R20 CO-PO-PSO GRAND MATRIX

By the end of each course student will be able to

I-I

20BS1101 Mathematics – I

CO1	Solve the differential equations related to various engineering fields
CO2	Utilize mean value theorems to real life problems
CO3	Familiarize with functions of several variables which is useful in optimization
CO4	Apply double integration techniques in evaluating areas bounded by region.
CO5	Learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensional and 3 – dimensional coordinate systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-

20BS1105 Applied Physics

CO1	Understand the principles such as interference and diffraction to design and enhance the resolving power of various optical instruments.
CO2	Learn the basic concepts of LASER light Sources and Apply them to holography
CO3	Study the magnetic and dielectric materials to enhance the utility aspects of materials.
CO4	Learn the fundamental concepts of Quantum behaviour of matter.
CO5	Identify the type of semiconductors using Hall Effect.

	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-

20HS1101 Communicative English

CO1	identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English (L3)
CO2	formulate sentences using proper grammatical structures and correct word forms (L3)
CO3	speak clearly on a specific topic using suitable discourse markers in informal discussions (L3)
CO4	write summaries based on global comprehension of reading/listening texts (L3)
CO5	produce a coherent paragraph interpreting a figure/graph/chart/table (L4)
CO6	take notes while listening to a talk/lecture to answer questions (L3)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	1	-	-

		CO3	-	-	-	-	-	-	-	-	2	3	-	1	-	-
		CO4	-	-	-	-	-	-	-	-	2	3	-	1	-	-
		CO5	-	-	-	-	-	-	-	-	2	3	-	1	-	-
		CO6	-	-	-	-	-	-	-	-	2	3	-	1	-	-

20ES1101	Programming for Problem Solving using C	CO1	Understand algorithms and basic terminology of C
		CO2	Solve problems using control structures and modular approach
		CO3	Make use of 1D and 2D arrays along with strings for linear data handling
		CO4	Determine the use of pointers and structure
		CO5	Implement various operations on data files

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	3	2	1	-	-	-	3	3	1	2	1	2
CO2	2	3	3	2	-	-	-	-	1	1	2	2	2	2
CO3	3	3	3	2	-	-	-	-	2	1	2	2	2	3
CO4	2	2	2	2	-	-	-	-	2	1	2	2	2	2
CO5	2	2	2	2	-	-	-	-	2	1	2	2	1	2

20ES1102	Engineering Graphics and Design	CO1	Prepare engineering drawings as per BIS conventions {Understand level, KL2}
		CO2	Produce computer generated of orthographic projections of Lines and Plane surfaces using CAD software {Apply level, KL3}
		CO3	Use the knowledge of orthographic projections of Solids to represent engineering information/concepts and present the same in the form of drawings {Apply level, KL3}
		CO4	Use the knowledge of sectional views and Development of Solid Surfaces in Real time Applications {Apply level, KL3}
		CO5	Develop isometric drawings of simple objects reading the orthographic projections of those objects{Analyze level, KL4}

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	-	3	-	-	-	-	2	-	1	-	-
CO2	2	1	1	-	3	-	-	-	-	2	-	1	-	-
CO3	2	2	2	-	3	-	-	-	-	2	-	1	-	-
CO4	2	2	2	-	3	-	-	-	-	2	-	1	-	-
CO5	2	2	2	-	3	-	-	-	-	2	-	1	-	-

20HS1102L	Communicative English Lab-I	CO1	identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English and speak clearly on a specific topic using suitable discourse markers in informal discussions (L3)
		CO2	take notes while listening to a talk/lecture; to answer questions in English; formulate sentences using proper grammatical structures and correct word forms; and use language effectively in competitive examinations (L3)
		CO3	write summaries based on global comprehension of reading/listening texts; produce a coherent write-up interpreting a figure/graph/chart/table; and use English as a successful medium of communication. (L3)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	1	-	-

20ES1103L — **Programming for Problem Solving**

CO1	Comprehend the various concepts of a C language
CO2	Develop algorithms and flowcharts
CO3	Design and development of C problem solving skills.
CO4	Acquire modular programming skills.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	3	2	1	-	-	-	3	3	1	2	1	2
CO2	2	3	3	2	-	-	-	-	1	1	2	2	2	2
CO3	3	3	3	2	-	-	-	-	2	1	2	2	2	3
CO4	2	2	2	2	-	-	-	-	2	1	2	2	2	2

20BS1106L — **Applied Physics Lab**

CO1	Apply knowledge of Interference concepts of light(L3)
CO2	Apply knowledge of Interference concepts of light(L3)* repeated
CO3	Infer the applications of Lasers(L2)
CO4	Define Acoustics of buildings and NDT applications (L1)
CO5	Define material properties and nuclear power generation(L1)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	-	-	-	-	-	-
CO2	2	2	2	3	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	2	3	-	-	-	-	-	-	-	-	-
CO4	2	2	3	3	3	-	-	-	-	-	-	-	-	-
CO5	3	2	3	2	2	-	-	-	-	-	-	-	-	-

I-II

20BS1202 — **Mathematics – II**

CO1	Evaluate approximate in the roots of polynomial and transcendental equations by different algorithms (EVALUATE)
CO2	Solve system of linear algebraic equations using Gauss Jacobi, Gauss Seidel and apply Newton's forward and backward interpolation and Lagrange's formulae for equal and unequal intervals (SOLVE , APPLY,FIND))
CO3	Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations and also by Laplace the transforms for solving differential equations (SOLVE , APPLY,FIND)
CO4	Find or compute the Fourier series of periodic signals (SOLVE ,APPLY, FIND, ANALYSE)
CO5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to range of non-periodic waveforms (SOLVE , APPLY, FIND)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-

20BS1209 — Applied Chemistry

CO1	explain the preparation, properties and applications of thermoplastics, thermosettings, elastomers and conducting polymers
CO2	know the importance of various materials and their uses in the construction of batteries and fuel cells.
CO3	know the applications of advanced materials in various industries
CO4	. apply the principles of supramolecular chemistry in the applications of molecular machines, need of green chemistry.
CO5	explain the principles of spectrometry such as UV, IR, and NMR

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	-	-	-	3	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	2	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	2	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	3	-	-	-	-	-	-	-
CO5	2	2	-	-	-	-	3	-	-	-	-	-	-	-

20ES1204 — Basic Electrical Engineering

CO1	Able to understand the concepts of electrical circuits and verify theorems in DC circuits.
CO2	Able to analyse different concepts of single phase AC circuits
CO3	Able to explain the working and applications of DC machines.
CO4	Able to understand the operation of single phase Transformers.
CO5	: Able to understand the working and applications of AC machines.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	1	-	-
	3	2	-	-	-	-	-	-	-	-	-	1	-	-

20ES1205 — NA

CO1	Apply matrix algebra and engineering tools like mesh and node methodsto solve various DC circuit problems {Apply level, KL3}
CO2	Match concepts in trigonometry, complex algebra to utilize techniques, skills to solve the AC circuit problems under steady state conditions. {Apply level, KL3}
CO3	Select proper network reduction techniques, circuital laws and theorems to analyze the both DC and AC circuit problems effectively. {Understand level, KL2}
CO4	Learns and gain the knowledge on characteristics of two port network parameters (Z, Y, ABCD, h & g) and solves for parameter for any sort of two port network. {Understand level, KL2}
CO5	Analyze the DC transients in RL, RC and RLC circuits in detail using solutions of homogeneous and non-homogeneous differential equations.{ Analyze level, KL4}

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	
CO5	2	3	-	-	-	-	-	-	-	-	-	-	-	

20ES1206 — Programming for Problem Solving using Python

CO1	Develop essential programming skills in computer programming concepts like data types, containers.
CO2	Solve coding tasks related to conditions, loops and String processing
CO3	Experiment with various Data structures in interpreted Language and to build modules and packages for real software needs.
CO4	Implement Files and object oriented principles in Python.
CO5	Identify solutions using GUI in Python

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	1	-	-	-	-	-	-	-		-	-
CO2	1	2	2	1	-	-	-	-	-	-	-		-	-
CO3	1	3	3	2	1	-	-	-	-	-	-		-	-
CO4	1	2	2	2	-	-	-	-	-	-	-		-	-
CO5	1	2	2	2	1	-	-	-	-	-	-		-	1

20BS1210L — Applied Chemistry Lab

CO1	To estimate the amount of metal ions present in different solutions (L4 & L3
CO2	To analyze the quality parameters of water (L4)
CO3	To determine the strength of different solutions by using different instrumentation techniques (L3)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	2	-	-	-	-	1	2	-	-	2	-	-
CO2	-	2	3	-	-	-	-	1	3	-	-	1	-	-
CO3	-	1	2	-	-	-	-	1	2	-	-	1	-	-

20ES1207L — Basic Electrical Engineering Lab

CO1	Able to analyze a given network by applying electrical laws and network theorems.
CO2	Able to know the response of electrical circuits for different excitations.
CO3	Able to analyze the performance characteristics of DC machines
CO4	Able to measure and calculate the performance characteristics of 1-phase Transformer
CO5	Able to analyse the performance characteristics of AC machines.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	1	-	-

20ES1208L — Python Lab

CO1	Comprehend how software easily to build right out of the box.
CO2	Demonstrates the use of an interpreted language for problem solving through control statements including loops and conditionals
CO3	Practice with data structures for quick programming solutions
CO4	Demonstrates software building for real needs by breaking out code into reusable functions and modules
CO5	Comprehend the software reliability through exception handling

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	2	2	-	-	-	2	-	-	-	-	-
CO2	2	2	2	2	2	-	-	-	2	-	-	-	-	-
CO3	2	2	2	2	3	-	-	-	2	-	-	-	-	-

		CO4	2	1	2	2	2	-	-	-	3	2	-	-	-	-
		CO5	-	3	3	2	3	-	-	-	3	2	-	-	-	-
20MC1201	Indian Constitution	CO1	Understand historical background of the constitution making and its importance for building a democratic India.													
		CO2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.													
		CO3	Understand the value of the fundamental rights and duties for becoming good citizen of India.													
		CO4	Analyze the decentralization of power between central, state and local self-government													
		CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.													
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
		CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
		CO3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
		CO4	-	-	-	-	-	-	-	-	-	-	-	1	-	-
		CO5	-	-	-	-	-	-	-	-	-	-	-	1	-	-
II-I																
20BS2112	Mathematics –III	CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)													
		CO2	Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan (L3)													
		CO3	To interpret the physical meaning of different operators such as gradient, curl and divergence (L5)													
		CO4	Estimate the work done against a field, circulation and flux using vector calculus (L5)													
		CO5	Identify the solution methods for partial differential equation that model physical processes (L3)													
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
		CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
		CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
		CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
		CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-
20PC2101	EDC	CO1	Describe the working of junction diodes and interpret V-I relations (Understand level)													
		CO2	Demonstrate the usage of diodes in various applications (Apply level)													
		CO3	Explain the working principles of BJTs and FETs (Understand level)													
		CO4	Learn the art of biasing of BJTs and FETs (Apply level)													
		CO5	Apply the equivalent small signal low frequency models of BJTs and FETS in amplifier analysis (Analyze level)													
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	2
		CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	2
		CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	3
		CO4	-	3	-	-	-	-	-	-	-	-	-	-	-	2
		CO5	2	-	-	-	-	-	-	-	-	-	-	-	-	2
20PC210	S&S	CO1	The student will be able to understand various types of signals mathematically and able to calculate complex Fourier spectrum. (Understand, Calculate)													
		CO2	Analyse the continuous-time signals and continuous-time systems using Fourier transform and Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct the original													

			signal from samples. (Analyse, Apply)												
		CO3	Define systems based on their properties and determine the response of LTI system. Understand the concept convolution, correlation, energy spectral density and power spectral density. (Remember, Understand)												
		CO4	Compute Laplace transforms to analyze continuous time signals and systems and understand the concept of region of convergence. (Compute)												
		CO5	Compute Z-transform to analyze discrete-time signals and systems, and understand the concept of region of convergence. (Compute)												
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	3	3	2	-	-	-	-	-	-	-	-	-	-	3
		CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	3
		CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	3
		CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	3
		CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	3
20PC2103	**Digital Circuits and Logic Design**	CO1	Distinguish the analog and digital systems, apply positional notations, number systems, computer codes in digital systems. (Remember, Understand, and Apply)												
		CO2	Understand the Boolean Algebra theorems, simplify and design logic circuits. (Understand, Apply, Analyze and valuate)												
		CO3	Implement combinational logic circuit design and modular combinational circuits using encoders, decoders, multiplexers and demultiplexers. (Apply, Analyze, valuate, and create)												
		CO4	Understand the basic elements of sequential logic circuits. (Understand, Apply, Analyze)												
		CO5	Design and analyze sequential circuits. (Apply, Analyze and create)												
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	3	2	2	-	-	-	-	-	-	1	-	-	-	3
		CO2	3	2	2	-	-	-	-	-	-	1	-	-	-	3
		CO3	3	2	2	-	-	-	-	-	-	1	-	-	-	3
		CO4	3	2	2	-	-	-	-	-	-	1	-	-	-	3
		CO5	3	2	2	-	-	-	-	-	-	1	-	-	-	3
20BS2113	**RVSP**	CO1	Mathematically model the random phenomena and solve simple probabilistic problems.(Understand, Apply)												
		CO2	Identify different types of random variables and compute statistical averages of these random variables.(Analyse, Apply, Compute)												
		CO3	Learn how to deal with multiple random variables, conditional probability and conditional expectation, joint distribution and independence, mean square estimation.(Analyse, Apply, Compute)												
		CO4	Characterize the random processes in the time and frequency domains.(Define, Understand)												
		CO5	Analyse the LTI systems with random inputs and to Construct and analyse the mathematical modelling of noise sources.(Define, Analyse, Apply, Compute)												
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	3	2	2	-	-	-	-	-	-	1	-	-	-	3
		CO2	3	2	3	-	-	-	-	-	-	1	-	-	-	3
		CO3	3	2	3	-	-	-	-	-	-	1	-	-	-	3
		CO4	3	2	2	-	-	-	-	-	-	1	-	-	-	3
		CO5	3	2	2	-	-	-	-	-	-	1	-	-	-	3
20MC	**EITK**	CO1	Understand philosophy of Indian culture and civilization												
		CO2	Distinguish the Indian languages and literature among difference traditions.												
		CO3	Learn the philosophy of ancient, medieval and modern India												

		CO4	Acquire the information about the fine arts in India
		CO5	To know the contribution of scientists of different eras.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	2	2	2	-	-	-	-	-
CO2	-	-	-	-	-	-	1	2	-	-	-	-	-	-
CO3	-	-	-	-	-	-	2	1	-	-	-	-	-	-
CO4	-	-	-	-	-	-	3	3	3	-	-	-	-	-
CO5	-	-	-	-	-	-	3	3	3	-	-	-	-	-

20PC2104L	Electronic Devices and Circuits Lab	CO1	Measure voltage, frequency and phase of any waveform using CRO.**(Understand)**
		CO2	Generate sine, square and triangular waveforms with required frequency and amplitude Using function generator. **(Apply)**
		CO3	Analyze the characteristics of different electronic devices such as diodes, transistors etc. **(Apply)**
		CO4	Apply the diode working principles to design simple circuits like rectifiers, power supplies and amplifiers etc. **(Apply)**
		CO5	Design the BJT amplifier circuit for the given operating conditions and specifications. (**Apply)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												2
CO2	3	2												2
CO3	3	2												2
CO4	3	3												3
CO5	3	3												2

20PC2105L	SS Lab	CO1	Create and evaluate signals using MATLAB
		CO2	Examine Fourier analysis and transformations
		CO3	Assess and formulate analog filter designs using Laplace Transforms
		CO4	Investigate digital signal processing and system analysis
		CO5	Apply convolution and filtering techniques proficiently

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	3	-	-	-	-	2	-	-	3	2
CO2	3	-	-	2	-	-	1	-	-	-	-	-	3	1
CO3	3	-	2	-	-	-	-	-	-	-	1	-	3	2
CO4	3	-	-	2	-	-	-	-	-	-	-	2	3	1
CO5	3	-	2	2	-	-	-	-	-	-	-	-	2	2

20PC2106L	DCLD Lab	CO1	**Understand** digital logic principles and logic gate operations, validate through experiments.
		CO2	Apply combinational logic to design circuits, derive minimal SOP expressions, and verify using a Digital Trainer Kit.
		CO3	**Analyze** and **verify** decoder and de-multiplexer circuits, showcasing proficiency and applications.
		CO4	Design sequential logic circuits, including various flip-flops, and work with sequential digital systems.
		CO5	Construct and analyze counters and other digital circuits, highlighting practical applications in digital

			electronics.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	-	-	-	2	3	1
CO2	3	-	3	-	3	-	-	-	-	-	2		3	2
CO3	3	3	2	-	-	-	1	-	-	-	-	-	2	2
CO4	3	-	3	-	3	-	-	-	2	-	-	-	3	2
CO5	3	3	3	-	-	-	1	-	-	-	-	-	3	2

20SC2101	DPVP	CO1	Demonstrate Knowledge of Python Fundamentals
		CO2	Utilize NumPy to efficiently **manipulate, analyze**, and process large datasets, including performing array creation, indexing, slicing, and reshaping operations.
		CO3	Demonstrate their ability to perform tasks such as data selection, aggregation, merging, and data cleaning on real-world datasets.
		CO4	Evaluate complex problems and design software solutions using OOP principles.
		CO5	Analyze problems, design algorithms, and implement solutions using Python programming.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	-		-	-	-	-	-	-	-	2	2
CO2	2	-	2	-	2	-	-	-	-	-	-	-	2	2
CO3	2	-	2	-	2	-	-	-	-	-	-	-	2	2
CO4	2	3	2	-	2	-	-	-	-	-	-	-	2	2
CO5	2	3	3	-	3	-	-	-	-	-	-	-	2	2

II-II

20PC2207	Analog Circuits	CO1	Analyze the RC circuits for low pass and high pass filtering and design clippers and clampers for various applications(Analyze)
		CO2	Apply and Analyze various amplifier circuits using BJT and MOSFET at high frequencies and multistage amplifiers.(Apply, Analyze)
		CO3	Familiarize the concept of feedback in amplifiers and analysis of different types of feedback amplifiers.(Familiarize, Analyze)
		CO4	Analyze and Design different types of oscillator circuits.(Analyze)
		CO5	Understand different types of power amplifiers and perform analysis of single tuned circuits.(Understand, Analyze)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	2	2
CO2	2	3	2	-	-	-	-	-	-	-	-	-	2	2
CO3	2	3	3	-	-	-	-	-	-	-	-	-	2	3
CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	3
CO5	1	2	-	-	-	-	-	-	-	-	-	-	2	2

20PC2208 — Electromagnetic Fields and Waves

CO1	Use the concepts of vectors and space coordinates to solve the fundamental problems of static electric fields
CO2	Apply principles of static electric field to understand the behaviour of dielectrics and conductors
CO3	Understand the principles of steady magnetic field
CO4	Solve the Maxwell's equations of Time Varying fields and obtain the wave phenomenon in various media.
CO5	Analyze wave propagation characteristics and power transportation phenomenon.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	2	-	-	-	-	-	3	2
CO2	3	2	-	-	-	-	2	-	-	-	-	-	3	2
CO3	3	2	-	-	-	-	2	-	-	-	-	-	3	2
CO4	3	2	-	-	-	-	2	-	-	-	-	-	3	2
CO5	3	1	-	-	-	-	2	-	-	-	-	-	3	1

20PC2209 — Digital System Design with VHDL

CO1	Understanding the structural description and electrical characteristics of various digital logic families.
CO2	Studying basics of HDL and Programming models of VHDL.
CO3	Implementing digital systems using VHDL.
CO4	Implementing the Combinational logic using ICs and VHDL code
CO5	Modeling of Sequential circuits using ICs and VHDL code

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	3	2	-	-	-	-	-	-	-	-	3
CO2	2	-	-	3	3	-	-	-	-	-	-	-	2	-
CO3	2	-	-	3	3	-	-	-	-	-	-	2	2	-
CO4	3	-	-	3	3	-	-	-	-	-	-	-	3	-
CO5	3	-	-	3	3	-	-	-	-	-	-	-	3	-

20OE2201 — Data Structures

CO1	Implement various operations on linear lists.
CO2	Apply data structure strategies like stacks and queues for exploring complex data structures.
CO3	Analyze performance and trade-offs of static and dynamic data structures..
CO4	Incorporate data structures into the applications such as binary trees, binary search trees.
CO5	Identify appropriate data structure algorithms for graphs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	-	-	-	-	-	-	-	-	-	1	1
CO2	1	2	2	-	-	-	-	-	-	-	-	-	2	1
CO3	1	-	2	2	-	-	-	-	-	-	-	-	2	1
CO4	2	-	2	1	-	-	-	-	-	-	-	-	1	1
CO5	-	2	1	2	-	-	-	-	-	-	-	-	1	1

20ES2209 — Control Systems

CO1	Understand the concepts of open loop and closed loop systems, mathematical models of mechanical and electrical systems, concepts of feedback, Construct the mathematical model of a system and Apply various approaches to reduce the overall system
CO2	Develop the acquaintance in analyzing the system response in time-domain, in terms of various performance indices.
CO3	Analyze the system in terms of absolute stability and relative stability by different approaches.
CO4	Develop the acquaintance in analyzing the system response in frequency domain in terms of various performance indices.
CO5	Design the control systems for various applications using time-domain and frequency domain analysis as per given specifications. Determine the controllability and observability of the control system using the

			concepts of state variable analysis.												
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
		CO2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
		CO3	3	-	3	-	-	-	-	-	-	-	-	2	-	-
		CO4	-	-	-	-	2	-	-	-	-	-	-	-	-	-
		CO5	3	-	3	-	2	-	-	-	-	-	-	2	-	-
20PC2211L	**Analog Circuits Lab**	CO1	Design and verify the operation of RC Circuit as differentiator and integrator.													
		CO2	Understand the operation of clipper and clampers circuits.													
		CO3	Calculate the bandwidth of common emitter, common source and two stage RC coupled amplifier													
		CO4	Design LC and RC oscillators.													
		CO5	Compare gain and bandwidth of amplifier with and without feedback													
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	2	2	3	-	3	-	-	-	3	-	-	2	3	2
		CO2	2	2	3	-	3	-	-	-	3	-	-	2	2	2
		CO3	2	2	3	-	3	-	-	-	3	-	-	2	3	3
		CO4	2	2	3	-	3	-	-	-	3	-	-	2	2	2
		CO5	2	2	3	-	3	-	-	-	3	-	-	2	2	2
20SC2202	**OHEE(SOC)**	CO1	To introduce open-sourcehardware platforms to the students													
		CO2	To design and develop general purpose electronic systems													
		CO3	To introduce electronic system coding, testing and debugging tools													
		CO4	To interface different analog and digital sensors which are basic building blocks for any interactive system design.													
		CO5	To familiarize student with the basic PCB designing concepts													
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	2	-	-	-	-	-	-	-	2	2	-	-	3	3
		CO2	3	-	-	-	-	-	-	-	2	2	-	-	3	3
		CO3	2	-	3	-	-	-	-	-	2	2	-	-	3	3
		CO4	2	-	2	-	-	-	-	-	2	2	-	-	3	3
		CO5	2	-	2	-	-	-	-	-	2	2	-	-	3	3
20PC2202L	**Digital System Design with VHDL Lab**	CO1	Understand the basics of HDL and Apply different programming approaches for obtaining digital Logic Gates and full adder, Perform simulation and verify the logical operations and also analyze the synthesis result													
		CO2	Apply programming approach using VHDL for developing decoder, encoder and multiplexer, Perform simulation and verify the logical operations and also analyze the synthesis result.													
		CO3	Write VHDL Source code for higher order comparator and ALU, Perform simulation and verify the logical operations and also analyze the synthesis result.													
		CO4	Use VHDL programming approach for developing Flip Flops, registers and shift register circuits, Perform simulation and verify the logical operations and also analyze the synthesis result.													
		CO5	Design different Counters and shift register counters using VHDL Source code, Perform simulation and verify the logical operations and also analyze the synthesis result.													
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	1	-	-	3	3	-	-	-	-	-	-	-	3	3
		CO2	1	-	-	3	3	-	-	-	-	-	-	-	3	3

		CO3	1	-	-	3	3	-	-	-	-	-	-	-	3	3
		CO4	1	-	-	3	3	-	-	-	-	-	-	-	3	3
		CO5	1	-	-	3	3	-	-	-	-	-	-	-	3	3

III-I

20PC3112	Linear IC Applications	CO1	Understand the DC and AC analysis of Differential Amplifier, and performance parameters of OP-Amp and its characteristics. {Understand level, KL2}
		CO2	Illustrate the linear and nonlinear applications using op-amp. {Apply level, KL3}
		CO3	Analyze and Design active filters, Modulators and oscillators using Op-Amp. {Analysis, KL4}
		CO4	Interpret the internal structure and operations of different analog IC's {Understand level, KL2}
		CO5	Construct the various Digital to Analog and Analog to Digital Converters. {Apply level, KL3}.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	-	3	-	2	-	-	-	-	-	-	-	-	2	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	-	-	3	-	-	-	-	-	-	-	-	3	-
CO5	2	-	-	2	-	-	-	-	-	-	-	-	2	-

20HS3104	EEM	CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product and Input-Output-Cost relationships.
		CO2	The Learner is also ready to understand the nature of different markets and also to have the knowledge of Money & Banking.
		CO3	The Learner will acquire the knowledge on management, HRM and Marketing.
		CO4	The Learner will acquire the knowledge to prepare Financial Statements and the techniques of project management .
		CO5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	-	-	-	-	1	-	1	1	2	-	-	1
CO2	1	2	-	-	-	1	1	-	1	-	2	-	-	1
CO3	-	-	-	-	-	1	1	1	1	1	2	-	-	1
CO4	1	2	-	3	-	-	1	-	1	2	2	-	-	1
CO5	1	2	-	3	-	-	1	1	1	2	2	-	-	1

20PC3113	ADC	CO1	Distinguish various Amplitude modulation and demodulation schemes and Understand various functional blocks of AM radio receivers.(Analyzing)
		CO2	Distinguish various Angle modulation and demodulation schemes and Compare the performance of AM, FM and PM schemes with reference to SNR.(Analyzing)
		CO3	Describe the generation and detection of base band system and Determine the performance of line codes in terms of mitigating inter symbol interference.(Evaluating)
		CO4	Determine the probability of error for various digital modulation scheme (Evaluating)
		CO5	Analyze the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel. (Analyzing)

			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	3	2	2	-	-	-	1	-	-	-	-	-	-	-
		CO2	3	2	1	-	-	-	1	-	-	-	-	-	-	-
		CO3	3	2	2	-	-	-	1	-	-	-	-	-	-	-
		CO4	3	2	2	-	-	-	1	-	-	-	-	-	-	-
		CO5	3	2	1	-	-	-	1	-	-	-	-	-	-	-

20PC3114	**VLSI Design**	CO1	Apply the basic electrical characteristics of MOS circuits to understand design concepts and processes .{Applying level, KL3}
		CO2	Demonstrate the application of the basic concepts of MOS devices to determine the delays of the circuits and their miniaturization. {Understanding level, KL2}
		CO3	Elaborate the operation of MOS circuits to design the single-stage amplifiers {Creating level, KL6}
		CO4	Analyze the static and dynamic CMOS design aspects to develop combinational and sequential circuits {Analyzing level, KL4}
		CO5	Understand the architectural aspects of CPLD and FPGA, and several advanced technologies. { Understanding level, KL2}

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	2	-	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	1	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	1	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	-

20OE3102	**OOPS Through JAVA**	CO1	Able to realize the concept of Object Oriented Programming & Java Programming, Arrays
		CO2	Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, Enumeration and various keywords
		CO3	Apply the concept of exception handling and Input/ Output operations
		CO4	Able to design the applications of Java & Java applet
		CO5	Able to Analyze & Design the concept of Event Handling and Abstract Window Toolkit

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	1	1		-	-	-	-	-	-	-	1	1
CO2	-	2	2	2	1	-	-	-	-	-	-	-	2	1
CO3	-	2	2	2	1	-	-	-	-	-	-	-	2	2
CO4	-	2	2	2	1	-	-	-	-	-	-	-	2	1
CO5	-	2	2	2	2	-	-	-	-	-	-	-	2	1

20MC3103 Environmental Science

CO1	Understand the concepts of the eco systems
CO2	Understand the natural resources and their importance
CO3	Able to learn the Biodiversity of India and the threats to Biodiversity and apply conservation practices.
CO4	Able to learn the various attributes of the pollution and their impacts
CO5	Understand social issues both rural and urban environment

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	2	-	3	-	3	-	3	2	-	-
CO2	2	-	2	-	2	-	3	-	2	-	3	2	-	-
CO3	3	-	3	-	2	-	3	-	2	-	3	3	-	-
CO4	2	-	3	-	2	-	3	-	2	-	3	3	-	-
CO5	3	-	1	-	3	-	3	-	3	-	3	2	-	-

20PC3116L Linear IC Applications Lab

CO1	Understand the basic Mathematical operations of Operational Amplifier
CO2	Design and **Observe** the frequency response of Active Filters
CO3	Measure the theoretical and practical frequency of oscillators using Operational Amplifier.
CO4	Construct different Waveform Generators using Operational Amplifier and 555 Timer & **Investigate** different Voltage Regulators IC's
CO5	**Develop** different Analog -Digital Converters and Digital – Analog Converters

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-		
CO2	2	-	-	-	-	-	-	-	-	-	-	-		
CO3	3	3	-	3	-	-	-	-	-	-	-	-		
CO4	2	3	-	3	-	-	-	-	-	-	-	-		
CO5	2	3	-	3	-	-	-	-	-	-	-	-		

20PC3117L ADC Lab

CO1	Analyze different Analog modulation & demodulation techniques
CO2	Understand various pulse analog modulation techniques
CO3	Demonstrate various band pass digital modulation techniques.
CO4	Execute programs in MATLAB to implement various analog and Digital modulation techniques.
CO5	Construct MATLAB simulink models to implement various analog & digital modulation techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	1	-	-	-	-	-	-	-	2	2
CO2	3	2	-	-	1	-	-	-	-	-	-	-	2	2
CO3	3	2	-	-	1	-	-	-	-	-	-	-	2	2
CO4	3	2	-	-	1	-	-	-	-	-	-	-	2	2
CO5	3	2	-	-	1	-	-	-	-	-	-	-	2	2

20PC3116L — **VLSI Design Lab**

CO1	Develop VHDL source code, Perform simulation using relevant simulator
CO2	Analyze the simulation results using necessary synthesizer
CO3	Implement combinational and sequential circuit designs on FPGA board
CO4	Perform transient, DC and AC analysis of a designed circuit using mentor graphics.
CO5	**Illustrate** layout for basic digital circuits at transistor level

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	2	3	3	-	-	-	-	-	-	-	3	2
CO2	-	-	-	3	3	-	-	-	-	-	-	-	2	3
CO3	-	-	3	3	3	-	-	-	-	-	-	-	2	3
CO4	-	-	3	-	3	-	-	-	-	-	-	-	3	2
CO5	-	-	3	-	3	-	-	-	-	-	-	-	3	3

20SC3103 — **Soft Skills(SAC-1)**

CO1	Master advanced nuances of both written and oral communication skills that are imperative for any professional to succeed
CO2	Confidently ace different competitive exams and develop writing skills
CO3	Able to enhance oral communication overcoming stage fright
CO4	Gain awareness of the industry expectations and draft CV / Résumé in lieu with desired job profiles
CO5	Crack behavioral (HR) interview confidently and exhibit professional persona

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	2	-	-

20PR3101 — **Summer Internship**

CO1	The intern will be able to apply the theoretical concepts and principles learned in their academic coursework to real-world situations encountered during the internship.
CO2	The intern will gain hands-on experience in identifying and solving practical problems relevant to their field of study or industry, demonstrating the ability to analyze, troubleshoot, and implement solutions.
CO3	The intern will enhance their communication and collaboration skills by interacting with colleagues, supervisors, and clients, contributing effectively to team projects and clearly conveying ideas and information.
CO4	The intern will demonstrate adaptability and flexibility in dealing with changing work environments, tasks, and unforeseen challenges, showcasing the ability to learn and adjust quickly.
CO5	The intern will exhibit a strong understanding of professional ethics, workplace etiquette, and the importance of adhering to industry-specific codes of conduct during their internship.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		-	-	-	-	-	-	-	-	3	2
CO2	-	3	-	2	-	-	-	-	-	-	2	-	2	3
CO3	-	-	-	-	-	-	-	-	3	3	2	-	2	2
CO4	-	-	-	-	-	2	-	-	-	-	2	3	2	2
CO5	-	-	-	-	-	2	-	3	3	-	-	-	2	2

III-II

20PC3218 Digital Signal Processing

CO1	Analyze the Discrete Time Signals and Systems& Apply the difference equations concept in the analysis of Discrete time systems
CO2	Know the importance of FFT algorithm for computation of Discrete Fourier Transform &Use the FFT algorithm for solving the DFT of a given signal
CO3	Design a Digital filter (FIR&IIR) from the given specifications
CO4	Able to realize the digital filters
CO5	Know the need of Multirate Processing, Use the Multirate Processing concepts in various applications &Learn the concepts of DSP Processors

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	-	-	-	1	-	-	-	-	-	-	-
CO2	3	-	1	-	-	-	1	-	-	-	-	-	-	-
CO3	3	-	2	-	-	-	1	-	-	-	-	-	-	-
CO4	3	-	2	-	-	-	1	-	-	-	-	-	-	-
CO5	3	-	1	-	-	-	1	-	-	-	-	-	-	-

20PC3219 MPMC

CO1	Understand the architecture of microprocessor and their basic hardware components and operation. {Understanding level, KL1}
CO2	Demonstrate programming skills in assembly language for processors. {Analysis level, KL4}
CO3	Analyze various interfacing techniques and apply them for the design of processor {Analysis level, KL4}
CO4	Understand the architecture of microcontroller and their operation {Understanding level, KL1, KL2}
CO5	Able to illustrate how the different on ARM Cortex processors and debug. {Analyzing level, KL3}

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	1	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	1	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	1	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	1	-	-	-	-	-	-	-
CO5	1	2	3	-	-	-	3	-	-	-	-	-	-	-

20PC3220 MW&OC

CO1	Design different modes in rectangular waveguide structures
CO2	Calculate S-matrix for various waveguide components and splitting the microwave energy in a desired direction and operation of microwave tubes and analysis
CO3	Design and Implementation of various optical fiber cables and optical fiber connectors
CO4	Design and implementation of various optical sources and detectors for various real time operations and also observed the optical system design
CO5	Measurement of various microwave parameters using a Microwave test bench and optical measurements using block diagram operations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	3	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	2	-	-	-	-	-	-	-	-	-
CO3	2	-	2	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	3	2	2	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	3	-	-	-	-	-	-	-	-	-

20PE3201 AWP

CO1	Understand & Remember the fundamentals of antenna theory for designing various Antennas .
CO2	Evaluate the Electric and Magnetic Field Equations for basic antennas at Far Field conditions
CO3	Construct the basic array system in antennas and Draw the Radiation Mechanisms for different types of arrays.
CO4	Analyze the operation of VHF, UHF and Microwave Antennas.
CO5	Identify and Explain the atmospheric and terrestrial effects on radio wave propagation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	-	-	2	-	-	-	-	-	-	-	3	2
CO2	3	2	-	-	3	-	-	-	-	-	-	-	3	3
CO3	3	-	3	-	-	-	-	-	-	-	-	2	2	3
CO4	-	-	2	3	3	-	-	-	-	-	-	-	2	3
CO5	2	-	-	3	-	-	-	-	-	-	-	2	3	2

20PC3221L MPMC Lab

CO1	Understand logical and arithmetic functions performed by 8086 and use them to implement processing activities
CO2	Demonstrate the interfacing of I/O with 8086 for real-time applications.
CO3	Develop assembly language programs to perform stack and code conversion operations
CO4	Compute sorting and arithmetic operations on binary numbers and arrays using **8051**
CO5	Assess the functional performance of ARM microcontrollers using simulators.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	3	2
CO2	-	-	3		3	2	-	-	-	-	-	3	3	3
CO3	-	-	3	3	3	-	-	-	-	-	-	3	3	3
CO4	-	-	-	-	2	-	-	-	-	-	-	3	2	3
CO5	3	-	3	3	3	-	-	-	-	-	-	3	3	3

20PC3223L Digital Signal Processing Lab

CO1	Understand to generate elementary signals, perform arithmetic operations on signals and obtain the response of the system through convolution operations.
CO2	Apply FFT of given sequence and demonstrate the reduction of computations using FFT.
CO3	Analyze the spectral parameter of window functions and design FIR, and IIR filters for band pass, band stop, low pass and high pass filters.
CO4	Construct the power density spectrum of a given signal
CO5	Understand the architecture of TMS320C6713 DSP Processors and employ it for real time processing.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	1
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	3
CO3	3	-	-	-	3	-	-	-	-	-	-	-	1	3
CO4	3	-	-	-	2	-	-	-	-	-	-	-	1	2
CO5	3	-	-	-	2	-	-	-	-	-	-	-	2	2

20PC3222L — MW&OC Lab

CO1	Identify and demonstrate the working of various microwave Passive components.
CO2	Analyze the characteristics of different microwave sources
CO3	Evaluate scattering parameters of microwave passive components.
CO4	Analyze the characteristics of different optical sources
CO5	Evaluate various optical fiber parameters and analyze an optical fiber communication link.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	2	-	-	2	2	2
CO2	3	3	-	-	-	-	-	-	2	-	-	2	2	2
CO3	3	3	-	-	-	-	-	-	2	-	-	2	3	3
CO4	3	3	-	-	-	-	-	-	2	-	-	2	2	3
CO5	3	3	-	-	-	-	-	-	2	-	-	2	3	3

20SC3204 — Web Development(SAC-2)

CO1	To develop webpages
CO2	To develop dynamic webpages using Java script
CO3	To create DTD's , XML schemas
CO4	To create websites using PHP
CO5	To develop websites using Databases

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	2	-	2	-	-	-	-	-	-	-	2	2
CO2	-	-	2	-	2	-	-	-	-	-	2	-	-	-
CO3	-	-	2	-	2	-	-	-	-	-	2	-	-	-
CO4	-	-	-	-		-	-	-	-	-	-	-	-	-
CO5	2	2	-	3	3	-	-	-	-	-	2	-	2	2

20HS3205 — UHV-2

CO1	Understanding the content and process for Value education.
CO2	Extend the harmony in the human being, family, society and nature/existence
CO3	Build the Strengthening of self-reflection.
CO4	Apply to All levels become sensitive to their commitment towards what they have understood (human values, human relationship and human society)
CO5	Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	-	3		-	-	3	-	-
CO2	-	-	-	-	-	3	3	-		-	-	2	-	-
CO3	-	-	-	-	-	3	-	-	3	-	-	3	-	-
CO4	-	-	-	-	-	3	3	3		-	-	2	-	-
CO5	-	-	-	-	-	-	3	3	3	-	-	3	-	-

20MC3204 — Entrepreneurial Skill Development

CO1	To provide an intensive & in-depth learning to the students in field of entrepreneurship
CO2	To encourage students to opt for self employment as an alternative career option
CO3	To enable students to appreciate the dynamic changes happening in the economy
CO4	To acquaint the students about the role of entrepreneurship in the growth and economic development of the nation
CO5	To analyze the role of government and non-government institutions in supporting entrepreneurial activities

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	-	-	-	-	1		-	3	2	-	-
CO2	-	-	-	-	-	3	-	1	3	-	2	2	-	-
CO3	-	-	-	-	-	3	-	1	-	-	2	2	-	-
CO4	-	-	-	-	-	3	2	1	-	-	2	2	-	-
CO5	-	2	-	3	-	-	-	1	-	1	2	2	-	-

IV-I

20PE4103 — Satellite Communication

CO1	Understand the origin, basic concepts of satellite communications, Categorize look angles, and Discuss launches, launch vehicles and orbital effects in satellite communications
CO2	Analyze the various satellite subsystems and their functionalities
CO3	Evaluate satellite link design and Apply the concepts of multiple access and various types of multiple access techniques in satellite systems.
CO4	Explain earth station technologies and earth segment.
CO5	Describe the services rendered by satellite and its applications

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	3	2	3
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	2
CO4	3	-	3	-	-	-	-	-	-	-	-	-	2	2
CO5	3	-	3	-	-	-	-	-	-	-	-	-	2	2

20PE4102 — Radar Engineering

CO1	Develop the Radar range equation and Solve analytical problem.
CO2	Explain the working of CW & FMCW Radar and its applications.
CO3	Describe the working of MTI and Pulse Doppler Radar and its performance.
CO4	Discuss the concept of tracking and different tracking techniques.
CO5	Analyze the characteristics of matched filter receiver performance and Evaluate the various components of radar receivers and their displays.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	2	2	3
CO2	3	2	-	-	-	-	-	-	-	-	-	2	2	3
CO3	3	2	-	-	-	-	-	-	-	-	-	2	2	3
CO4	3	2	-	-	-	-	-	-	-	-	-	2	2	3
CO5	3	2	-	-	-	-	-	-	-	-	-	2	3	3

20PE4104 — Digital Image Processing

CO1	Familiarize with basic concepts of digital image processing and different image transforms
CO2	Learn various image processing techniques like image enhancement both in spatial and frequency domain
CO3	Familiarize with basic restoration techniques
CO4	Understand segmentation and morphological techniques applicable to various tasks
CO5	Understand the need for compression and familiarize few compression methods

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	-	-	-	-	-	-	-	-	-	2	2
CO2	2	3	-	-	-	-	-	-	-	-	-	-	3	2
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	2
CO4	3	2	-	-	2	-	-	-	-	-	-	3	3	2
CO5	3	3	-	-	3	2	-	-	-	-	-	3	3	3

20PE4105 — Mobile Cellular Communication

CO1	Know inner workings of cellular system and **Describe** the elements of cellular systems.
CO2	Categorize different interferences and **Analyze** cell coverage for signal and traffic in various environments.
CO3	Distinguish the frequency management and channel assignments in cellular system and **Understand** the handoffs in cellular systems
CO4	Determine digital cellular systems.
CO5	Interpret advancement in modern cellular technologies.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	3	2
CO2	2	3	3	-	-	-	-	-	-	-	-	-	3	2
CO3	-	3	3	-	-	-	-	-	-	-	-	-	2	3
CO4	-	3	3	2	-	-	-	-	-	-	-	-	3	2
CO5	-	3	3	3	-	-	-	-	-	-	-	3	3	3

20OE4103 — Marketing Management

CO1	Acquaint with tools essential to creating, and evaluating marketing activities. (K2)
CO2	Demonstrating the key techniques used for marketing new products. (K6)
CO3	Developing the process of strategic decision-making for effective Pricing of Products. (K6)
CO4	Study and selecting the right marketing channels in order to meet strategic objectives. (K3)
CO5	Developing a holistic perspective of different marketing land Scape (K6)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	1	-	3	2	3	3	-	-
CO2	-	-	-	-	-	-	2	2	1	-	2	1	-	-
CO3	-	-	-	-	-	-	2	2	-	-	1	1	-	-
CO4	-	-	-	-	-	-	1	2	-	-	1	-	-	-
CO5	-	-	-	-	-	-	-	1	3	1	-	2	-	-

20OE4104 — Green Buildings

CO1	Understand why buildings should be made energy efficient.
CO2	Have a fuller grasp on Renewable Energy mechanisms such as Passive Solar heating and collection, Photovoltaics, and Ground source heat pumps, and their adaption to green building concepts.
CO3	Understand the concepts of Site and Climate, Building Form, Building Fabric
CO4	Understand the concepts of Infiltration and ventilation, Lighting, Heating, Cooling, Energy Management and water conservation.
CO5	Have the necessary skills to undertake an Environmental Impact Assessment study for Energy Efficient Buildings. They shall be equipped with the associated cutting-edge management strategies too.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	1	3	-	2	1	-	-	-	-
CO2	2	-	-	-	-	1	3	-	2	1	-	1	-	-
CO3	2	-	3	-	-	-	3	-	2	1	-	2	-	-
CO4	2	-	3	-	-	2	3	-	2	1	-	2	-	-
CO5	2	-	-	-	-	1	3	-	2	1	-	1	-	-

20SC4105 — IoT Tools & Applications(SAC-3)

CO1	Explain the fundamental concepts of IoT and its various applications, as well as the functioning of Raspberry Pi hardware and software.
CO2	Demonstrate the ability to interface sensors and actuators with Raspberry Pi for IoT projects.
CO3	Comprehensive understanding of cloud technologies and their practical applications in real-world scenarios.
CO4	Design, develop, and deploy a cloud-based application using a selected cloud platform.
CO5	Develop innovative IoT projects that apply IoT concepts to real-world applications in various fields and troubleshoot IoT applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	2	1	-	-	-	-	-	-	3	1
CO2	-	-	3	-	-	-	-	-	2	1	-	-	3	2
CO3	-	-	-	3	-	-	-	-	-	-	2	-	3	1
CO4	-	-	3	-	-	-	-	-	2	-	3	-	3	2
CO5	-	3	-	-	-	-	-	-	2	-	-	1	3	2

20PR4102 — Industrial/Research Internship

CO1	The intern will be able to apply the theoretical concepts and principles learned in their academic coursework to real-world situations encountered during the internship.
CO2	The intern will gain hands-on experience in identifying and solving practical problems relevant to their field of study or industry, demonstrating the ability to analyze, troubleshoot, and implement solutions.
CO3	The intern will enhance their communication and collaboration skills by interacting with colleagues, supervisors, and clients, contributing effectively to team projects and clearly conveying ideas and information.
CO4	The intern will demonstrate adaptability and flexibility in dealing with changing work environments, tasks, and unforeseen challenges, showcasing the ability to learn and adjust quickly.
CO5	The intern will exhibit a strong understanding of professional ethics, workplace etiquette, and the importance of adhering to industry-specific codes of conduct during their internship.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2		-	-	-	-	-	-	-	-	3	2
CO2	-	3	-	2	-	-	-	-	-	-	2	-	2	3

		CO3	-	-	-	-	-	-	-	-	3	3	2	-	2	2
		CO4	-	-	-	-	-	2	-	-	-	-	2	3	2	2
		CO5	-	-	-	-	-	2	-	3	3	-	-	-	2	2

IV-II

	Major Project	CO1	Understand the advanced technology and research in Engineering
		CO2	Collaborate with team members in **analyzing** the requirements of the project to be developed.
		CO3	**Build** necessary design specifications and documents for the chosen project
		CO4	Develop apt domain and technical knowledge to implement/code the application and deploy the project after implementation
		CO5	Demonstrate the project comprehensively with necessary tools

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	2	2
CO2	2	-	2	-	3	-	-	-	3	3	3	3	2	3
CO3	1	-	3	3	3	-	-	-	-	-	-	3	2	3
CO4	2	-	3	3	2	-	-	2	-	-	-	3	2	2
CO5	-	-	-	-	-	-	-	3	-	3	-	3	2	2