oscillator circuits suited for various applications using Barkhausen's criterion	3	1	2	-
<b>PC231EC.4:</b> Identify the importance of power amplifiers and calculate the efficiencies of class –A, B, AB and examine the effect on distortion	2	-	-	-
<b>PC231EC.5:</b> Describe the working of tuned amplifiers and distinguish various types, analyze the effect of neutralization techniques to improve the stability.	1	-	-	-
<b>PC 505 – Microprocessors and Microcontrollers Third Year Semester I</b>	1	3	-	2
<b>PC505EC.1:</b> Describe the fundamental concept of an advanced microprocessor 8086 and its architecture.	1	3	-	-
<b>PC505EC.2:</b> Demonstrate program proficiency by writing efficient programs in assembly language using various addressing modes and instruction set of 8086.	-	3	-	2
<b>PC505EC.3:</b> Identify functions of various programmable peripheral ICs in a microprocessor based system and make aware of the different techniques of interfacing between the processor and peripheral devices.	1	3	-	-
<b>PC505EC.4:</b> Distinguish between a microprocessor and microcontroller and describe the architecture, instruction and programming of 8051 microcontroller.	1	3	-	2
<b>PC505EC.5:</b> Apply the design concepts to interface a microcontroller based system to the real world,	-	3	-	-
<b>EC 352 – Digital Signal Processing Third Year Semester II</b>	-	-	3	-
<b>PC502EC .1:</b> Compute the Discrete Fourier transform (DFT), and develop the DIT-FFT, DIF-FFT algorithm and	-	-	3	-

  
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evaluate their computational efficiency.				
<b>PC502EC .2:</b> Design FIR filter using different windowing techniques and explain finite word length effects.	-	-	3	-
<b>PC502EC .3:</b> Design Butterworth and Chebyshev filters using Impulse Invariant Technique (IIT) and Bilinear transformation techniques, compare FIR and IIR filters	-	-	3	-
<b>PC502EC .4:</b> Formulate multistage implementation of sampling rate conversion and illustrate the process of interpolation and decimation.	-	-	2	-
<b>PC502EC .5:</b> Explain the architectures of DSP processor TMS320C54XX and Analyze their instruction sets and addressing modes.	-	2	3	-
<b>PC 702 – VLSI Design Final Year Semester VII</b>	3	-	-	2
PC702EC.1: Apply the knowledge of Verilog HDL data types, system tasks and compiler directives to write gate level and data flow level modeling programs	3	-	-	2
PC702EC.2: Write verilog programs for logic blocks using behavioural modeling and switch level modeling by applying concepts of Tasks and Functions and also model a system using Mealy and Moore state machines.	3	-	-	2
PC702EC.3: Describe Basic MOS Transistor action: and Basic electrical properties of MOS. Infer MOS inverters with different loads, Basic Logic Gates with CMOS and Transmission gate logic circuits, BiCMOS inverter.	3	-	-	-
PC702EC.4: Design basic CMOS logic gates at circuit level and obtain its stick and layout diagram using concept of CMOS fabrication and design rules.	3	-	-	-
PC702EC.5: Compare the architectural difference between Combinational and Sequential Logic.	2	-	-	-
<b>PW961EC – Project Final Year Semester II</b>	3	3	3	3
PW961 EC.1: Demonstrate an in-depth knowledge of one or more areas of Electronics and Communication Engineering and integration of knowledge gained through several	3	3	3	2

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courses, by developing veritable solution to a complex problem. (Technical Content and Contribution)				
PW961 EC.2: Demonstrate the ability to produce a formatted report with proper layout, grammar, spelling, cross-referencing of figures, tables and references to previous works. (Report Writing)	3	3	3	3
PW961 EC.3: Develop and present project plan making use of management tools like PERT, CPM, and UML diagrams by dividing the project work into suitable packages and identify resources for completion of the packages. (Project Planning)	2	2	2	2
PW961 EC.4: Present results clearly making use of appropriate latest IT tools in the form of graphs, tables, drawing or text, analyze the results and state appropriate conclusions. (Results)	3	3	3	3
CO482.5: Exhibit a sound knowledge of the problem, its solutions and results through detailed presentation of the material and oral responses to the questions based on the work. (University viva-voce Examination)	3	3	3	3

Note: 1: Slight Correlation 2: Moderate Correlation 3: High Correlation - : NO Correlation

**a) Program level course – PO matrix of all courses including first year courses(10)**

**Table Course-PO matrix for all courses**

Course Code	Course Title	Program Outcomes											
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12
		First Year (2020 -- 21)											
HS101EG	English	-	-	-	-	-	-	-	-	-	3	-	2
BS102MT	Mathematics 1	3	3	-	-	-	-	-	-	-	-	-	2
BS103MT	Mathematics 2	3	3	-	-	-	-	-	-	-	-	-	3
BS104PH	Physics	3	3	-	-	-	-	-	-	-	-	-	3
BS105CH	Chemistry	-	3	2	2	-	3	3	-	3	-	-	3

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ES107CS	Programs for problem solving	2	2	2	1	-	-	-	-	-	-	1	-
BS152PH	Physics Lab	3	3	-	3	-	-	-	-	-	-	-	-
BS153CH	Chemistry Lab	3	3	-	3	-	-	-	-	-	-	-	-
ES157ME	Workshop	2	-	-	-	-	1	3	-	-	-	-	-
ES155CS	Programs for problem solving lab	-	-	-	3	-	-	-	-	-	-	-	-
HS151EG	English Lab	-	-	-	-	-	-	-	-	3	3	1	2

**Second Year First semester (2020 -- 21)**

BS205MT	Mathematics – III (PDE, Probability & Statistics)	3	2	-	-	-	-	-	-	-	-	-	-
PC221EC	Electronic Devices	3	2	3	3	2	-	-	-	-	-	-	-
ES212ME	Elements of Mechanical Engineering	3	3	3	-	-	-	-	-	-	-	-	-
PC251EC	Electronic Devices lab	-	-	-	3	2	-	-	-	2	3	-	-
MC111PO	Indian Constitution												
HS201EG	Effective Technical Communication in English												
HS202CM	Finance and Accounting												
ES216EC	Digital Electronics												
PC222EC	Network Theory												
PC252EC	Electronic Workshop	2	-	-	3	2	-	-	-	2	3	-	-

**Second Year Second Semester (2020 -- 21)**

PC231EC	Analog Electronics Circuits	3	3	3	3	-	-	-	-	-	-	-	-
MC113PY	Essence of Indian Traditional Knowledge												
BS206BZ	Biology for Engineers												
HS213MP	Industrial Psychology												
PC232EC	Electromagnetic Theory	3	3	3	-	-	-	-					

  
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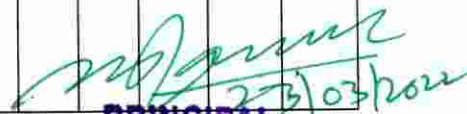
	and Transmission Lines												
ES215EC	Signals and Systems	3	3	-	1	-	-	-	-	-	-	-	-
PC233EC	Pulse and Linear Integrated Circuits	2	3	3	1	-	-	-	-	-	-	-	-
PC234EC	Computer Organisation and Architecture												
MC112CE	Environmental Sciences	-	-	-	-	-	3	3	3	-	-	-	-
PC261EC	Analog Electronic Circuits Lab	-	-	2	3	2	-	-	-	2	3	-	-
PC262EC	Pulse and Linear Integrated Circuits Lab	-	1	-	3	-	-	-	-	2	3	-	-

**Third Year First Semester (2020 -- 21)**

PC502EC	Digital Signal Processing	3	2	3	1	-	-	-	-	-	-	-	-
PC501EC	Analog Communications	3	2	1	1	-	-	-	-	-	-	-	-
PC503EC	Automatic Control Systems	3	2	2	-	-	-	-	-	-	-	-	-
PC505EC	Microprocessors and Microcontrollers	3	2	2	2	2	-	-	-	-	-	-	-
EC 331	Integrated Circuits Lab	-	-	2	3	2	-	-	-	2	3	-	-
PC551EC	Systems and Signal Processing Lab	-	-	2	3	2	-	-	-	2	3	-	-
PC552EC	Microprocessor and Microcontroller Lab	3	-	-	3	3	1	-	-	2	3	-	-

**Third Year Second Semester (2020 -- 21)**

PC601EC	Digital Communication	3	3	-	1	-	-	-	-	-	-	-	-
PC602EC	Digital system Design with Verilog												
PC603EC	Data Communication and computer networking	2	1	-	3	-	-	-	-	-	-	3	-

  
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PC604EC	Electronic Measurements and Instrumentation												
OE – I	Open Elective-I												
PE – I	Professional Elective-I												
PC651EC	Digital Communication lab	-	-	2	3	2	-	-	-	2	3	-	-
PC652EC	DCCN Lab	-	-	-	3	3	-	-	-	2	3	-	-
PC653EC	Digital system Design with Verilog Lab												
PC654EC	Summer Internship*	-	-	-	-	-	-	-	-	-	-	-	-
Fourth Year First semester (2020 -- 21)													
PC 702 EC	VLSI Design	3	2	3	1	-	-	-	-	-	-	-	-
PC 703 EC	Microwave Techniques												
PE 721	Mobile Cellular Communication	3	-	2	-	-	2	2	-	-	-	-	3
PC 701	: Embedded Systems	-	2	2	2	2	3	-	-	-	-	2	2
ES 707 ME	Industrial Administration and Financial Management	-	-	-	-	-	3	2	2	2	3	3	-
OE 774EE	Non-Conventional Energy Sources 5												
OE 775ME	Entrepreneurship												
OE 771 CE	Green Building Technologies												
PE 723 EC	Electronic Measurements and Instrumentation												
OE 781 CE	Road Safety Engineering												
OE 782 IT	Software Engineering												
PC 751 EC	Microwave Engineering Lab	-	-	2	3	2	-	-	-	2	3	-	-

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PC 752 EC	Electronic Design and Automation Lab	3	-	-	3	3	-	-	-	2	3	-	-
PW 761 EC	Project Seminar	3	3	3	3	3	2	2	2	3	3	2	3
SI 762 EC	Summer Internship												
Fourth Year Second Semester (2020 -- 21)													
PE 824 EC	Satellite Communication	3	3	2	-	-	2	2	-	-	-	-	-
PE 843 EC	Radar Systems												
PE 844 EC	Elective 2: Design of Fault Tolerant Systems	-	2	3	-	-	-	3	-	-	-	-	-
PE 841 EC	Elective 2: Real time operating systems	2	1	2	-	-	3	-	-	-	-	-	-
PE 832 EC	Elective 3: Global Navigational Satellite Systems	3	3	--	-	-	3	3	-	-	-	-	-
PE 823 EC	Elective 3: Neural Networks	3	3	2	2	-	-	-	-	-	-	-	-
PE 824 EC	Satellite Communications												
PE 834 EC	Multirate Signal Processing												
PE 831 EC	Wireless Sensor Networks												
PE 822 EC	Internet of Things												
PE 821 EC	Field Programmable Gate Arrays												
PE 833 EC	System Verilog												
PW961 EC	Project	3	3	3	3	3	2	2	2	3	3	2	3

Note: 1: Slight Correlation 2: Moderate Correlation 3: High Correlation - : NO Correlation

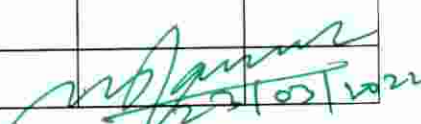
**b) Program level course – PSO matrix of all courses including first year courses**

**Table Course-PSO matrix for all courses**

Course	Course Title	Program Specific Outcomes(PSOs)
		03/2020

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Code		PSO1	PSO2	PSO3	PSO 4
	First Year (2020 -- 21)				
HS101EG	English	-	-	-	3
BS102MT	Mathematics 1	2	-	2	-
BS103MT	Mathematics 2	2	-	2	-
BS104PH	Physics	-	-	-	-
BS105CH	Chemistry	-	-	-	-
ES107CS	Programs for problem solving	-	3	-	3
BS152PH	Physics Lab	-	-	-	-
BS153CH	Chemistry Lab	-	-	-	-
ES157ME	Workshop	2	-	-	-
ES155CS	Programs for problem solving lab	2	-	-	-
HS151EG	English Lab	-	-	-	-
HS101EG	English	-	3	-	3
BS102MT	Mathematics 1	-	-	-	2
	Second Year first Semester (2020 -- 21)				
BS205MT	Mathematics – III (PDE, Probability & Statistics)	-	-	2	-
PC221EC	Electronic Devices	2	-	-	-
ES212ME	Elements of Mechanical Engineering	-	-	2	-
PC251EC	Electronic Devices lab	3	-	-	-
MC111PO	Indian Constitution	-	-	-	-
HS201EG	Effective Technical Communication in English	-	-	-	-
HS202CM	Finance and Accounting	3	-	-	-
ES216EC	Digital Electronics	2	2	-	-
PC222EC	Network Theory				
PC252EC	Electronic Workshop				

  
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Second Year second Semester (2020 -- 21)					
PC231EC	Analog Electronics Circuits	-	-	2	-
MC113PY	Essence of Indian Traditional Knowledge	3	-	2	-
BS206BZ	Biology for Engineers	-	-	2	-
HS213MP	Industrial Psychology	-	-	3	-
PC232EC	Electromagnetic Theory and Transmission Lines	-	3	-	-
ES215EC	Signals and Systems	-	-	-	-
PC233EC	Pulse and Linear Integrated Circuits	3	-	-	-
PC234EC	Computer Organisation and Architecture	-	-	-	-
MC112CE	Environmental Sciences				
PC261EC	Analog Electronic Circuits Lab				
PC262EC	Pulse and Linear Integrated Circuits Lab				
Third Year First Semester (2020 -- 21)					
PC502EC	Digital Signal Processing	2	2	-	-
PC501EC	Analog Communications	2	3	-	-
PC503EC	Automatic Control Systems	2	-	3	-
PC505EC	Microprocessors and Microcontrollers	2	2	2	-
EC 331	Integrated Circuits Lab	-	3	-	-
PC551EC	Systems and Signal Processing Lab	3	2	-	-
PC552EC	Microprocessor and Microcontroller Lab	-	-	3	-
Third Year Second Semester (2020 -- 21)					
PC601EC	Digital Communication	1	-	3	-
PC602EC	Digital system Design with Verilog	-	-	3	-
PC603EC	Data Communication and	-	-		

  
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	computer networking				
PC604EC	Electronic Measurements and Instrumentation	-	2	-	-
OE – I	Open Elective-I	2	2	-	-
PE – I	Professional Elective-I	1	1	1	-
PC651EC	Digital Communication lab	-	-	3	-
PC652EC	DCCN Lab	-	-	3	-
PC653EC	Digital system Design with Verilog Lab	2	2	2	2
PC654EC	Summer Internship*				
Final Year First Semester (2020 -- 21)					
PC 702 EC	VLSI Design	-	-	2	-
PC 703 EC	Microwave Techniques	3	1	-	-
PE 721	Mobile Cellular Communication	-	-	2	-
PC 701	Embedded Systems	-	-	3	-
ES 707 ME	Industrial Administration and Financial Management	-	3	-	-
OE 774EE	Non-Conventional Energy Sources 5	-	-	3	-
OE 775ME	Entrepreneurship	1	1	1	-
OE 771 CE	Green Building Technologies	-	-	2	-
PE 723 EC	Electronic Measurements and Instrumentation	3	-	-	-
OE 781 CE	Road Safety Engineering	2	2	2	2
OE 782 IT	Software Engineering				
PC 751 EC	Microwave Engineering Lab				
PC 752 EC	Electronic Design and Automation Lab				
PW 761 EC	Project Seminar				
SI 762 EC	Summer Internship				
Final Year Second Semester (2020 -- 21)					
PE 824 EC	Satellite Communication	-	-	2	-

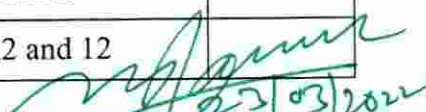
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PE 843 EC	Radar Systems	2	-	-	-
PE 844 EC	Elective 2: Design of Fault Tolerant Systems	-	3	-	-
PE 841 EC	Elective 2: Real time operating systems	-	-	3	-
PE 832 EC	Elective 3: Global Navigational Satellite Systems	-	-	2	-
PE 823 EC	Elective 3: Neural Networks	2	2	2	2
PE 824 EC	Satellite Communications	3	3	3	3
PE 834 EC	Multirate Signal Processing				
PE 831 EC	Wireless Sensor Networks				
PE 822 EC	Internet of Things				
PE 821 EC	Field Programmable Gate Arrays				
PE 833 EC	System Verilog				
PW961 EC	Project				

### Mapping of Curriculum with POs and PSOs

Course Component	Curriculum Content(% of total no. of credits of programme)		POs	PSO
Mathematics	Mathematics-I	6.48%	1,2 and 12	
	Mathematics-II		1,2 and 12	
	Mathematics-III		1 and 2	
Basic Sciences	Physics	5.55%	1,2 and 12	

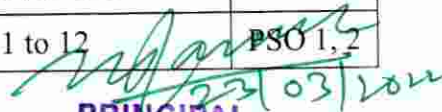
  
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	Chemistry		2,3,4,6 and 7	
	Physics Lab		1,2 and 4	
	Chemistry Lab		1,2 and 4	
Computing	Programming in C & C++	2.77%	1,2,3,4 and 11	PSO 2, PSO 4
	Programming Lab		4	PSO2, PSO 4
Humanities	English	4.62%	10 and 12	PSO4
	English Lab		9,10,11 and 12	PSO4
	Environmental Sciences		6,7 and 8	
Professional Core	Basic Circuit Analysis	54.62%	1,2,4 and 5	PSO 1
	Electromagnetic Theory		1,2 and 3	
	Electronic Devices		1,2,3,4 and 5	PSO 1
	Electronic Devices Lab		4,5,9 and 10	
	Electronic & Workshop Lab		1,4,5,9 and 10	
	Analog Electronic Circuits		1,2,3 and 4	PSO 1
	Network Transmission Lines		1,2 and 3	
	Signal Analysis and Transform Techniques		1,2 and 4	
	Pulse Digital And Switching Circuits		1,2,3 and 4	PSO 2
	Electronic Circuits Lab		2,4,5,9 and 10	
	Linear Integrated Circuits and Applications		1,2,3 and 4	PSO 1
	Digital Integrated Circuits and Applications		1,2,3 and 4	PSO 1
	Analog Communication		1,2,3 and 4	
	Microprocessors and Microcontrollers		1,2,3 ,4 and 5	PSO 2
	Integrated Circuits Lab		3,4,5,9 and 10	PSO 2
	Automatic Control Systems		1,2 and 3	
	Analog Communication Lab		3,4,5,9 and 10	
	Microprocessors and Microcontrollers Lab		1,4,5,6,9 and 10	PSO 2

  
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	Digital Communication		1,2 and 4	
	Digital Signal Processing		1,2,3 and 4	
	Antenna and Wave Propagation		1,2 and 3	
	Computer Organization and Architecture		1,2 and 3	PSO 2
	Electronic Instrumentation		1,2 and 3	
	Digital Communication lab		3,4,5,9 and 10	
	Digital Signal Processing Lab		4, 5, 9 and 10	PSO 3, 4
	Microwave Engineering		1,2,3 and 4	
	VLSI Design		1,2,3 and 4	PSO 1
	Computer Networking		1,2,6,8 and 12	PSO 3
	Mobile Cellular Communication		1,3,6,7 and 12	
	Microwave Engineering Lab		3,4,5 and 10	
	Electronic Design and Automation Lab		1,4,5,9 and 10	PSO 1, 4
	Radar and Satellite Comm.		1,2,3,6 and 7	
Engineering Sciences	Engineering Graphics	14.11%	1,3 and 5	
	Workshop Practice Lab		1,6 and 7	
	Elements of Mechanical Engineering		1,2,3 and 4	
	Electrical Technology		2,4 and 6	
	Electrical Technology Lab		2,4,9 and 10	
	Managerial Economics and Accountancy		1,2,4 and 11	
	Industrial Administration and Financial Management		6,7,8,9 and 11	
Electives	Embedded Systems	5.55%	2,3,4,5,6 and 12	PSO 2
	Digital Image Processing		1,2,3 and 11	
	Design of Fault Tolerant Systems		2,3 and 7	
	Real Time Operating System		1,2,3 and 6	
	Neural Network and Fuzzy Logic		1,2,3 and 4	
Seminars	Industrial Visit/Study	5.55%	1 to 12	PSO 1, 2

  
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and project				3
	Project Seminar		1 to 12	PSO 1, 2 3
	Seminar		1 to 12	PSO 1, 2 3,4
	Project			

In order to identify curricular gaps a separate table is given below in which each program outcome and program specific outcome is explicitly mentioned along with the courses that strongly map to the POs and PSOs.

Table 1 Mapping of POs and PSOs to identify curricular gaps

Program Outcome	Courses catering to POs and PSOs
<b>PO1: Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	Mathematics I, II, III and IV Engineering Physics Engineering Chemistry Engineering Mechanics Basic Circuit Analysis Electromagnetic Theory Signal Analysis and Transform Techniques Pulse Digital and Switching circuits
<b>PO2: Problem analysis:</b> Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	Electronic Devices Analog Electronics Circuits Analog Communications Automatic Control Systems Digital Communication Digital Signal Processing Antenna and Wave Propagation Electronic Instrumentation Project Seminar Project
<b>PO3: Design/development of solutions:</b> Design solutions for complex engineering problems and	Linear Integrated Circuits and Applications Digital Integrated Circuits and Applications

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design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	Microprocessors and Microcontrollers Computer Organization and Architecture VLSI Design Embedded Systems Digital Image processing Design of Fault Tolerant Systems Real Time Operating System
<b>PO4: Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	Electronic Devices Lab Electronic Workshop and Basic Circuits Lab Electronic Circuits Lab Integrated Circuits Lab Communication Lab Microprocessors and Microcontrollers Lab Microwave Engineering Lab Electronic Design and Automation Lab
<b>PO5: Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.	Electronic Workshop and Basic Circuits Lab(SPICE Tools) Microprocessors and Microcontrollers Lab(KEIL Software) Digital Signal Processing Lab(MATLAB Software) Electronic Design and Automation Lab(Softwares used - Mentor, Xilinx, Tanner, Cadence)
<b>PO6: The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	Chemistry, Electrical Technology, Environmental Studies, Industrial Administration and Financial Management Project Seminar General Seminar Project
<b>PO7: Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the	Chemistry Engineering Workshop Environmental Studies Project Seminar,

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knowledge of, and need for sustainable development.	Design of Fault Tolerant Systems General Seminar
<b>PO8: Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	Computer Networking Managerial Economics and Industrial Administration Project
<b>PO9: Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	English Project Seminar Project And Laboratories
<b>PO10: Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	English English Lab All laboratory courses of department Project Seminar General Seminar Project
<b>PO11: Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	Managerial Economics and Accountancy Industrial Administration and Financial Management Project Seminar Project
<b>PO 12: Life-long learning:</b> Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	Project Seminar Project R&D Projects Sponsored projects by SUES
<b>Program Specific Outcomes</b>	
<b>PSO1:</b> The ECE Graduates will acquire state of art analysis and design skills in the area of digital and analog VLSI design using modern CAD	Basic Circuit Analysis Electronic Devices Analog Electronic Circuits

  
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tools.	Digital Integrated Circuits Linear Integrated Circuits VLSI Design Electronic Design and Automation Lab Design of Fault Tolerant System Project
PSO2: The Student will be able to develop preliminary skills and capabilities necessary for embedded system design and demonstrate understanding of its societal impact.	Programming in C & C++ Programming Lab Pulse Digital And Switching Circuits Digital Integrated Circuits and Applications Microprocessor and Microcontroller Microprocessor and Microcontroller Lab Integrated Circuits lab Embedded systems RTOS Project
PSO 3: The ECE Graduates will be able to obtain the knowledge of working principles of modern communication systems and be able to develop simulation models of components of a communication system.	Signal Analysis and Transform Techniques Digital Signal Processing DSP lab Digital Image Processing Mobile Cellular Communications Analog and Digital Communication Radar and Satellite Communications Project
PSO 4: The ECE Graduates will develop soft skills, aptitude and programming skills to be employable in IT sector.	English English Lab Programming in C & C++ Programming Lab DSP Lab EDA Lab Project

**Curricular Gaps identified in attainment of POs and PSOs**

  
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**Gap 1:** As per PO3, the students are exposed to systems design but they are not doing system design taking public health, safety, cultural, societal, and environmental needs into considerations. A clear stress has to be given in this aspect.


**Gap 2:** As per PO 6, the student is expected to realize his/her responsibilities relevant to the professional engineering practice keeping societal, health, safety, legal, and cultural issues in mind. Only General Seminar, project and Project seminar are the courses that partly cater to this PO. The student needs to be in a better position in this regard.

**Gap 3:** As per PO8 on Ethics a student is expected to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. This PO is covered partially in the final year project and hence there is a clear and evident gap in this area.

**Gap 4:** As per PO11 wherein principles of project management and finance are to be demonstrated by the student in multidisciplinary environments, there are two subjects MEA and IAFM in the curriculum that partially caters to this requirement and is a curricular gap.


**Gap 5:** As per PSO 1, the student needs to get knowledge of complete design flow in both analog and digital VLSI design areas. It is observed that the curriculum stresses on sub system design and integration of smaller subsystems to form a complete working system and is not focused towards carrying out projects. It is expected that the student has ability to design circuits for complicated system and even generate layouts of Analog and Digital ICs.

**Gap 6:** In PSO 2, the students are well versed with conventional microprocessors(X86 architecture) and microcontrollers (8051 based controllers), however in many advanced applications latest processors and controllers like Arduino, Raspberry pi, ARM, PIC etc are employed. The students need to get a first hand exposure of doing complete embedded system design using these controllers.

  
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**Gap 7:** In PSO 3, there is only one laboratory, namely DSP lab in the curriculum that provides the students an opportunity in getting acquainted in the direction of signal processing and communication. More avenues of practical learning are to be created in this direction.

**Gap 8:** In PSO 4, it is highlighted that the students should acquire soft skills, Aptitude and technical skills to work in software industry. An improvement in general aptitude and programming skills with an introductory knowledge of latest techniques like cloud computing, data analytics etc. would give the students a better chance to crack the campus placement.

  
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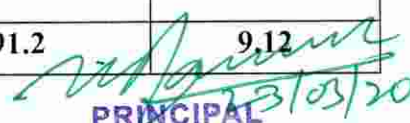
### CO attainment statement

Course Code	Course Title	Percentage Attainment	Score
<b>I year</b>			
EG 101	English	95.5	9.55
MAT 101	Mathematics 1	80.5	8.05
MAT 102	Mathematics 2	80.5	8.05
PH 101	Engineering Physics	69.5	6.95
CH 101	Engineering Chemistry	81	8.1
CS 101	Programming in C and C++	83	8.3
CE 101	Engineering Mechanics	74.5	7.45
CE 102	Engineering Graphics	78	7.8
PH 132	Physics Lab	97	9.7
CH 132	Chemistry Lab	87.5	8.75
ME 131	Workshop Practice	97.5	9.75
CS 131	Programming Lab c/c++	95	9.5
EG 131	English Language Lab	96.5	9.65
<b>II year I Semester</b>			
MAT 201	Mathematics 3	70.5	7.05
EC 201	Basic Circuit Analysis	80.5	8.05
EC 202	Electromagnetic Theory	68	6.8
EC 203	Electronic Devices	81.5	8.15
ME 221	Elements of Mechanical Engineering	77.5	7.75
EE 222	Electrical Technology	77	7.7
EC 231	Electronic Devices lab	90	9.0
EC 232	Electronic Workshop Lab and Basic Circuits Lab	90	9.0
<b>II year II Semester</b>			
MAT 251	Mathematics IV	86	8.6
EC 251	Analog Electronics Circuits	81.5	8.15
EC 252	Networks and Transmission Lines	72	7.2
EC: 253	Signal Analysis and Transform Techniques	69	6.9
EC 254	Pulse Digital and Switching circuits	75.5	7.55

  
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CE 222	Environmental Sciences	89.5	8.95
EC 281	Electronic Circuits Lab	85.5	8.55
EE 292	Electrical Technology Lab	85.5	8.55
<b>III year I Semester</b>			
EC 301	Linear Integrated Circuits and Applications	68	6.8
EC 302	Digital Integrated Circuits and Applications	74	7.4
EC 303	Analog Communications	72.5	7.25
EC 304	Automatic Control Systems	77.5	7.75
EC 305	Microprocessors and Microcontrollers	62.5	6.25
EC 331	Integrated Circuits Lab	82	8.2
EC 332	Analog Communication Lab	80	8.0
EC 333	Microprocessor and Microcontroller Lab	79	7.9
<b>III year II Semester</b>			
EC 351	Digital Communication	74	7.4
EC 352	Digital Signal Processing	72.5	7.25
EC 353	Antenna and Wave Propagation	77.5	7.75
EC 354	Computer Organisation and Architecture	68	6.8
EC 355	Electronic Instrumentation	78.5	7.85
CM 371	Managerial Economics and Accountancy	86.5	8.65
EC 381	Digital Communication lab	81	8.1
EC 382	Digital Signal Processing Lab	86.5	8.65
EC 383	Industrial Visit/Study	-	-
<b>IV year I Semester</b>			
EC 401	Microwave Engineering	80.3	8.03
EC 402	VLSI Design	77	7.7
EC 403	Computer Networking	66.7	6.67
EC 404	Mobile Cellular Communication	67.5	6.75
EC 411	Elective 1: Embedded Systems	88.6	8.86
EC 413	Elective 1: Digital Image Processing	58.4	5.84
ME 472	Industrial Administration and Financial Management	78.5	7.85
EC 431	Microwave Engineering Lab	91.2	9.12

  
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EC 432	Electronic Design and Automation Lab	81.9	8.19
EC 433	Project Seminar	75.5	7.55
<b>IV year II Semester</b>			
EC 451	Radar and Satellite Communication	93.7	9.37
EC 463	Elective 2: Design of Fault Tolerant Systems	58.8	5.88
EC 461	Elective 2: Wireless sensor networks	56.25	5.625
EC 472	Elective 3: Global Positioning System	59.4	5.94
EC 473	Elective 3: Neural Networks and Fuzzy logic	79.6	7.96
EC 481	Seminar	86	8.6
EC 482	Project	81.5	8.15

#### Analysis of attainment of Course outcomes


Sl.No	Course outcome attainment level	No of Courses at this level	% courses at each level
1	Course outcome Attainment Score > 9.0	9	14.51
2	Course outcome Attainment Score > 8.0	22	35.48
3	Course outcome Attainment Score > 7.0	19	30.64
4	Course outcome Attainment Score > 6.0	8	12.9
5	Course outcome Attainment Score > 5.0	4	6.45
	<b>Total number of courses</b>	<b>62</b>	
	<b>CO Attainment Threshold fixed by ECE department</b>	<b>7.0</b>	

CO Attainment Threshold fixed by ECE department = 7.0

Number of courses having CO attainment more than department threshold = 50 out of 62

Number of courses having CO attainment less than department threshold = 12 out of 62

**Note : It is observed that 80.6% of the courses are above the department threshold and hence the department is claiming  $4 \times 8.06 = 32.24$  marks out of 40.**

  
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