ADITYA ENGINEERING COLLEGE

An Autonomous Institutuion

Approved by AICTE • Permanently Affiliated to JNTUK • Accredited by NAAC with 'A' Grade

Recognised by UGC under sections 2(f) and 12(B) of UGC Act, 1956

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Department of Electrical and Electronics Engineering

B.Tech-AR19-Course Articulation Matrix

Note Enter Correlation Levels 1 or 2 or 3. Where 1- Slight(Low), 2 - Moderate(Medium), 3 - Substantial (High).

	CO Statements	POs												PSOs	
I SEM															
Course Code	**191HS1T01 - COMMUNICATIVE ENGLISH**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Identify the ways to overcome fear and use of words paradoxically, interpret the developing conditions and the core competences of the state to prioritize education system.	-	-	-	-	-	-	**1**	-	-	**3**	-	-	-	-
CO2	Explain about world's most precious natural resources.	-	-	-	-	-	-	**1**	-	-	**3**	-	-	-	-
CO3	Explain about importance of unity to aboilish war	-	-	-	-	-	-	-	-	-	**3**	-	-	-	-
CO4	Respond well to the changing situations in life with independent knowledge for better decision making	-	-	-	-	-	-	-	-	**2**	**3**	-	**2**	-	-
CO5	Demonstrate writing and concepts of effective writing skills.	-	-	-	-	-	-	-	-	**1**	**3**	-	-	-	-
Course Code	**191BS1T01- DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply the concepts of Mean Value theorem, Partial Differentiation and identify the maxima and minima of a given function.	**3**	**2**	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Solve the linear differential equations and model various situations involving differential equations of first order.	**3**	**2**	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Solve linear differential equations of higher order and model various situations involving second order differential equations.	**3**	**2**	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Calculate Rank of a matrix and solve the system of Linear equations and find the Eigen values and Eigen vectors.	**3**	**2**	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Compute various powers of a matrix and identify the nature of the quadratic form	**3**	**2**	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191BS1T04 - ENGINEERING CHEMISTRY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Compare the quality of drinking water and problems associated with hard water	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Explain the fundamentals and applications of Electrochemical Energy Systems	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Explain the fundamentals and applications of Advance materials.	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs	
CO4	Explain about renewable energy sources and their manufacturing methods	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Summarize the importance of Nano materials and Green chemistry.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191ES1T01 - PROGRAMMING FOR PROBLEM SOLVING USING C**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate the fundamental concepts of computers and basics of computer programming	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO2	Make use of control structures and arrays in solving complex problems.	**3**	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO3	Develop modular program aspects and strings fundamentals	**3**	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	Demonstrate the ideas of pointers usage.	**2**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO5	Solve real world problems using the concept of structures, unions and File operations.	**3**	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
Course Code	**191HS1L01 - COMMUNICATIVE ENGLISH LAB-I**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Make use of the concepts to communicate confidently and competently in English Language in all spheres.	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**3**	**-**	**1**	**-**	**-**
CO2	Express Creative skills to construct Dialogues / Conversations in Spoken and Written forms.	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**-**	**-**
CO3	Identify Accent for intelligibility.	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**-**	**-**
CO4	Demonstrate communicative ability in everyday Conversation, JAM Sessions and Public Speaking	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**3**	**-**	**1**	**-**	**-**
CO5	Demonstrate nuances of Language through Audio – Visual Experience and group activities	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**3**	**-**	**1**	**-**	**-**
Course Code	**191BS1L02 -ENGINEERING CHEMISTRY LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze & generate experimental skills	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**-**	**-**
CO2	Demonstrate Acid – Base Redox & Complexometric titrations byVolumetric analysis.	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**-**	**-**
CO3	Demonstrate Acid – Base titrations by instrumental analysis.	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**-**	**-**
CO4	Prepare polymer like Bakelite.	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**-**	**-**
CO5	Prepare alternative fuel like Bio-Diesel.														
Course Code	**191ES1L01 - PROGRAMMING FOR PROBLEM SOLVING USING C LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Develop the basic programs in C and draw the flowcharts using Raptor	**2**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO2	Make use of conditional and iterative statements to solve real time scenarios in C	**3**	**2**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO3	Apply the concept of arrays, modularity and strings to handle complex problems.	**3**	**2**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

	CO Statements	POs												PSOs	
CO4	Apply the dynamic memory allocation functions using pointers	**2**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO5	Develop programs using structures, and Files.	**3**	**2**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
Course Code	**191ES1L02- BASIC ENGINEERING WORKSHOP**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Construct the various wooden joints.	**3**	**2**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO2	Develop various fitting joints.	**3**	**2**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO3	Develop components for making the various sheet metal models.	**3**	**2**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO4	Experiment with the various parallel house wiring connections.	**3**	**2**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
Course Code	**191MC1A01 - ENVIRONMENTAL SCIENCE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Outline the natural resources and their importance for the sustenance of the life	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain about the biodiversity of India, threats and its conservation methods	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Illustrate various attributes of the pollution, impacts and measures to control the pollution along with waste management practices	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Describe social issues of both rural and urban environment to combat the challenges and the legislations of India in environmental protection	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the population growth and its implications	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191MC1A02 - CONSTITUTION OF INDIA**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain historical background of the constitution making and its importance for building a democratic India	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Compare the functioning of three wings of the government ie., executive, legislative and judiciary.	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Interpret the value of the fundamental rights and duties for becoming good citizen of India	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Compare the decentralization of power between central, state and local selfgovernment	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Extend the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	II SEM														
Course Code	**191BS2T05 - PARTIAL DIFFERENTIAL EQUATION AND VECTOR CALCULUS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Solve improper integrals using beta and gamma functions.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO2	Solve partial differential equations of first order.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO3	Compute the double integral over a region and triple integral over a volume.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		

	CO Statements	POs												PSOs	
CO4	Calculate the gradient of a scalar function, divergence and curl of a vector function	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO5	Apply line, surface and volume integrals	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
Course Code	**191BS2T07 -APPLIED PHYSICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply the principles of interference and diffraction to design and enhance the resolving power of various optical instruments.			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain the fundamental concepts of Quantum behaviour of matter			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Classify the solids based on energy band structure.			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain the basic concepts of Semi-Conductors and Identify the type of semiconductors using Hall Effect.			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO5	Explain about magnetic and dielectric properties of different materials.			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
Course Code	**191ES2T05- DATA STRUCTURES THROUGH C**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate time and space complexities of an algorithm	**2**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Apply various searching and sorting techniques to solve computing problems.	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		**-**
CO3	Make use of linear data structures to solve real time problems	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		**-**
CO4	Develop applications using Tree data structures.	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		**-**
CO5	Solve problems using Graph algorithms.	**3**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		**-**
Course Code	**191EE2T01 -ELECTRICAL CIRCUITS ANALYSIS-I**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain network elements, types of sources and source transformation for network reduction.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Analyze the network by obtaining solution through mesh and nodal analysis and Summarize the behavior of RLC networks	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Solve Electrical networks with network topology concepts	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Explain electrical networks by using principles of network theorems	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Determine resonance frequency and Q factor of an AC Circuit	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO6	Identify magnetic circuit with various dot conventions.	**2**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	
Course Code	**191ES2T06-BASIC CIVIL AND MECHANICAL ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply Shear force diagram & Bending moment diagram principles for Cantilever and Simply supported beams.	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Apply concepts of Rosette analysis for strain measurements.	**2**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Analyse the characteristics of common building materials.	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Compare the working characteristics of Internal Combustion engines.	**2**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Compare the differences between boiler mountings and accessories.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
Course Code	**191HS2L02-COMMUNICATIVE ENGLISH LAB-II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Make effective use of Body language in all situations and contexts to enhance effective communication in all aspects.	-	-	-	-	-	-	-	-	-	3	-	2	-	-
CO2	Identify communicative competency to respond to others in different situations	-	-	-	-	-	-	-	-	-	3	-	2	-	-
CO3	Make use of effective delivery strategies to select, compile and synthesize information for oral presentation	-	-	-	-	-	-	-	-	-	3	-	2	-	-
CO4	Demonstrate in mock interviews, group discussion and public speaking.	-	-	-	-	-	-	-	-	-	3	-	2		
CO5	Illustrate interpersonal skills using English language confidently and effectively for personal and professional growth	-	-	-	-	-	-	-	-	-	3	-	2	-	-
Course Code	**191BS2L05 - APPLIED PHYSICS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Use spectrometer, travelling microscope for making measurements.	3	2	-	-	-	-	-	-	1	-	-	1	-	-
CO2	Determine energy gap of a semiconductor, draw characteristic curves to estimate thermal coefficient of a thermistor, Zener diode	2	2	-	-	-	-	-	-	1	-	-	1	-	
CO3	Determine the dielectric constant and resistivity.	3	1	-	-	-	-	-	-	1	-	-	1	-	-
CO4	Determine wavelength of source and width of the narrow slits	3	2	-	-	-	-	-	-	1	-	-	1	-	-
CO5	Find the strength of magnetic field.	3	2	-	-	-	-	-	-	1	-	-	1		-
Course Code	**191ES2L05 - BASIC CIVIL AND MECHANICAL ENGINEERING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Solve to arrive at finding constant speed and variable speed on IC engines and interpret their performance.	3	2	1	1			-	-	-	2	-	-	-	-
CO2	Estimate energy distribution by conducting heat balance test on IC engines	3	2	-	-			-	-	-	3	-	-	-	-
CO3	Explain procedure for standardization of experiments.	2	1	-	-			-	-	-	3	-	-	-	-
CO4	Determine flow discharge measuring device used in pipes channels and tanks.	3	2	2	2			-	-	-	-	-	-	-	-
CO5	Determine fluid and flow properties	3	2	2	2			-	-	-	-	-	-	-	-
CO6	Solve for drag coefficients.	3	2	1	1			-	-	-	3	-	-	-	-
Course Code	**191ES2L09 - ELECTRICAL ENGINEERING WORKSHOP**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Demonstrate knowledge on different tools, abbreviations and symbols used in Electrical Engineering.	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO2	Study of various wiring joints and measurement of gauge.	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO3	Perform wiring and earthing for residential houses.	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	Perform wiring for wiring for induction motor and UPS.	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO5	Demonstrate how to trouble shoot the electrical equipments (like fan, grinder, motor, etc.)	2	1	1	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs	
III SEM															
Course Code	**191BS3T12-TRANSFORM TECHNIQUES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Compute Laplace transform of a function	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Apply Laplace transform to solve Initial Value Problems.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Compute Fourier series of a function.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Compute Fourier transform of a function	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply Z- transforms to solve difference equations.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE3T02-ANALOG ELECTRONIC CIRCUITS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the fundamental principle of quantum mechanics and Solid State Physics to calculate the parameters of semiconductor materials.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Explain the operation and principle characteristics of different types of diodes	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Analyze the characteristics of rectifiers, filters and regulators.	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Explain various transistor configurations, different biasing, and stabilization techniques in transistor circuits	**2**	**3**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Explain the concept and operation of Feedback Amplifiers, Power Amplifier Circuits	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO6	Determine the frequency of oscillations of different types of oscillators.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191ES3T11-PYTHON PROGRAMMING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply control statements in solving complex problems.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Use data structures in Python to address various real-time problems.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Develop solutions for real-time problems with strings, functions and module creation.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Discuss Object Oriented Programming concepts and exceptions.	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Make Use of files, standard libraries like math, turtle, os, datetime in building real-time applications.	**3**	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE3T03-ELECTRICAL CIRCUIT ANALYSIS-II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the importance of three phase circuits with Star& Delta connected balanced and unbalanced loads.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO2	Analyze the transient behaviour of electrical networks for DC excitation.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Analyze the transient behaviour of electrical networks for AC excitation.	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Analyze the various networks parameters for the given two port networks.	**2**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	Apply the electrical networks into different forms.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**

	CO Statements	POs												PSOs	
Course Code	**191EE3T04-ELECTRICAL MACHINES – I**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the concepts of electromechanical energy conversion.	**3**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO2	Evaluate the ill-effects of armature reaction in dc machines.	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Determine the torque production mechanism and control the speed of dc motors.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Analyze the performance of single phase transformers by regulation, losses and efficiency	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Inspect the parallel transformers, control voltages with tap changing methods and achieve three-phase to two-phase transformer.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE3T05-ELECTROMAGNETIC FIELDS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply the laws of Electrostatics to calculate electric field intensity.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	Analyze the behavior of materials in electric field, calculation and design of capacitance and energy stored in the dielectrics	**3**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	Apply the laws of Magneto-statics to calculate field intensity.	**3**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	Determine the magnetic forces, Self and Mutual inductances and energy stored in the magnetic field using laws of magneto-statics.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Analyze the concepts of Faraday's laws, displacement current and poynting vector	**3**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE3L01-ELECTRICAL CIRCUITS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze complex DC and AC linear circuits	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO2	Apply concepts of electrical circuits across engineering	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO3	Evaluate response in a given network by using theorems	**1**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO4	Determine self and mutual inductance of a magnetic circuit	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO5	Determine the active and reactive power three face system.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
Course Code	**191ES3L15-PYTHON PROGRAMING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Experiment with basic Python programs.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Develop programs using conditional and iterative statements.	**3**	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	Make use of different data structures in solving complex problems.	**3**	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	Analyze the Object Oriented concepts in Python.	**3**	**3**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO5	Develop real-time applications using files and standard libraries.	**3**	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
Course Code	**191MC3A03-EMPLOYABILITY SKILLS-I**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Solve problems of Series & Analogy for Numbers and Letters	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Solve problems on Coding & Decoding and Divisibility rules	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	Solve problems on LCM & HCF and Simple Equations	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	Demonstrate Attitude, self-confidence and decision making in different situations	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**-**	**-**
CO5	Develop out of box and lateral thinking, better goal setting and time management	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**-**	**-**

	CO Statements	POs												PSOs	
Course Code	**191MC3A04-ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Identify the concept of Traditional knowledge and its importance.	-	-	-	-	-	1	1	-	-	-	-	-	-	-
CO2	Explain the need and importance of protecting traditional knowledge.	-	-	-	-	-	1	1	-	-	-	-	-	-	-
CO3	Illustrate the various enactments related to the protection of traditional knowledge.	-	-	-	-	-	1	1	-	-	-	-	-	-	-
CO4	Interpret the concepts of Intellectual property to protect the traditional knowledge.	-	-	-	-	-	1	1	-	-	-	-	-	-	-
CO5	Explain the importance of Traditional knowledge in Agriculture and Medicine.	-	-	-	-	-	1	1	-	-	-	-	-	-	-
IV SEM															
Course Code	**191BS4T17-Numerical methods & Complex Variables**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply numerical methods to compute approximate solution of equations and to interpolate polynomials.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Apply numerical methods to initial value problems and problems involving integration.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Examine the analyticity of functions of complex variables.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Compute different types of complex integrals and expand complex functions into Taylor's series.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Identify various singular points and compute improper integrals using Cauchy residue theorem Cauchy residue theorem	3	2	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191EE4T06-DIGITAL CIRCUITS AND LOGIC DESIGN**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Interpret numeric information in different code formats.	3	2	1	-	-	-	-	-	-	-	-	1	1	-
CO2	Diminish the switching functions using Boolean algebra.	2	3	2	1	-	-	-	-	-	-	-	-	1	-
CO3	Design various combinational logic circuits for required specifications.	2	3	2	1	-	-	-	-	-	-	-	-	1	-
CO4	Recognize Programmable Logic Devices..	3	2	2	-	-	-	-	-	-	-	-	-	1	-
CO5	Designsequential circuits.	2	3	2	1	-	-	-	-	-	-	-	-	1	-
Course Code	**191EE4T07-ELECTRICAL MACHINES-II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the construction, operation and performance of three phase induction motor	3	2	1	-	-	-	-	-	-	-	-	-	2	-
CO2	Analyze the starting and testing methods of induction motor.	3	1	2	-	-	-	-	-	-	-	-	-	1	-
CO3	Explain the construction and operation of synchronous generators.	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO4	Analyze the parallel operation of synchronous generators	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO5	Determine the operation and performance of synchronous motor.	3	1	2	-	-	-	-	-	-	-	-	-	1	-

	CO Statements	POs												PSOs	
Course Code	**191EE4T08-CONTROL SYSTEMS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Aquire the mathematical modeling of physical systems.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Determine time response specifications of second order systems.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Apply the Routh's stability criterion and the root locus method for stability of LTI systems.	**2**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Analyze the stability of LTI systems using frequency response methods.	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Analyze the state space representations of LTI systems.	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE4T09-POWER SYSTEMS-I**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the different components of thermal power plant & hydro power plant	**1**	**-**	**2**	**-**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO2	Explain the different components of nuclear Power plants.	**1**	**-**	**2**	**-**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO3	Distinguish between AC/ DC distribution systems and also estimate voltage drops of distribution systems.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO4	Classify the different components of air and gas insulated substations.	**-**	**-**	**-**	**1**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Categorize single core and multi core cables with different insulating materials.	**2**	**2**	**3**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO6	Analyze the different economic factors of power generation and tariffs.	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191ES4T15-INTERNET OF THINGS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe the application areas of IoT.	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Illustrate revolution of Internet in Mobile Devices, Cloud & Sensor Networks.	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain communication protocols used in IoT.	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Make use of python programming to implement Internet of Things.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Design IoT applications using Raspberry Pi.	**3**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE4L02-ELECTRICAL MACHINES – I LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Interpret the constructional details of the DC machines and Transformers.	**1**	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Determine and predetermine the performance of DC machines.	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Analyze the various speed control techniques of DC motor.	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Estimate the performance of transformers.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Determine the Efficiency and regulation of transformers.	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE4L03-ANALOG ELECTRONIC CIRCUITS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Examine the functional characteristics of semiconductor devices.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Design rectifier and regulator circuits using basic semiconductor devices.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**

	CO Statements	POs												PSOs	
CO3	Examine the characteristics of transistor in different configurations.	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Analyze the frequency response of small signal low frequency amplifiers.	**2**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Determine the ripple factor and percentage regulation of half wave and full wave rectifier.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191MC4A05-EMPLOYABILITY SKILLS-II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Examine the symbols, notations and Venn -diagrams.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Solve different types of number systems problems.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	Solve ratio & proportion, ages and averages by using simple logic.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	Apply negotiation skills and leadership skills in a team	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**-**	**-**
CO5	Apply listening skills and verbal skills of communication in a team	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**-**	**-**
Course Code	**191MC4A06-BIOLOGY FOR ENGINEERS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply biological engineering principles, procedures needed to solve real-world problems.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Demonstrate the fundamentals of living things, their classification,cell structure and biochemical constituents.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Apply the concept of plant, animal and microbial systems and growth in real life situations.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain genetics and the immune system to know the cause,symptoms, diagnosis and treatment of common diseases.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Demonstrate basic knowledge of the applications of biological systems in relevant industries.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	V SEM														
Course Code	**191EE5T10-POWER SYSTEMS-II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate parameters of various types of transmission lines during different operating conditions	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	Analyze the performance of short and medium transmission lines	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	Demonstrate travelling waves on transmission lines	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	Identify various factors related to charged transmission lines	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	Make use of sag/tension of transmission lines and performance of line insulators	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Course Code	**191EE5T11-POWER ELECTRONICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the different types of power semiconductor devices and their Characteristics.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	Distinguish between 1ϕ and 3ϕ phase controlled converters.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Analyze the operation of AC voltage controllers and cycloconverters.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Analyze the operation of different types of DC-DC converters.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**

	CO Statements	POs												PSOs	
CO5	Illustrate the operation of Inverters and application of PWM techniques.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE5T12-ELECTRICAL MEASUREMENTS AND INSTRUMENTATION**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Select the instrument for measurement of voltage and current for ac and dc	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Develop the suitable bridge for the measurement of electrical parameters	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Explain the ballistic galvanometer and flux meter for magnetic measuring instruments.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	Demonstrate the calibration of the potentiometer	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	Explain frequency and phase difference between signals using CRO.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Course Code	**191HS5T05-MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the Managerial Economic concepts for decision making and forward planning.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**
CO2	Illustrate the law of demand and its exceptions by using different forecasting methods.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**
CO3	Identify the cost behavior for managerial decision making and Break Even Point (BEP) of an enterprise.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**
CO4	Classify the different types of business organizations along with basic knowledge on business cycle.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO5	Make use of the process & principles of accounting for the preparation of final accounts.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**
CO6	Utilize various techniques on investment project proposals with the help of capital budgeting techniques for decision making.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
Course Code	**191EE5E01-ADVANCED CONTROL SYSTEMS (Professional Elective-I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply state space representation to formulate different state models.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	Design control system using the pole placement technique.	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	Analyze the nonlinear system using the describing function technique and phase plane analysis.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	Analyze the stability analysis using Lypunov's method.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	Explain the Minimization of functionals using calculus of variation studied.	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO6	Formulate and solve the LQR problem and riccatti equation.	**2**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**

	CO Statements	POs												PSOs	
Course Code	**191EE5E02-ELECTRICAL MACHINE MODELING AND ANALYSIS (Professional Elective-I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze the behaviour of DC motor models for different applications.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Evaluate the characteristics of different types of DC motors for designing suitable controllers.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Apply the reference frame theory of AC machines to model the induction and Synchronous machines.	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Evaluate the steady state and transient behaviour of induction machines to propose the suitability of drives for different industrial applications	**2**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Evaluate the steady state and transient behaviour of synchronous machines to propose the suitability of drives for different industrial applications.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE5E03-RENEWABLE ENERGY SOURCES (Professional Elective-I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.	**1**	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	Examine the solar photo voltaic systems.	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	Develop maximum power point techniques in solar PV and wind energy systems.	**3**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	Illustrate the wind energy conversion systems, wind generators and power generation	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO5	Explain basic principle and working of tidal, biomass, fuel cell and geothermal systems.	**1**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
Course Code	**191CE5O01-BASIC CONCRETE TECHNOLOGY (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the basic concepts of concrete and admixtures	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain the properties of ingredients of concrete.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Select the suitability of different types of aggregate for their use	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain the destructive and non-destructive tests on Hardened Concrete	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Illustrate the concept of special concrete and their use.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE5O01-ELECTRICAL SAFETY (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe electrical hazards and safety equipment			**1**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Apply various grounding and bonding techniques	**1**				**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Select appropriate safety method for low, medium and high voltage equipment			**1**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**

	CO Statements	POs												PSOs	
CO4	Discuss safety managmenet and organizing structure			**1**		-	-	-	-	-	-	-	-	**2**	-
CO5	Demonstrate proper maintenance of electrical equipment by understanding various standards			**1**		-	-	-	-	-	-	-	-	**2**	-
Course Code	**191EE5O02-ELECTRICAL MATERIALS (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Identify various types of dielectric materials, their properties in various conditions.	**3**	**2**	-	-	-	-	-	-	-	-	-	-	**2**	-
CO2	Analyze magnetic materials and their behaviour.	**3**	**1**	-	-	-	-	-	-	-	-	-	-	**2**	-
CO3	Evaluate semiconductor materials and technologies.	**3**	**1**	-	-	-	-	-	-	-	-	-	-	**2**	-
CO4	Explain the application of Materials in electrical engineering	**3**	**2**	-	-	-	-	-	-	-	-	-	-	**2**	-
CO5	Explain the application of Special Purpose Materials in electrical engineering.	**3**	**2**	-	-	-	-	-	-	-	-	-	-	**2**	-
Course Code	**191EE5O03-BASIC ELECTRICAL MEASUREMENTS (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze the behaviour of different types of torques in instruments.	**1**	**1**	-	-	-	-	-	-	-	-	-	-	**2**	-
CO2	Select the right type of instrument for measurement of voltage, current, power &energy.	**1**	**1**	-	-	-	-	-	-	-	-	-	-	**2**	-
CO3	Develop the suitable bridge for the measurement of electrical parameters.	**1**	**1**	-	-	-	-	-	-	-	-	-	-	**2**	-
CO4	Analyze the behaviour of different types of Transducers and Sensors.	**1**	**1**	-	-	-	-	-	-	-	-	-	-	**2**	-
CO5	Explain frequency and phase difference between signals using CRO.	**1**	**1**	-	-	-	-	-	-	-	-	-	-	**2**	-
Course Code	**191ME5O01-RENEWABLE ENERGY SOURCES (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.	**2**	**1**	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Examine the solar photo voltaic systems.	**3**	**2**	**1**	**1**	-	-	-	-	-	-	-	-	-	-
CO3	Develop maximum power point techniques in solar PV and wind energy systems.	**2**	**1**	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Illustrate the wind energy conversion systems, wind generators and power generation.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Explain basic principle and working of tidal, biomass, fuel cell and geothermal systems.	**2**	**3**	**2**	**2**	-	-	-	-	-	-	-	-	-	-
Course Code	**191ME5O02-FUNDAMENTALS OF MECHANICAL ENGINEERING (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Compare the different types of boilers, mountings and accessories.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Interpret different manufacturing methods.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Explain the working of air compressors and refrigeration.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs	
CO4	Explain the working principle of Internal Combustion Engines and their performance.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Compute the parameters of mechanical components for power transmission.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191ME5O03-SUPPLY CHAIN MANAGEMENT (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the framework and scope of supply chain network and functions.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Appraise the importance of the design and redesign of a supply chain as key components of an organization's strategic plan.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Explain the strategic importance of logistic elements and describe how they affect supply chain management.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Analyze the creation of new value in the supply chain for customers, society and the environment.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Develop coordinated and collaborative processes and activities among the business partners in a supply chain, leveraging current and emerging technologies.	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191ME5O04-3D PRINTING (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Summarize the basics of Additive manufacturing (AM) technologies.	**1**	-	-	-	-	**2**	-	-	-	-	-	**1**	-	-
CO2	Explain about vat photo polymerization, material jetting and binder jetting AM technologies.	**1**	-	-	-	-	-	-	-	-	-	-	**1**	-	-
CO3	Explain material extrusion and sheet lamination AM technologies.	**1**	-	-	-	-	-	-	-	-	-	-	**1**	-	-
CO4	Illustrate Powder Bed Fusion and Directed Energy Deposition AM technologies.	**1**	-	-	-	-	-	-	-	-	-	-	**1**		
CO5	Apply the AM techniques in different industries	**1**	-	-	-	-	-	-	-	-	-	-	**1**	-	-
CO6	Select AM technologies using decision methods	**1**	-	-	-	-	-	-	-	-	-	-	**1**	-	-
Course Code	**191ME5O05-ENTREPRENEURSHIP DEVELOPMENT AND INCUBATION (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe the meaning and concepts of entrepreneurship development	-	-	-	-	-	**1**	**2**	-	-	**2**	-	-	-	-
CO2	Apply the business plan for preparation and evaluation of project.	-	-	-	-	-	**1**	**2**	-	-	**2**	-	-	-	-
CO3	Explain about Institutional Support to Entrepreneur and MSMEs	-	-	-	-	-	**2**	**3**	-	-	**2**	**2**	-	-	-
CO4	Explain about the Opportunities of Entrepreneurship Internationally.	-	-	-	-	-	**2**	**3**	-	-	**2**	**2**	-	-	-
CO5	Explain about Informaal Risk Capital, Venture capital and Social responsibility for entrepreneurship	-	-	-	-	-	**1**	**2**	-	-	**2**	-	-	-	-
Course Code	**191EC5O01-SIGNALS AND SYSTEMS (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Categorize signals and systems based on their characteristics.	**2**	**1**	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs	
CO2	Demonstrate the spectral characteristics of signals using Fourier series	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Demonstrate the spectral characteristics of signals using Fourier Transform	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Identify system characteristics in time domain and frequency domain.	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply Laplace transform techniques for the analysis of continuous time signals and Systems.	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EC5O02-DIGITAL ELECTRONICS AND LOGIC DESIGN (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Interpret numeric information in different code formats.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Develop optimized logic by using various optimization algorithms.	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Construct various combinational logic circuits for required specifications.	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Build different Programmable Logic Device for required specifications.	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO5	Build different sequential logic circuits for required specifications.	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EC5O03-SEMICONDUCTOR DEVICES (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Interpret the characteristics of semiconductor diodes.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Apply the knowledge of semiconductors in the functioning of BJT.	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Demonstrate the switching and amplification application of FET.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO4	Classify the semiconductor devices for special Applications.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Identify the sensor types used in various applications and explain their principle of operation.	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191CS5O01-DATA STRUCTURES (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate time and space complexities of an algorithm	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Apply various searching and sorting techniques to solve computing problems.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Make use of linear data structures to solve real time problems.	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Develop applications using Tree Data Structures.	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Solve problems using Graph Algorithms.	**1**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191CS5O02-OBJECT ORIENTED PROGRAMMING THROUGH C++ (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Compare and contrast object oriented programming and procedural oriented programming.	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Summarize the OOPS concepts.	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Make use of constructor and destructor to initialize and destroy class objects.	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO4	Develop programs using virtual functions and Polymorphism.	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply inheritance to build real time applications, Exception handling mechanism to handle runtime errors.	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO6	Develop C++ classes with templates and STL.	**1**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191CS5O03-JAVA PROGRAMMING (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply object oriented programming features and concepts for solving given problem.	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Solve real time problems using the concepts of class, inheritance, interface and packages.	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Test for runtime exceptions arise in java applications.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Develop real time applications using multithreading and I/O streams.	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Develop GUI applications using event handlers, adapter classes, AWT and Swing components.	**2**	**1**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191CS5O04-R PROGRAMMING (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate the basic concepts and advanced data structures of R programming.	**3**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain the control statements and operators in R.	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Implement simulation, Probability and linear algebra operations.	**3**	**2**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Make use of graph functions for better visualization of results.l	**2**	**1**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Develop programs for distribution functions and regression models.	**2**	**2**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191IT5O01-DATABASE MANAGEMENT SYSTEMS (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Identify the database characteristics and various database architectures.	**3**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Interpret relational database using SQL.	**3**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Examine issues in data storage and query processing for appropriate solutions.	**1**	**-**	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Make use of normalization techniques to build database system for real world problems.	**1**	**2**	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Illustrate the mechanisms of transaction management.	**2**	**2**	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191IT5O02-COMPUTER GRAPHICS (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Identify the applications of computer graphics and Video Display devices for implementing Graphical user interface.	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Analyze output primitives and filled area primitives in implementing various algorithms.	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Make use of Geometric Transformations, Viewing and Clipping in 2D & 3D Graphics.	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Illustrate various Visual Surface detection Methods in 3D Graphics.	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO5	Apply OpenGL for General Computer Animations.	**2**	**1**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO6	Explain different object color modeling techniques, Fractals and Ray tracing concepts.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191MI5O01-OVERVIEW OF MINING (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze different stages in the life of a mine.	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Choose a suitable location for opening to a deposit.	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Organize for building appropriate permanent lining, drift with proper ventilation and lighting arrangements.	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Select the special methods need to be adopted for a particular situation.	**1**	**3**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the impact of mining activities on environment	**1**	**3**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191PT5O01-PROCESS INTENSIFICATION IN PETROLEUM INDUSTRY (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the basic principles and mechanisms that are responsible for process intensification.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Analyze various modifications to process equipment and designs with which process intensification becomes a reality in unit operations and unit processes.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Analyze various case studies available in petrochemical, fine chemical, bioprocesses for Downhole separation	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain the role of photo voltaic cells, solar power in offshore oil and gas operations.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply the working principles of Divided wall distillation for separation of natural gas -liquid	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191PT5O02-FUNDAMENTALS OF PETROLEUM INDUSTRY (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply the basic principles and mechanisms that are responsible for petroleum industry.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Analyze various modifications to equipment and designs with which evaluate the lithological characteristics and behavior of reservoir.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain the hydro carbon activity in reservoir, logging, testing and completion.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Analyze various case studies available in petrochemical, chemical, bioprocesses for treatment of wastage.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Analyze various modifications to well for better production rate.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191AG5O01-BASIC CROP PRODUCTION PRACTICES (Open Elective –I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain factors affecting on crop growth and production.	**1**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**

	CO Statements	POs												PSOs	
CO2	Explain crop selection and establishment of an adequate crop stand and ground cover.	**1**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain crop water management using integrated water management methods.	**1**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Apply agricultural crops production practices in field.	**1**	**-**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply the horticulture crops production practices in field.	**1**	**-**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
Course Code	**191EE5L04-ELECTRICAL MACHINES-II LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Assess the performance of three phase and single phase induction motors	**3**	**2**	**---**	**---**	**---**	**---**	**---**	**---**	**2**	**1**	**---**	**---**	**1**	**-**
CO2	Examine the speed of three phase induction motor	**3**	**2**	**---**	**---**	**---**	**---**	**---**	**---**	**2**	**1**	**---**	**---**	**2**	**-**
CO3	Pre determine the regulation of three phase alternator by various methods	**3**	**2**	**---**	**---**	**---**	**---**	**---**	**---**	**2**	**1**	**---**	**---**	**2**	**-**
CO4	Find Xd/Xq ratio of alternator and assess the performance of three phase synchronous motor	**3**	**2**	**---**	**---**	**---**	**---**	**---**	**---**	**2**	**1**	**---**	**---**	**2**	**-**
CO5	Discuss the procedure of synchronization to grid.	**3**	**2**	**---**	**---**	**---**	**---**	**---**	**---**	**2**	**1**	**---**	**---**	**2**	**-**
Course Code	**191EE5L05-CONTROL SYSTEMS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze the performance and working of Magnetic amplifier, D.C and A.C servo motors	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**
CO2	Design of different types of controllers like PI, PID and compensators like Lag, Lead and lead – lag	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**
CO3	Understand the Control of temperature using PID controller	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**
CO4	Determine the transfer function of DC machine	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**
CO5	Analyze the fundamentals and application of PLC in electrical Domain	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**
Course Code	**191HS5T06-EMPLOYABILITY SKILLS-III**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain different types of puzzles,group reasoning,clock and calender problems	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Solve problems on cubes & dice, partnership, percentages.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	Solve problems on profit and loss, simple interest and compound interest	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	Apply interviewing skills, Group discussion skills and personal priorities	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**-**	**-**
CO5	Apply resume writing skills, e-mail writing & business etiquette	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**-**	**-**
Course Code	**191PR5P02-SOCIALLY RELEVANT PROJECT**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Conduct a literature survey in the selected area	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**		**-**	**-**
CO2	Use scientific reasoning to gather, evaluate and interpret the survey data to identify the problem	**-**	**2**	**-**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**

	CO Statements	POs												PSOs	
CO3	Design and develop many solutions in the light of societal, cultural, legal and environmental issues	-	-	2	2	-	-	-	1	-	-	-	-	-	-
CO4	Select a final solution to the social problem and submit as a working prototype	-	-	-	2	-	-	-		-	-	-	-	-	-
CO5	Use modern tools to prepare the results of the project as a report adhering to professional ethics	-	-	-	-	2	-	-	2	-	-	1	1	-	-
Course Code	**191MC5A08-INTELLECTUAL PROPERTY RIGHTS AND PATENTS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Compare various types of Intellectual Property rights.	-	-	-	-	-	-	-	3	-	-	-	2	-	-
CO2	Discuss Intellectual Property and infer rights on such Intellectual Property owners	-	-	-	-	-	-	-	3	-	-	-	2	-	-
CO3	Explain the process of patenting	-	-	-	-	-	-	-	3	-	-	-	2	-	-
CO4	Apply for trade marks and trade secrets.	-	-	-	-	-	-	-	3	-	-	-	2	-	-
CO5	Interpret the legal issues on Intellectual Property Rights and cyber laws	-	-	-	-	-	-	-	3	-	-	-	2	-	-
VI SEM															
Course Code	**191EE6T13-MICROPROCESSOR AND INTERFACING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyse the generalized concepts of microprocessors	2	3	2	1	-	-	-	-	-	-	-	-	1	-
CO2	Demonstrate programming proficiency using the various addressing modes and instructions.	3	2	2	1	-	-	-	-	-	-	-	-	1	-
CO3	Explain the basic concepts of interfacing memory and peripheral devices to a microprocessor.	2	3	2	1	-	-	-	-	-	-	-	-	1	-
CO4	Develop the internal architecture of microcontroller systems, including counters, timers, ports, and memory.	2	2	2	1	-	-	-	-	-	-	-	-	1	-
CO5	Explain the circuits for various applications using microcontrollers.	3	2	2	-	-	-	-	-	-	-	-	1	1	-
Course Code	**191EE6T14 - POWER SYSTEM ANALYSIS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the impedance diagram for a power system network and per unit quantities.	3	1	2	-	-	-	-	-	-	-	-	-	1	-
CO2	Explain the steps to form aYbus and Zbus for a power system networks.	3	2	1	-	-	-	-	-	-	-	-	-	1	-
CO3	Apply the different load flow methods to solve the power system problems.	2	-	3	1	-	-	-	-	-	-	-	-	1	-
CO4	Evaluate the fault currents for all types faults to provide data for the design of Protective devices.	1	1	3	2	-	-	-	-	-	-	-	-	1	-
CO5	Evaluate the sequence components of currents for unbalanced power system Network.	2	1	3	1	-	-	-	-	-	-	-	-	1	-

	CO Statements	POs												PSOs	
CO6	Analyze the steady state, transient and dynamic stability concepts of a power system.	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Course Code	**191EE6T15 - POWER CONVERTER DRIVES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the fundamentals of electric drive and converter fed DC motor drives.	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	Analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Explain the converter control of dc motors in various quadrants	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Explain the concepts of speed control of induction motor by using AC voltage controllers and voltage source inverters.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Explain the principles of static rotor resistance control, various slip power recovery schemes and various speed control mechanisms of synchronous motors.	**2**	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE6E05 -ADVANCED POWER ELECTRONICS CONVERTERS Professional Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze and design the isolated and non isolated Switched Mode DC to DC Converters.	**3**	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	Explain various PWM techniques of 2-level DC to AC converters.	**3**	**3**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	Analyze and design the current regulated voltage source inverters.	**3**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	Explain the analysis of traditional multilevel inverters.	**3**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	Design multilevel inverters with carrier based PWM techniques and SVPWM.	**3**	**3**	**1**	**3**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Course Code	**191EE6E06 -DIGITAL CONTROL SYSTEMS Professional Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Interpret numeric information in different representations.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**
CO2	Diminish the switching functions using Boolean algebra.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	Design various combinational logic circuits for required specifications.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	Recognize Programmable Logic Devices.	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	Design sequential circuits.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Course Code	**191EE6E07 - ELECTRICAL DISTRIBUTION SYSTEMS Professional Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Identify various factors of distribution system.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Design the substation and feeders.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Determine the voltage drop and power loss.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	Explain the different protection and its coordination .	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Explain the effect of compensation for p.f improvement.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**

	CO Statements	POs												PSOs	
CO6	Explain the different methods of voltage control.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Course Code	**191EE6E08 -ENERGY AUDIT, CONSERVATION & MANAGEMENT Professional Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain energy efficiency, conservation and various technologies	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	Design energy efficient lighting systems.	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	Calculate power factor of systems and propose suitable compensation techniques.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	Explain energy conservation in HVAC systems.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	Calculate life cycle costing analysis and return on investment on energy efficient technologies.	**1**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Course Code	**191EE6E09 -CONTROL SYSTEM DESIGN (Professional Elective – III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Determine the time domain & frequency domain specifications and effect of addition of pole and zero on system response.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Design Lag, Lead & Lag – Lead Compensators in time domain.	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Design Lag, Lead & Lag – Lead Compensators in frequency domain.	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		**2**	**-**
CO4	Design PID Controllers in time domain & frequency domain for first, second & third order systems.	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Review state models for physical systems and determine the response.Understanding the concepts of Controllability and Observability.	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE6E10 -ELECTRICAL SAFETY (Professional Elective – III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe electrical hazards and safety equipment	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO2	Analyze and apply various grounding and bonding techniques	**1**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO3	Select appropriate safety method for low, medium and high voltage equipment	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO4	Discuss safety management and organizing structure.	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO5	Carry out proper maintenance of electrical equipment by understanding various Standards	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
Course Code	**191EE6E11 -HIGH VOLTAGE TRANSMISSION (Professional Elective – III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyse the performance of high voltages with regard to different configurations of electrode systems.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Analyse the theory of breakdown and withstand phenomena of all types of dielectric materials.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**

	CO Statements	POs												PSOs	
CO3	Eplain the techniques of generation of AC, DC and Impulse voltages.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Apply knowledge for measurement of high voltage and high current AC, DC and Impulse.	**3**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Recognize measure dielectric property of material used for HV equipment.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO6	Identify the techniques of testing for various equipment's used in HV engineering.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Course Code	**191EE6E12 -SWITCHED MODE POWER CONVERTERS (Professional Elective – III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze the operation of non-isolated switch mode converters.	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Analyze the operation of isolated switch mode converters.	**-**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Analyze the operation and control of resonant converters	**-**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Apply different control schemes of switching converters.	**1**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Design the switch mode converters based on linearized models.	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191CE6O02 - DISASTER MANAGEMENT (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the aspects of disaster management and adopt remedial measures	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain the disaster vulnerability profile of India	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain the hazard assessment and mitigation measures	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain landslides and earthquake disasters and management	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO5	Explain about cyclone, fire disasters and rehabilitation programmes	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE6O04 - ENERGY AUDIT AND CONSERVATION MANAGEMENT (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain energy efficiency, conservation, and various technologies.	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Design energy efficient lighting systems.	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Calculate power factor of systems and propose suitable compensation techniques.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain energy conservation in HVAC systems.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Calculate life cycle costing analysis and return on investment on energy efficient technologies.	**1**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE6O05 - NON CONVENTIONAL ENERGY RESOURCES (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the prospects of renewable energy and solar energy.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Apply the knowledge of solar principles for its applications.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Discuss the working principles of wind and Bio-mass energy resources.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO4	Illustrate the techniques and conversion principles of Geothermal and tidal energy resources.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the concept of Direct energy conversion	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE6O06 - INSTRUMENTATION (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain various types of signals	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain various types of Transducers principles	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Measure various parameters such as strain, velocity, temperature, pressure etc.	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain the working principle of various types of digital Voltmeters and measure various parameter like phase and frequency of a signal with the help of CRO.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Analyze the different signals using various types of signal analyzers	**1**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191ME6O06 -SOLAR ENERGY UTILISATION (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the concept of solar radiation and its measurement.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Describe the working principle of different types of collectors and its types	**2**	**-**	**-**	**-**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO3	Explain the various solar thermal energy technologies and their applications	**2**	**-**	**-**	**-**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO4	Analyze the various solar PV cell materials and conversion techniques.	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO5	Apply solar passive building techniques for cooling and heating applications.	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
Course Code	**191ME6O07-BASIC THERMODYNAMICS AND HEAT TRANSFER (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain basic thermodynamic concepts and laws of thermodynamics	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO2	Make use of steam tables to solve problems on properties of pure substance and gas mixture	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO3	Find the efficiency of a thermodynamic cycle	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO4	Explain basic heat transfer mechanisms	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
CO5	Evaluate the performance of heat exchangers	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		
Course Code	**191ME6O08-Introduction to Hydraulics and Pneumatics (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe the fundamentals of fluid power systems.	**-**	**-**	**1**	**-**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Illustrate the working of fluid power actuators, hydraulic motors, and Hydraulic Components.	**-**	**-**	**1**	**-**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Analyze the concepts of hydraulic circuits.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain the working of pneumatic systems.	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO5	Examine the concepts of pneumatic circuits.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191ME6O09-3D PRINTING (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Summarize the basics of AM technologies.	**1**	-	-	-	-	**1**	-	-	-	-	-	**1**	-	-
CO2	Explain about vat photo polymerization, material jetting and binder jetting AM technologies.	**1**	-	-	-	-	**1**	-	-	-	-	-	**1**	-	-
CO3	Explain material extrusion and sheet lamination AM technologies.	**1**	-	-	-	-	-	**1**	-	-	-	-	**1**	-	-
CO4	Illustrate powder bed fusion and directed energy deposition AM technologies.	**1**	-	-	-	-	-	**1**	-	-	-	-	**1**	-	-
CO5	Apply the AM techniques in different industries	**1**	-	-	-	-	**1**	-	-	-	-	-	**1**	-	-
CO6	Select AM technologies using decision methods	**1**	-	-	-	-	-	-	-	-	-	-	**1**	-	-
Course Code	**191ME6O06-ROBOTICS (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the basic concepts, parts of robots and types of robots.	**2**	-	-	-	-	-	-	-	-	-	-	**1**	-	-
CO2	Identify various robot configuration and components,	**2**	-	-	-	-	-	-	-	-	-	-	**1**	-	-
CO3	Analyze the transformations and manitulator kinematics of robot using DH Notation	**2**	**1**	-	-	-	-	-	-	-	-	-	**1**	-	-
CO4	Analyze the differential transformations and dynamics of robots	**3**	**2**	-	-	-	-	-	-	-	-	-	**1**	-	-
CO5	Analyze the trajectory planning for a manipulator by avoiding Obstacles	**1**	**2**	**1**	-	-	-	-	-	-	-	-	**1**	-	-
Course Code	**191ME6O09-MANAGEMENT SCIENCE (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply management and motivation theories to renovate the practice of management.	**1**	**1**	-	-	-	**1**	-	-	-	-	-	**1**	-	-
CO2	Explain concepts of quality management and use process control charts, concepts and tools of quality engineering in the design of products and process controls.	**1**	**1**	-	-	-	**1**	-	-	-	-	-	**1**	-	-
CO3	Appraise the functional management challenges associated with high levels of change in the organizations.	**1**	**1**	-	-	-	**1**	-	-	-	-	-	**1**	-	-
CO4	Identify activities with their interdependency and use scheduling techniques of project management PERT/CPM.	**1**	**1**	-	-	-	-	**1**	-	-	-	-	**1**	-	-
CO5	Develop global vision and management skills both at strategic level and interpersonal level.	**1**	**1**	-	-	-	-	**1**	-	-	-	-	**1**	-	-
Course Code	**191ME6O12-ENTREPRENEURSHIP DEVELOPMENT AND INCUBATION (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe the meaning and concepts of entrepreneurship development	-	-	-	-	-	**1**	**2**	-	-	**2**	-	-	-	-
CO2	Apply the business plan for preparation and evaluation of project.	-	-	-	-	-	**1**	**2**	-	-	**2**	-	-	-	-
CO3	Explain about Institutional Support to Entrepreneur and MSMEs	-	-	-	-	-	**2**	**3**	-	-	**2**	**2**	-	-	-
CO4	Utilize the Opportunities of Entrepreneurship Internationally.	-	-	-	-	-	**2**	**3**	-	-	**2**	**2**	-	-	-

	CO Statements	POs												PSOs	
CO5	Explain Informal Risk capital, Venture capital , Social & Rural entrepreneurship	-	-	-	-	-	1	2	-	-	2	-	-	-	-
Course Code	**1191EC6O04-BIOMEDICAL INSTRUMENTATION (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Summarize the physiological relation of the human body with the environment.	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Make use of different electrodes and transducers for biomedical applications.	2	2	2	1	-	-	-	-	-	-	-	-	-	-
CO3	Demonstrate the working principle of different biomedical instruments for heart and respiratory system monitoring.	2	3	2	1	-	-	-	-	-	-	-	-	-	-
CO4	Illustrate Intensive-Care Monitoring system for patient management.	2	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5	Outline different diagnostic techniques for telemedicine.	2	2	3	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191ME6O08-ECAD TOOLS (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate the basic concepts on ECAD tools and PSPICE.	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	Summarize the fundamental concepts of passive circuits using PSPICE.	2	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	Demonstrate the performance active circuits using PSPICE.	2	2	1	-	-	-	-	-	-	-	-	2	-	-
CO4	Develop the various functionality of MATLAB.	2	2	1	-	-	-	-	-	-	-	-	2	-	-
CO5	Apply the fundamentals and applications of MATLAB Simulink.	2	2	1	-	-	-	-	-	-	-	-	2	-	-
Course Code	**191CS6O05-PYTHON PROGRAMMING (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Develop programs using fundamental concepts and control statements in python.	2	2	3	-	2	-	-	-	-	-	-	-	-	-
CO2	Utilize data structures in Python to solve various problems.	2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	Develop programs using functions and Standard libraries like math, datetime, random etc. in building real time applications.	2	2	3	-	2	-	-	-	-	-	-	-	-	-
CO4	Apply Object Oriented Programming concepts.	3	-	2	-	2	-	-	-	-	-	-	-	-	-
CO5	Apply concept of exception handling in solving runtime issues.	3	-	2	-	2	-	-	-	-	-	-	-	-	-
CO6	Build various applications using files.	2	3	2	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs	
Course Code	**191CS6O06-OPERATING SYSTEMS (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate the basic structure, services, system calls and architectural components of Operating Systems.	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Solve problems related to process scheduling, synchronization in unit and multi-processing systems.	**2**	**2**	**2**	**3**	-	-	-	-	-	-	-	-	-	-
CO3	Explain the deadlock handling Mechanism in the processing System	**2**	**3**	**1**	**2**	-	-	-	-	-	-	-	-	-	-
CO4	Summarize the concepts of Memory Management, Virtual Memory Management and Thrashing	**2**	**2**	**3**	**2**	-	-	-	-	-	-	-	-	-	-
CO5	Describe the concepts of file system and mass storage structure.	**2**	**3**	**2**	**2**	-	-	-	-	-	-	-	-	-	-
Course Code	**191CS6O07-WEB TECHNOLOGIES (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Develop static web pages using HTML and CSS.	**2**	-	**3**	-	-	-	-	-	-	-	-	-	-	-
CO2	Apply JavaScript for Client-side validations and Node.JS to learn server-side applications using JavaScript.	**3**	**2**	**2**	-	**2**	-	-	-	-	-	-	-	-	-
CO3	Make use of Angular JS for developing dynamic and responsive web pages.	**2**	**2**	**3**	-	**2**	-	-	-	-	-	-	-	-	-
CO4	Utilize React JS for developing dynamic and responsive web pages.	**2**	**3**	**2**	-	-	-	-	-	-	-	-	-	-	-
CO5	Create and deploy secure, usable database driven web applications using PHP and MySQL/Mongo DB.	**2**	-	**2**	-	**3**	-	-	-	-	-	-	-	-	-
Course Code	**191CS8O08-CYBER SECURITY (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the cyber security and security management methods to maintain security protection.	**3**	**1**	-	-	**2**	-	-	**2**	-	-	-	-	-	-
CO2	Illustrate the nature of secure software development and operating systems.	**2**	**3**	-	-	**2**	-	-	-	-	-	-	-	-	-
CO3	Summarize the Network management and cloud computing security issues.	**1**	**2**	-	-	**3**	-	-	-	-	-	-	-	-	-
CO4	Analyze the data privacy techniques for data management.	**1**	**3**	-	-	**2**	-	-	-	-	-	-	-	-	-
CO5	Demonstrate the role security management plays in cyber security defense and legal and social issues at play in developing solutions.	**3**	**1**	-	-	**2**	-	-	**2**	-	-	-	-	-	-
Course Code	**191CS6O09-AR/VR (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain VR, its environments and hardware technologies for 3D interfaces.	**3**	-	-	**1**	**1**	-	-	-	-	-	-	-	-	-
CO2	Summarize 3D user interface input hardware in VR environment.	**3**	**1**	-	**2**	**1**	-	-	-	-	-	-	-	-	-
CO3	Make use of software technologies to build VR applications.	**2**	**2**	**3**	-	**2**	-	-	-	-	-	-	-	-	-
CO4	Develop 3D user interfaces using 3D interaction techniques.	**2**	**2**	**3**	-	**2**	-	-	-	-	-	-	-	-	-
CO5	Describe the fundamental concepts of AR	**2**	**3**	**2**	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs	
Course Code	**191IT6O03-COMPUTER ORGANIZATION (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe the basic structure of a computer system, various number systems and arithmetic operations.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain the Operation of CPUs including RTL, ALU, Instruction Cycle and Buses	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Demonstrate the architecture and functionality of central processing unit	**2**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Illustrate the I/O and memory organization in an efficient way.	**1**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Make use of multi processors and pipelining to improve the efficiency of computer system.	**1**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191IT6O04-AI TOOLS & TECHNIQUES (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the fundamentals of Artificial Intelligence and its applications.	**-**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Describe various problems solving techniques and searching techniques.	**-**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Apply various logical systems to inference the different logical problems.	**-**	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Demonstrate the concept of Knowledge Representation Techniques.	**-**	**2**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the phases in Expert System and its applications.	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO6	Identify various interpretations of probability theory, basic knowledge of fuzzy sets and fuzzy logic.	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191IT6O05-ROBOTIC PROCESS AUTOMATION (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe the fundamentals of Robotic Process Automation Technology.	**-**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Summarize the UiPath programming techniques to deploy robot configurations.	**-**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explore various data extraction techniques and learn about integrations with various popular applications like SAP and MS Office	**-**	**2**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Develop a programmed robot including logging and exception handling	**-**	**2**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Create and Deploy the Bots and control it with UiPath Orchestrator.	**-**	**2**	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191MI6O02-INDUSTRIAL SAFETY PRACTICES (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the different hazards and its prevention in mining industries.	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Distinguish the mine accidents occurring in surface and underground mining area.	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO3	Explain the safety concepts, emergency preparation and response in disaster	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Assess and minimize the risk using safety analysis techniques	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain Safety standards, safety information system and safety audit	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191MI6O03-ELECTRICAL EQUIPMENT IN MINES ELECTRICAL EQUIPMENT IN MINES (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain about power systems used in mines.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Analyze various earthing methods used in mines.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Summarize various electrical equipments used in mines.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Discuss about the instrumentation and control systems used in mines	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Analyze about intrinsic safety.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191PT6O03-Unconventional Hydrocarbon Resources (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Outline the fundamentals of Coal Bed Methane	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Estimate the shale gas reserves for Indian Scenario	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Determine the extent of gas hydrates resource estimation	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Illustrate the Origin and Characterize Shale Gas.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the Heavy oil reservoirs and their Challenges	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191PT6O04-Asset Management (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the Asset Management in corporate approach	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO2	Estimate the running cost and value for Asset Management	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO3	Determine value using Asset Management Interpretation	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO4	Illustrate Asset Management Decision making framework	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO5	Explain the Capital Planning System	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
Course Code	**191AG6O02-WEATHER FORECAST IN AGRICULTURE (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the weather elements and their impact on crop production.	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Identify the type of crop production risk and their management.	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain crop weather relationships and their responses.	**-**	**2**	**-**	**1**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Classify the types of weather forecast and their characteristics.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply weather thumb rules and verification of weather forecast with real events.	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191AG6O03-BIO-ENERGY SYSTEMS DESIGN AND APPLICATIONS (Open Elective –II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the importance of Bioenergy.	**2**	**-**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Compare and contrast Biomass and Agrochemical Conversion techniques.	**3**	**2**	**-**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Categorize different ways of biomass production.	**2**	**1**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO4	Classify Gasification and Liquefaction.	**2**	**1**	**-**	**-**	**-**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Analyze advanced Bio-diesel production from Oils and Seeds.	**2**	**1**	**-**	**-**	**-**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE6L06-ELECTRICAL MEASUREMENTS & INSTRUMENTATION LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Measure the active and reactive power of different loads.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**
CO2	Calibrate ammeter, voltmeter, and wattmeter and energy meter.	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**
CO3	Illustrate the working of different bridges	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**
CO4	Compare the different errors of the equipment	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**	**-**
CO5	Determine the breakdown strength of oil used in transformers.	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE6L07-POWER ELECTRONICS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Study the characteristics of various power electronic devices and analyze gate drive circuits of IGBT.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**1**	**-**
CO2	Analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads.	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**
CO3	Illustrate the operation of single phase AC voltage regulator with resistive and inductive loads.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**
CO4	Explain working of Buck converter, Boost converter.	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**
CO5	Explain working of single–phase square wave inverter and PWM inverter.	**1**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**
Course Code	**191HS6T07-EMPLOYABILITY SKILLS– IV**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Solve problems of seating arrangements ,syllogism	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**
CO2	Solve problems of Time and Work, Pipes and Cisterns, Time and Distance, Races and trains	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**-**
CO3	Solve Problems on Boats and Streams, Permutation and Combination, Probability and Data Interpretation	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**
CO4	Apply processes of Group discussion ,Phonetics, Leadership skills in real world	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**1**	**1**	**-**
CO5	Apply principles of Group Dynamics, Interview Skills & Evaluation criteria in organizations	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**1**	**2**	**-**
Course Code	**191MC6A09-PROFESSIONAL ETHICS AND HUMAN VALUES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Make use of values, morals and ethics in their day to day life.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Identify what is right and wrong through moral ethics.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Analyze experimental learning while developing the society with ethics.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Apply ethical principles to resolve the problems that arise in work place.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply adequate knowledge on global code of conduct.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
VII SEM															
Course Code	**191EE7T16-POWER SYSTEM OPERATION AND CONTROL**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the process of optimal scheduling of Generators.	**3**	**2**	**1**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Explain the process of hydrothermal scheduling.	**3**	**2**	**1**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Analyze the unit commitment problem.	**3**	**2**	**1**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Illustrate the importance of the frequency.	**3**	**1**	**2**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	Apply the concept of PID controllers in single area and two area systems.	**3**	**2**	**1**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO6	Explain the reactive power control and compensation for transmission line.	**3**	**2**	**1**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Course Code	**191EE7T17-SWITCHGEAR AND PROTECTION**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply the Knowledge of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF6 gas type	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO2	Explain the working principle and operation of different types of electromagnetic protective relays	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	Analyse the protective schemes for high power generator and transformers.	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	Apply the various types of protective schemes used for feeders and bus bar protection.	**2**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO5	Explaindifferent types of static relays and their applications	**2**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO6	Select the different types of over voltages and protective schemes required for insulation co–ordination..	**2**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
Course Code	**191EE7E13-ELECTRICAL AND HYBRID VEHICLES 191EE7E13 Electrical and HybridVehicles (Professional Elective – IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the characteristics of electrical and hybrid vehicles.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Analyze the models to describe electric trains and their performance.	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO3	Compare and evaluate the different possible ways of energy storage.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Demonstrate the sizing of the drive system.	**2**	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO5	Apply the different strategies related to energy management.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE7E14-PLC & APPLICATIONS 191EE7E13 Electrical and HybridVehicles (Professional Elective – IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Interpret the PLCs and their I/O modules.	**1**	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO2	Develop control algorithms to PLC using ladder logic.	**1**	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	Interpret PLC Timers and counters	**1**	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	Explain the data handling functions of PLC	**2**	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO5	Analyze the applications of PLC	**1**	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

	CO Statements	POs												PSOs	
Course Code	**191EE7E13- Electrical and HybridVehicles (Professional Elective – IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the concepts of microgrid and its issues in interconnection.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Analyze the microgrid modeling.	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO3	Analyze the necessity of smart grid.	**3**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO4	Describe the different technologies in smart grid.	**3**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Design the different models of smart microgrid.	**2**	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
Course Code	**191EE7E16-ENERGY STORAGE SYSTEMS (Professional Elective – V)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze the characteristics of electrical energy storage technologies.	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Analyze the needs for electrical energy storage.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Classify various types of energy storage and various devices used for the purpose.	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Understand the various types of electrical energy storage systems.	**2**	**1**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Identify various real time applications of energy storage systems.	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE7E17-MICRO CONTROLLER AND APPLICATIONS (Professional Elective – V)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate the basic concepts of microprocessors.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO2	Explain the assembly language programming concepts of 8086 microprocessors.	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO3	Demonstrate the basic concepts of interfacing memory and peripheral devices to a microprocessor.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO4	Apply the knowledge of instruction set to write 8051 microcontroller based programs.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO5	Explain the interfacing concepts of 8051 microcontrollers	**2**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
Course Code	**191EE7E18-POWER QUALITY AND FACTS (Professional Elective – V)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the characteristics of ac transmission and the effect of shunt and series reactive compensation.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Illustrate the working principles of FACTS devices and their operating characteristics.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Explain the basic concepts of power quality.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		**2**	**-**
CO4	Explain the working principles of devices to improve power quality.	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Explain the operation of DST ATCOM, DVR and UPQC.	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191CE7O03-WASTE WATER MANAGEMENT (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Summarize the importance of sanitation and waste water management	**2**	**1**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO2	Estimatethe rate of sewage flow and storm water drainage	**1**	**1**	**-**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Identify the various characteristics of sewage and plan the treatment system.	**3**	**2**	**-**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Outline various waste water treatment technologies.	**2**	**1**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the different treated effluent disposal methods	**2**	**1**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE7O07-ELECTRICAL AND HYBRID VEHICLES (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the characteristics of electrical and hybrid vehicles.	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Analyze the models to describe electric trains and their performance.	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Compare and evaluate the different possible ways of energy storage.	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Demonstrate the sizing of the drive system.	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply the different strategies related to energy management.	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE7O08-SPECIAL ELECTRICAL MACHINES (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Distinguish between brush dc motor and brush less dc motor.	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain the performance and control of stepper motors and their applications.	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Describe theory of operation and control of switched reluctance motor.	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explicate the theory of travelling magnetic field and applications of linear motors.	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the significance of electrical motors for traction drives.	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EEO09-INDUSTRIAL ELECTRICAL SYSTEMS (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the electrical wiring systems for residential, commercial, and industrial consumers, representing the systems with standard symbols and drawings, SLD.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Illustrate the residential and commercial electrical systems.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Design the residential and commercial lightning systems.	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain various components of industrial electrical systems.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Analyze and select the proper size of various electrical system components.	**3**	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191ME7O13-OPTIMIZATION TECHNIQUES (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Use advanced optimization techniques to solve real-life problems.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Formulate and solve various practical optimization problems in manufacturing and service organizations	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**

	CO Statements	POs												PSOs	
CO3	Use non-linear optimization techniques such as classical optimization methods, integer programming.	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	Apply unconstrained optimization and constrained non-linear programming and dynamic programming	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO5	Use Advance techniques to formulate and solve the optimization problems.	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
Course Code	**191ME7O14-ENERGY CONSERVATION (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the concepts of National Energy consumption, Energy Auditing, and its types	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain the improvement in efficiency of various electrical equipment's like capacitors and electric motors etc.	**1**	**2**	**1**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain the improvement in efficiency of various mechanical equipment like boilers, condensers, and steam lines etc.	**1**		**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	Explain the energy efficiency of components like pumps, blowers, fans, and various refrigeration equipment.	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO5	Apply the concepts of energy economics like payback period, internal rate of returns life cycle costing etc.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
Course Code	**191ME7O15-INTRODUCTION TO MATERIAL HANDLING SYSTEMS (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Demonstrate ability to complete successfully Forklift Certification to safely and operate effectively in the manufacturing environment.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**
CO2	Discuss proficiency in supply chain operations, utilizing appropriate methods to plan and implement processes necessary for the purchase and conveyance of goods in a timely and cost-effective manner.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
CO3	Summarize different types of material handling systems, advantages, and disadvantages and suggest the selection procedure for the material handling along with its specifications.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
CO4	Explain different techniques of Material handling systems like Automated Material handling Design Program, and Computerized material handling planning	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
CO5	Analyze different models of Material handling system and selection procedure of material handling on different function-oriented systems related with plant layout by which the minimization of the handling charges.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
Course Code	**191ME7O16-ROBOTICS (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the basic concepts, parts of robots and types of robots.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**

	CO Statements	POs												PSOs	
CO2	Identify various robot configuration and components,	-	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	Select appropriate actuators and sensors for a robot based on specific application	1	-	1	1	-	-	-	-	-	-	-	1	-	-
CO4	Apply DH Notation for Joint coordinates and world coordinators in Manipulator kinematics problems	-	2	-	2	-	-	-	-	-	-	-	1	-	-
CO5	Analyze the trajectory planning for a manipulator by avoiding Obstacles	-	2	2	2	-	-	-	-	-	-	-	1	-	-
Course Code	**191ME7O17-ENTREPRENEURSHIP DEVELOPMENT AND INCUBATION (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe the meaning and concepts of entrepreneurship development	-	-	-	-	-	1	2	-	-	2	-	-	-	-
CO2	Apply the business plan for preparation and evaluation of project.	-	-	-	-	-	1	2	-	-	2	-	-	-	-
CO3	Explain about Institutional Support to Entrepreneur and MSMEs	-	-	-	-	-	2	3	-	-	2	2	-	-	-
CO4	Explain about the Opportunities of Entrepreneurship Internationally.	-	-	-	-	-	2	3	-	-	2	2	-	-	-
CO5	Explain about Informaal Risk Capital, Venture capital and Social responsibility for entrepreneurship	-	-	-	-	-	1	2	-	-	2	-	-	-	-
Course Code	**191EC7O06-OVERVIEW OF DIGITAL SIGNAL PROCESSING (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze Discrete Time Signals and Systems.	2	2	1	1	-	-	-	-	-	-	-	-	-	-
CO2	Apply various DFT properties to evaluate the given sequence.	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO3	Make use of FFT Algorithms for the computation of DFT.	2	2	1	1	-	-	-	-	-	-	-	-	-	-
CO4	Design digital filters and implement with different structures.	2	2	1	1	-	-	-	-	-	-	-	-	-	-
CO5	Apply the knowledge of Multirate signal processing in the real time applications.	2	2	2	2	-	-	-	-	-	-	-	-	-	-
Course Code	**191EC7O07-BASICS OF VLSI DESIGN (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Demonstrate the fundamental concepts of basic MOS theory of fabrication process and the electrical properties of MOS and Bi-CMOS Circuits.	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Develop the stick and layout models of MOS circuits using design rules.	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Develop various CMOS logic structures using different MOS logic technologies.	2	2	1	2	-	-	-	-	-	-	-	-	-	-
CO4	Demonstrate the scaling factors in determining the characteristics and performance of MOS circuits in silicon.	2	3	1	1	-	-	-	-	-	-	-	-	-	-
CO5	Explain different architectural issues of subsystem design process and testability.	2	1	3	1	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs	
Course Code	**191EC7O08-MICRO ELECTRO MECHANICAL SYSTEMS (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Summarize the operation of micro systems, and their applications	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Classify the materials for micro system applications	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain the state-of-the-art for lithography and packaging techniques	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Extend the knowledge of basic approaches for various sensors and actuators design	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply the expertise on micro systems for interdisciplinary applications	**2**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EC7O09-IMAGE PROCESSING (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the concepts of digital image processing.	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Identify various image enhancement and image restoration techniques.	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Outline the color fundamentals and different color image processing methods.	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Utilize different morphological operators for image processing.	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Analyze different image segmentation techniques for image processing.	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191CS7O10-BIG DATA ANALYTICS (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate big data challenges in different domains including social media, transportation, finance, and medicine	**-**	**2**	**3**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Use various techniques for mining data stream	**-**	**2**	**2**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Demonstrate building blocks of Hadoop	**-**	**2**	**3**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Apply map reduce procedure to solve big data problems	**-**	**3**	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Make use of Pig & Hive Frameworks to work with big data.	**-**	**2**	**2**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO6	Explore various visualization techniques	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191CS7O11-MOBILE APPLICATION DEVELOPMENT (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Make use of Android Studio to develop Android application.	**3**	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Develop user Interfaces using Android platform.	**2**	**2**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Make Use of state information across important operating system events	**2**	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Apply Java programming concepts to Android application development	**3**	**2**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the concepts of GPS and mobile security	**2**	**2**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191CS7O12-DATA SCIENCE (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe Data Science and the skill sets needed to be a data scientist.	**2**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO2	Apply basic tools for visualizing Data& optimization.	**2**	**2**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Describe the process of reading and exploring data.	**2**	**2**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Implement various machine learning algorithms for analyzing various datasets.	**2**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Analyze datasets using clustering and recommender systems	**2**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
Course Code	**191IT7O06-MACHINE LEARNING (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Identify machine learning techniques suitable for a given problem	**2**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Evaluate the performance of an algorithm used in an ML model	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Apply probability approximations and frame ordered and unordered rules for given machine learning problem	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Design multilayer model using techniques like back propagation, quadratic programming solution.	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Design models using conditional probability, logistic regression, and distance-based techniques.	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191IT7O07-QUANTUM COMPUTING (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate fundamentals of quantum information processing	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain quantum basics and principles	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Apply various quantum algorithms for solving problems	**1**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Apply simple quantum algorithms and information channels in the quantum circuit model	**1**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Demonstrate Performance, Security and Scalability of quantum computing	**2**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO6	Analyze various quantum computing models and approaches	**1**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191IT7O08-BLOCK CHAIN TECHNOLOGIES (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Demonstrate the foundation of the Blockchain technology and understand the processes in payment and funding.	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO2	Identify the risks involved in building Blockchain applications.	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO3	Explain the legal implications using smart contracts.	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO4	Choose the present landscape of Blockchain implementations and Understand Crypto currency markets	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO5	Examine how to profit from trading crypto currencies.	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
Course Code	**191MI7O04-COMMUNICATION SYSTEM IN MINES (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Demonstrate types of signals and relation of time domain representation to frequency domain.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Apply signal concepts to continuous wave modulation.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Interpret the basic concepts of pulse modulation.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO4	Analyze the concepts of digital modulation techniques.	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Summarize different advanced communication networks.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191MI7O05-DRILLING & BLASTING (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Differentiate between explosives.	**1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Use blasting accessories along with monitoring and assessment.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Analyze problems associated with open cast blasting and mitigation.	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Analyze problems associated with underground blasting and mitigation.	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Assess blasting in metal mines.	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191PT7O05 -INTRODUCTION TO EARTH SCIENCES (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain various branches of earth sciences and universe	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Explain the origin of the universe and solar systems	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain the concepts of earth's magnetic field	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Illustrate the concepts of the plate tectonics	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO5	Explain the origin of the oceans, continents, mountains, and valleys	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
Course Code	**191PT7O06-BASIC CONCEPTS IN PETROLEUM DRILLING AND COMPLETIONS (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the types of drilling equipment and drilling hydraulics.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain about Casings, cement slurry design, directional drilling, and fishing, well control concepts.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain different types of wells, well testing, surface, and subsurface equipment.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain well completion equipment and different perforation techniques.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Illustrate different Subsurface circulating equipment and different types of packers	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191AG7O04 -GREENHOUSE TECHNOLOGY (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Design small scale polyhouse for drying purpose.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
CO2	Classify greenhouses based on construction materials.	**3**	**2**	**-**	**-**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain the scenario of protective cultivation around the globe and in India.	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Make use of non-chemical and chemical pesticides and growth regulators effectively in an environmentally responsible way.	**1**	**-**	**1**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Assess the basic production requirements and the knowledge of horticulture crop cultivation in greenhouse.	**3**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
Course Code	**191AG7O05 -FLOODS AND CONTROL MEASURES (Open Elective –III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Determine the peak rate of flood by rational, empirical methods and flood frequency by log normal, Gumbel's extreme value and log-Pearson type-III distribution methods.	**2**	**2**	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain importance of various flood routing techniques and flood control measures.	**3**	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Design of flood control projects and their cost economics estimation.	**3**	**2**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Estimate seepage through earth embankments and understand causes of failures.	**3**	**2**	**1**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Design of earthen dam and its stability analysis by different methods	**3**	**2**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE7L08 -POWER SYSTEMS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Determine sequence impedances of Transformer & Alternator.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**1**	**-**
CO2	Apply and measure A,B,C,D parameters of Short, Medium and Long Transmission lines	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**
CO3	Evaluate Active and Reactive power at various buses.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**
CO4	Explain the process to draw the locus diagrams	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**
CO5	Analyze the method to measure high currents	**1**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE4L09 -MICROPROCESSORS AND INTERFACING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply the fundamentals of 8086 for writing assembly level programs	**1**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Develop interfacing circuits with 8086	**1**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Relate the assembly level programming of microprocessors with microcontrollers.	**1**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Design interfacing circuits with 8051.	**2**	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Develop an assembly language program for specified application with 8051.	**1**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE7P03 -INTERNSHIP**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Conduct a technical survey to identify a real world engineering problem	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**2**	**-**
CO2	Analyze the industrial plant layout using technical expertise	**2**	**-**	**-**	**-**	**-**	**1**	**1**		**-**	**-**	**-**	**1**	**2**	**-**
CO3	Compare theoretical and real work environments in technical perspective	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**2**	**-**
CO4	Identify the challenges in the execution of operations	**1**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Execute the operations and report the results of assigned tasks using modern tools adhering to professional ethics	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**2**	**1**	**1**	**-**	**-**	**2**	**-**

	CO Statements	POs												PSOs	
Course Code	**191EE7P04 -PROJECT-PART 1**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Conduct technical survey to identify a real industrial problem to solve as a project work	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**2**	**-**
CO2	Estimate the resources & constraints in the process of execution	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**
CO3	Develop technical procedure of planning & scheduling to execute an identified project work in line with societal and environmental implications.	**-**	**2**	**-**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**-**
CO4	Estimate the costs of individual stages and overall cost of the project in light of optimum resources allocation	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**
CO5	Estimate the optimum project duration using quantitative techniques	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**
VIII SEM															
Course Code	**191EE8E19 -DIGITAL SIGNAL PROCESSING (Professional Elective – VI)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Analyze Discrete Time Signals and Systems.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Determine the frequency response of different systems using DTFT.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Translate the DFT approach into algorithm approach FFT.	**1**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Design IIR filters using different techniques.	**1**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Design FIR filters using different techniques.	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**2**	**-**
CO6	Analyze multirate DSP systems.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE8E20 -MACHINE LEARNING FOR ENGINEERING AND SCIENCE APPLICATIONS (Professional Elective – VI)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Domain Knowledge for Productive use of Machine Learning and Diversity of Data	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Demonstrate on Supervised and Computational Learning problems	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Analyze on Statistics in learning techniques and Logistic Regression	**2**	**1**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Illustrate the concept of Support Vector Machines	**2**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Design of Perceptron and Multilayer Perceptron Networks Algorithms	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191EE8E04 -NEURAL NETWORKS FOR SIGNAL PROCESSING (Professional Elective – VI)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Demonstrate different models of artificial neuron.	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO2	Explain various learning methods of ANN.	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Analyze the various feed forward neural networks and Hopfield Network	**1**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO4	Compare and Contrast Classical and Fuzzy sets.	**3**	**1**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Utilize different modules of Fuzzy Logic Controller for rule base and decision making Systems	**2**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**

	CO Statements	POs												PSOs	
CO6	Analyze the application of fuzzy logic control to real time systems	**1**	**2**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**191CE8O04 -INTEGRATED WASTE MANAGEMENT FOR A SMART CITY (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe generation rates, composition and issues of Solid waste	**2**	**1**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain about issues, collection, recovery, reuse, processing of Municipal solid waste	**2**	**1**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Illustrate the rules regarding MSW and current issues in Solid waste management	**1**	**2**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Interpret Construction and demolition waste management	**2**	**1**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Assess the issues related to E-waste generation and current management practices	**1**	**2**	**-**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE8O10 -FUNDAMENTALS OF ELECTRICAL ENGINEERING (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the concepts of basic circuits and basic laws for electrical networks.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Summarize the behaviour of RLC networks	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Analyse the network by obtaining solution through mesh and nodal analysis	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**			
CO4	Determine resonance frequency and Q factor of an AC Circuit.	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the operation of the Transformer	**3**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO6	Explain the operation of the Induction motors and DC Machines	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE8O11 -BASIC ELECTRIC CIRCUITS (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain various theories of electrical networks	**3**	**2**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain the importance of three phase circuits with Star& Delta connected balanced and unbalanced loads.	**2**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Illustrate various electrical networks by using principles of network theorems	**2**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Obtain the various network parameters for the given two port networks	**3**	**2**	**1**		**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Analyze the transient behavior of electrical networks for DC excitations	**2**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE8012 -ELECTRICAL MACHINES (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Evaluate the effects of armature reaction in dc machines	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Determine the torque production mechanism and control the speed of dc motors.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO3	Determine the voltage regulation and efficiency of single-phase transformers.	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Explain the operation and performance of three phase induction motor.	**1**	**1**	**2**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply methods of staring and correction of power factor with synchronous motor	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE8013 -POWER ELECTRONICS (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the different types of power semiconductor devices and their Characteristics.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Distinguish between 1ϕ and 3ϕ phase-controlled converters.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Analyze the operation of AC voltage controllers and cycloconverters.	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**			
CO4	Analyze the operation of different types of DC-DC converters.	**3**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Illustrate the operation of Inverters and application of PWM techniques.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE8014 -NON CONVENTIONAL ENERGY SOURCES (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the prospects of renewable energy and solar energy.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Apply the knowledge of solar principles for its applications.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Discuss the working principles of wind and Bio-mass energy resources.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Illustrate the techniques and conversion principles of Geothermal and tidal energy resources.	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the concept of Direct energy conversion	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191ME8O18 -FABRICATION PROCESSES (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the fundamentals of Casting and Casting Processes.	**-**	**2**	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Explain the basics of Welding and types of Welding processes.	**-**	**2**	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	Explain the various technological approaches applied to the different hot working and cold working operations.	**1**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	Explain the concept of various Extrusion processes and forces in extrusion.	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO5	Explain the concept of Forging processes, Forging defects and forces in forging operations.	**2**	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
Course Code	**191ME8O19 -SMART MATERIALS (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe and characterize mechanical behaviour of smart materials.	**2**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Select materials for sensor applications based on required properties.	**2**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**

	CO Statements	POs												PSOs	
CO3	Characterize interaction between smart materials and simple structures in actuation and sensing.	**2**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	Describe and characterize novel functions of smart materials using structure-property relationships.	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO5	Demonstrate the functions of smart structures.	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
Course Code	**191EC8O10-MICRO ELECTRO MECHANICAL SYSTEMS (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Summarize the operation of micro systems, and their applications	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Classify the materials for micro system applications	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain the state-of-the-art for lithography and packaging techniques	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Extend the knowledge of basic approaches for various sensors and actuators design	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Apply the experience on micro systems for interdisciplinary applications	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EC8O11-BASIC ELECTRONIC CIRCUITS (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain Superposition theorem and Phasors.	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Interpret about BJT and BJT Amplifier.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Develop Operations performed by OP-AMP circuits.	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Develop Counters and Registers using Flip-flops.	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Contrast Analog-to-digital and Digital-to -analog conversions.	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EC8O12-PRINCIPLES OF COMMUNICATIONS (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate Analog communication systems using amplitude modulation and demodulation.	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Demonstrate Analog communication systems using angle modulation and demodulation.	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	Analyze various pulse analog and pulse digital modulation techniques.	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	Explain the process of reproduction of baseband signal.	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO5	Compare and contrast various Multiplexing techniques used in Communication systems.	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
Course Code	**191EC8O13-ELECTRONIC INSTRUMENTATION (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the fundamental characteristics of different Instruments	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Compare different signal generators and function generators in terms of their performance	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO3	Distinguish the operation of various types of analog and digital meters.	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Interpret the working of various potentiometers and AC bridges	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Compare various data acquisition systems for analog to digital conversion and digital to analog conversion.	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EC8O14-DIGITAL IMAGE PROCESSING (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the concepts of digital image processing.	**2**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Utilize various image transforms techniques for image analysis.	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Identify the image enhancement and restoration methods.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Utilize color fundamentals and different color image processing methods.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain different image segmentation techniques and image morphological operators for image processing.	**2**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191CS8O13-CYBER SECURITY (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Illustrate cyber crime fundamentals.	**2**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Distinguish type of tools and methods used in cyber crimes.	**3**	**2**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Interpret the nature and effect of cyber crime in society and forensics fundamentals.	**2**	**1**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Utilize the history of Cyber Crimesand Liturgical Procedures to analyze the real time current scenarios.	**3**	**2**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the importance of cyber security.	**2**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191CS8O14-DATA SCIENCE (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Describe Data Science and the skill sets needed to be a data scientist.	**-**	**3**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO2	Apply basic tools for visualizing Data& optimization.	**-**	**2**	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO3	Describe the process of reading and exploring data.	**-**	**2**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO4	Implement various machine learning algorithms for analyzing various datasets.	**-**	**2**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO5	Analyze datasets using clustering and recommender systems	**-**	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
Course Code	**191IT8O12-GAME PROGRAMMING (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the concepts of Game design and development.	**-**	**1**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Design the processes and use mechanics for game development.	**-**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain the Core architectures of Game Programming.	**-**	**1**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Make use of Game programming platforms, frame works and engines to develop a game.	**-**	**2**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Create interactive Games.	**-**	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
Course Code	**191IT8O11-CLOUD COMPUTING (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Interpret the key dimensions of the challenge of Cloud Computing	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Identify the economics, financial, and technological implications for selecting cloud computing for own organization	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Demonstrate the basic concepts of virtualization and implementation levels of Virtualization	**2**	-	**1**	-	-	-	-	-	-	-	-	**1**	-	-
CO4	Classify various storage systems and models in cloud computing environment.	**2**	-	**1**	-	-	-	-	-	-	-	-	**2**	-	-
CO5	Analyze the Cloud Security risks and Mechanisms.	**2**	-	**1**	-	-	-	-	-	-	-	-		-	-
CO6	Utilize cloud environment platform and tools for actively initiating, installing and developing cloud-based applications	**2**	-	**1**	-	**1**	-	-	-	-	-	-	**1**	-	-
Course Code	**191CS8O16-AR/VR (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain VR, its environments and hardware technologies for 3D interfaces.	**3**	**1**	**1**	-	-	-	-	-	-	-	-	-	-	-
CO2	Summarize 3D user interface input hardware in VR environment.	**3**	**2**	**1**	-	-	-	-	-	-	-	-	-	-	-
CO3	Make use of software technologies to build VR applications.	**2**	**1**	**2**	-	**3**	-	-	-	-	-	-	-	-	-
CO4	Develop 3D user interfaces using 3D interaction techniques.	**2**	**1**	**3**	-	**2**	-	-	-	-	-	-	-	-	-
CO5	Describe the fundamental concepts of AR	**2**	**3**	**1**	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191IT8O09-DEEP LEARNING (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Demonstrate the mathematical foundation of neural network	**3**	**2**	-	**2**	**2**	-	-	-	-	-	-	-	-	-
CO2	Explain various machine learning algorithms and their importance for data analysis.	**3**	**2**	-	**2**	**2**	-	-	-	-	-	-	-	-	-
CO3	Illustrate the challenges and optimization strategies of deep neural network.	**2**	**2**	-	**3**	**1**	-	-	-	-	-	-	-	-	-
CO4	Build a convolutional neural network using different activation functions.	**2**	**3**	-	**2**	**1**	-	-	-	-	-	-	-	-	-
CO5	Build and train RNN and LSTMs using sequence modelling.	**2**	**3**	-	**2**	**1**	-	-	-	-	-	-	-	-	-
Course Code	**191IT8O10-BLOCK CHAIN TECHNOLOGIES (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Demonstrate the foundation of the Blockchain technology and understand the processes in payment and funding.	**2**	**2**	**1**	-	-	-	-	-	-	-	-	**2**	-	-
CO2	Identify the risks involved in building Blockchain applications.	**2**	**3**	**1**	-	-	-	-	-	-	-	-	**2**	-	-
CO3	Review of legal implications using smart contracts.	**2**	**2**	**1**	-	-	-	-	-	-	-	-	**2**	-	-
CO4	Analyze the present landscape of Blockchain implementations to understand Crypto currency markets.	**2**	**2**	**1**	-	-	-	-	-	-	-	-	**2**	-	-
CO5	Examine how to profit from trading crypto currencies.	**2**	**2**	**1**	-	-	-	-	-	-	-	-	**2**	-	-

	CO Statements	POs												PSOs	
Course Code	**191PT8O07-CHEMICAL PROCESS SAFETY (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the Process Safety, Accidents and Loss statistics, Toxicological Studies	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Explain the fire and explosion and its prevention	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO3	Explain the Source model and dispersion, Relief sizing	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO4	Illustrate Hazard Identification, HAZOP analysis, Risk Assessment	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO5	Explain the Process of Accident Investigation, Reliability Engineering, Economics of loss prevention	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
Course Code	**191PT8O08-MECHANICAL UNIT OPERATION (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Explain the fundamentals of Mechanical unit operations	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Explain storage of bulk solids and flow measurements.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Explain the Flow past immersed solid objects and motion of particles through fluids, beds of solids	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Apply Filtration, flow through packed and fluidized beds, cross flow filtration	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Explain the Gravity sedimentation, centrifugal separations, floatation	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191AG8O06-APPLICATIONS OF RS AND GIS IN LAND AND WATER RESOURCES MANAGEMENT (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Apply the knowledge of RS and GIS in land and water resources management.	**1**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO2	Illustrate the concept DEM hydro-processing for watershed characterization.	**1**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Demonstrate the digital image processing techniques using ERDAS/ARC GIS software.	**1**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Apply the Geospatial techniques in irrigation water management.	**1**	**-**	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
CO5	Apply RS & GIS inputs for site suitability for various water related projects.	**1**	**1**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191AG8O07-PLASTIC APPLICATIONS IN AGRICULTURE (Open Elective –IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Assess the types and quality of plastics used in soil and water conservation	**2**	**1**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**
CO2	Design, estimation and laying of plastic films in lining of canal, reservoir and water harvesting ponds	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Design, estimation and installation of green, poly and shade net houses, low tunnels etc.	**3**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs												PSOs	
CO4	Explain plastics application in drying, preservation, handling and storage of agricultural produce.	**3**	**1**	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Outline plastic usage due to hands on experience through visit to a greenhouse and farmer's field.	**3**	**1**	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**191EE8P05:Project Part-II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	Demonstrate technical skills of data collection and data analysis adhering to professional ethics	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**1**	**2**	**-**
CO2	Design the solutions for the critical problem areas marked in data analysis in the light of environmental and societal adherence	**-**	**-**	**3**	**2**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Build a team of people to work together and communicate well in the critical stages of project progress.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**	**1**	**2**	**-**
CO4	Use modern tools to derive conclusions of the project work effectively	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**2**	**1**	**1**	**2**	**-**
CO5	Demonstrate the results of the project work as a functional product prototype/application/analytical solution for a specified operation	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**2**	**-**