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 Agricultural Engineering

B.Tech - AR19 - Course Articulation Matrix

Note: Correlation Levels are 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**	**PSO3**
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**	**PSO3**
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	**191BS1T02 - Engineering Physics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the basic concepts of crystal structure and X-ray diffraction Techniques.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	

	CO Statements	POs												PSOs		
CO2	Apply the knowledge of acoustics to improve acoustic quality of concert halls and understand the concepts of flaw detection techniques using ultrasonics.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	
CO3	Apply the structure- property relationship exhibited by solid materials within the elastic limit.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	
CO4	Explain thebasic concepts of LASERs along with its Engineering applications andfamiliarize with types of sensors for various engineering applications	2	1	-	-	-	-	-	-	-	-	-	-	-	-	
CO5	Explain about magnetic and dielectric properties of different materials.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	
Course Code	**191ES1T01 - Programming for Problem Solving Using C**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Illustrate the fundamental concepts of computers and basics of computer programming	2	3	-	-	1	-	-	-	-	-	-	2	-	-	-
CO2	Make use of control structures and arrays in solving complex problems.	3	2	-	-	2	-	-	-	-	-	-	2	-	-	-
CO3	Develop modular program aspects and strings fundamentals.	2	2	3	-	-	-	-	-	-	-	-	1	-	-	-
CO4	Demonstrate the ideas of pointers usage.	2	3	-	-	2	-	-	-	-	-	-	2	-	-	-
CO5	Solve real world problems using the concept of structures, unions and File operations.	3	2	2	-	-	-	-	-	-	-	-	2	-	-	-
Course Code	**191HS1L01 - Communicative English Lab-I**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	**191BS1L01 - Engineering Physics Lab**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Determine the rigidity and young's modulus to understand material properties	3	2	-	-	-	-	-	-	2	-	-	1	-	-	-
CO2	Determine Acceleration due to Gravity, Radius of Gyration and spring constant by oscillatory mechanics.	3	2	-	-	-	-	-	-	2	-	-	1	-	-	-
CO3	Find the strength of the magnetic field.	2	1	-	-	-	-	-	-	2	-	-	1	-	-	-

	CO Statements	POs												PSOs		
CO4	Determine wave length of unknown source, particle size using lasers.	3	2	-	-	-	-	-	-	2	-	-	1	-	-	-
CO5	Determination of velocity of sound, moment of inertia.	3	2	-	-	-	-	-	-	2	-	-	1	-	-	-
Course Code	**191ES1L01 - PROGRAMMING FOR PROBLEM SOLVING USING C LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Develop the basic programs in C and draw the flowcharts using Raptor.	2	1	-	-	3	-	-	-	-	2	-	-	-	-	-
CO2	Make use of conditional and iterative statements to solve real time scenarios in C.	3	2	-	-	-	-	-	-	-	-	1	2	-	-	-
CO3	Apply the concept of arrays, modularity and strings to handle complex problems.	3	2	-	-	-	-	-	-	-	-	1	2	-	-	-
CO4	Apply the dynamic memory allocation functions using pointers.	2	3	-	-	-	-	-	-	-	2	-	1	-	-	-
CO5	Develop programs using structures, and Files.	3	2	-	-	-	-	-	-	-	-	2	2	-	-	-
Course Code	**191ES1L02 - BASIC ENGINEERING WORKSHOP**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Prepare carpentry joints using carpentry tools.	1	-	-	-	-	-	-	-	1	-	-	1	1	-	-
CO2	Develop various fitting joints using fitting tools.	1	-	-	-	-	-	-	-	1	-	-	1	1	-	-
CO3	Develop component drawings for making the sheet metal models.	1	-	-	-	-	-	-	-	1	-	-	1	1	-	-
CO4	Prepare sheet metal models using drawings and tin smithy tools.	1	-	-	-	-	-	-	-	1	-	-	1	1	-	-
CO5	Experiment with the various house wiring connections.	1	-	-	-	-	-	-	-	1	-	-	1	1	-	-
Course Code	**191MC1A01 - Environmental Science**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191MC1A02 - Constitution of India**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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 i.e., 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 self-government.	-	-	-	-	-	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 EQUATIONS AND VECTOR CALCULUS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-	-
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	**191BS2T06 - Chemistry of Materials**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Compare the quality of drinking water and problems associated with hardwater.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Explain the fundamentals and applications of Electrochemical energy systems.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Explain fundamentals and applications of polymers and building materials.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Explain the fundamentals and controlling methods of corrosion.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Explain the properties and applications of nano materials, conductors, Semiconductors and Super conductors.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191ES2T02 - Engineering Graphics and Design**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Make use of fundamentals of Engineering Drawing to sketch basic curves, conic sections, cycloid, epicycloid, hypocycloid and involute.	1	-	-	-	-	-	-	-	-	1	-	1	1	-	-
CO2	Apply the principles of orthographic projections for points, lines and planes.	1	-	-	-	-	-	-	-	-	1	-	1	1	-	-
CO3	Apply the principles of orthographic projections for solids.	1	-	-	-	-	-	-	-	-	1	-	1	1	-	-
CO4	Apply the AutoCAD software for the orthographic projection of the machine parts.	1	-	-	-	3	-	-	-	-	1	-	1	1	-	-
CO5	Apply the AutoCAD software for the isometric projection of the machine parts.	1	-	-	-	3	-	-	-	-	1	-	1	1	-	-
Course Code	**191ES2T03 - Essential Electrical and Electronics Engineering**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Construct simple electrical circuits using basic laws.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Explain the constructional features of DC Machines and working.	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Examine the performance of single phase transformer.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Illustrate the principle of AC rotating machines.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Analyze the device structure, operation and application of diode and BJT.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191ES2T04 - Engineering Mechanics**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Determine the resultant force and moment for a given force system.	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	Solve the member forces in trusses.	1	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	Apply concept of Virtual work to find the work done by force and couple.	1	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	Solve the centre of gravity and moment of inertia for various geometric shapes	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO5	Determine the displacement, velocity and acceleration relations in dynamic systems	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO6	Apply the concepts of kinematics, kinetics, work - energy and impulse - momentum methods to particle motion.	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
Course Code	**191HS2L02 - Communicative English Lab-II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Make effective use of Body language in all situations and contexts to enhance effective communication in all aspects.	-	-	-	-	-	-	-	-	-	3	-	2	-	-	-

	CO Statements	POs												PSOs		
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	**191BS2L04 - Engineering Chemistry Lab**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Demonstrate Complexometric titrations by volumetric analysis.	2	-	-	-	-	-	-	-	1	1	-	1	-	-	-
CO2	Demonstrate Acid – Base titrations by instrumental analysis.	2	-	-	-	-	-	-	-	1	1	-	1	-	-	-
CO3	Estimate Vitamin C using volumetric analysis.	2	-	-	-	-	-	-	-	1	1	-	1	-	-	-
CO4	Prepare polymer like Bakelite.	2	-	-	-	-	-	-	-	1	1	-	1	-	-	-
CO5	Prepare alternative fuel like Bio-Diesel.	2	-	-	-	-	-	1	-	1	1	-	1	-	-	-
Course Code	**191ES2L03 - Essential Electrical and Electronics Engineering Lab**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the electrical networks using network theorems.	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	Analyze the performance of AC and DC Machines.	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Estimate the performance of 1-phase transformer.	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	Explain diode characteristics and its applications	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Explain the simulation of diode and transistor.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191ES2L14 - AGRICULTURAL ENGINEERING WORKSHOP**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Develop components by using lathe machine.	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	Practice on different types welding joints.	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO3	Experiment with different drilling practices.	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO4	Demonstrate different milling practices.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Create different types of shape using moulding and casting.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191PR2P01 - ENGINEERING EXPLORATION PROJECT**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the surrounding environment and identify a design challenge.	1	1	1	-	-	-	-	-	-	-	-	1	-	-	-
CO2	Foster team collaboration, find inspiration from the environment and learn how to identify problems.	-	1	1	-	-	-	-	-	1	1	-	-	-	-	-
CO3	Encourage exploration to process the Design Challenge, empathize & brainstorm the users effectively.	-	-	1	1	-	1	1	-	-	-	-	-	-	-	-
CO4	Build effective prototypes as tangible models to use as communication tools.	-	-	-	1	-	-	-	-	1	1	-	-	-	-	-
CO5	Test the prototype for design challenge and submit the report adhering to professional ethics.	-	-	-	-	1	-	-	1	-	1	1	-	-	-	-
III SEM																
Course Code	**191MC3A03 - EMPLOYABILITY SKILLS – I**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-
Course Code	**191BS3T11 - INTEGRAL TRANSFORMS AND APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Compute the Fourier series of a given function.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Compute the Fourier transforms of various certain functions.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Compute Laplace transform of various functions.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Apply Laplace transform to solve initial value problems.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Solve one dimensional heat equation, wave equation and two dimensional Laplace equation.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191ES3T10 - INTERNET OF THINGS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Identify the application areas of IoT.	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-
CO2	Illustrate revolution of Internet in Mobile Devices, Cloud & Sensor Networks.	2	-	-	-	1	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
CO3	Identify communication protocols used in IoT.	3	-	-	-	1	-	-	-	-	-	-	-	-	-	-
CO4	Make use of python programming to implement Internet of Things.	3	2	-	1	1	-	-	-	-	-	-	-	-	-	-
CO5	Design IoT applications using Raspberry Pi.	3	1	-	1	1	-	-	-	-	-	-	-	-	-	-
Course Code	**191HS3T02 - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the Managerial Economic concepts for decision making and forward planning.	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-
CO2	Illustrate the law of demand and its exceptions, to use different forecasting methods for predicting demand for various products and services.	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO3	Identify the cost behavior, costs useful for managerial decision making and Break Even Point (BEP) of an enterprise.	-	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO4	Outline the different types of business organizations along with basic knowledge on business cycle.	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-
CO5	Make use of the process & principles of accounting and prepare Journal, Ledger, Trial Balance, Trading A/c., Profit & Loss A/c. and Balance Sheet of an enterprise.	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-
CO6	Utilize various techniques on investment project proposals with the help of capital budgeting techniques for decision making.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Course Code	**191AG3T01 - PRINCIPLES OF AGRONOMY AND SOIL SCIENCE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Classify crops based on origin, agronomic, ontogeny, season and special purpose.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	Explain about tillage, types of tillage, Methods of sowing, weed management, and problems of dryland farming.	-	2	3	-	-	-	-	-	-	-	-	2	-	2	-
CO3	Explain about the mode of formation of rocks, minerals and processes of weathering and soil forming.	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-
CO4	Explain about importance of soil structure, soil air, soil temperature and soil colour.	1	2	-	-	-	-	-	-	-	-	-	1	-	2	-
CO5	Explain the role of beneficial organisms in enriching the soil, availability of plant nutrients and problematic soils.	1	-	3	-	-	-	-	-	-	-	-	2	-	3	-
Course Code	**191AG3T02 - FLUID MECHANICS AND OPEN CHANNEL HYDRAULICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Interpret the various properties of fluids and their influence on fluid motion.	2	1	-	-	-	-	2	-	-	-	-	-	-	2	-
CO2	Solve problems on pressure measurement, hydrostatic forces on submerged bodies and continuity equation.	3	1	-	-	-	-	2	-	-	-	-	-	-	2	-
CO3	Apply the knowledge of Dynamics to Solve problems on Bernoulli's equation and its applications and also thickness of boundary layer.	2	1	-	-	-	-	-	-	-	-	-	-	-	2	-
CO4	Solve problems on meta centric heights of floating bodies and measurement of discharge in closed and open channels.	3	2	-	-	-	-	2	-	-	-	-	-	-	2	-

	CO Statements	POs												PSOs		
CO5	Determine losses and discharges in simple and compound pipes.	2	2	-	-	-	-	2	-	-	-	-	-	-	2	-
CO6	Solve the problems on economical sections, critical depth and specific energy for various channels.	1	2	-	-	-	-	3	-	-	-	-	-	-	2	-
Course Code	**191AG3T03 - SURVEYING AND LEVELING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Use the linear and angular distances using chain, compass instruments.	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
CO2	Make use of appropriate techniques in order to estimate the level of existing ground.	3	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO3	Solve height and distances problems using Theodolite and Tachometry.	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
CO4	Utilize various advanced surveying equipment for large projects.	3	2	2	-	-	-	-	-	-	-	-	-	-	1	-
CO5	Determine regular, irregular areas and volumes of given field.	3	2	1	-	-	-	-	-	-	-	-	-	-	2	-
Course Code	**191AG3L01 - PRINCIPLES OF AGRONOMY AND SOIL SCIENCE LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Describe soil profile and collection of soil samples.	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-
CO2	Determine pH and EC using standard methods.	2	2	-	1	-	-	-	-	-	-	-	-	-	3	-
CO3	Make use of different implements for practicing ploughing, seed bed preparation, sowing, weeding and fertilizer application.	1	1	-	-	-	-	-	-	-	-	-	-	-	3	-
CO4	Identify different nutrient deficiency symptoms in the crops.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Measure infiltration and evaporation rate in soil using standard procedure.	-	-	-	-	2	-	-	-	-	-	-	-	-	2	-
CO6	Classify different crops, manures and fertilizers.	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191AG3L02 - FLUID MECHANICS AND OPEN CHANNEL HYDRAULICS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain Fluid Properties.	2	1	-	-	2	1	-	-	-	-	-	-	-	1	-
CO2	Illustrate Flow Measuring Devices used in pipes, channels and Tanks.	2	1	-	-	3	2	-	-	-	-	-	-	-	2	-
CO3	Determine major and minor losses in pipes.	3	2	-	-	2	-	-	-	-	-	-	-	-	1	-
CO4	Demonstrate the flow behavior in open channels.	2	2	-	-	2	1	-	-	-	-	-	-	-	3	-
CO5	Examine the performance characteristics of pumps.	3	3	-	-	2	2	-	-	-	-	-	-	-	3	-

	CO Statements	POs												PSOs		
Course Code	**191AG3L03 - SURVEYING AND LEVELING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	List and handle different surveying instruments.	2	1	-	-	-	1	-	-	-	-	-	-	-	1	-
CO2	Estimate the levels of existing ground and prepare contour plan.	3	2	1	-	-	2	-	-	-	-	-	-	-	1	-
CO3	Develop the plan or map showing the ground features from data obtained by surveying.	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
CO4	Make use of advanced surveying equipments to avoid manual errors.	3	2	2	-	-	1	-	-	-	-	-	-	-	1	-
CO5	Identify layout curves for roads and computation of areas and volumes.	3	2	1	-	-	2	-	-	-	-	-	-	-	1	-
Course Code	**191MC3A03 - EMPLOYABILITY SKILLS – I**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-
Course Code	**191MC3A04 - ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	**191BS4T16 - NUMERICAL METHODS & STATISTICAL TECHNIQUES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Apply numerical methods to solve equations and interpolation of polynomials.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
CO2	Apply numerical methods to solve initial value problems and problems involving integration.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Apply discrete and continuous probability distributions.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Compute the components of a classical hypothesis test.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Apply the statistical inferential methods based on small and large sampling tests.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191AG4T04 - THERMODYNAMICS AND REFRIGERATION SYSTEMS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the basic concepts and laws of thermodynamics.	3	2	1	-	-	2	-	-	-	-	-	-	-	-	3
CO2	Discuss the working principle and performance of 4-stroke and 2-stroke Diesel and Petrol Engines.	3	2	-	-	-	2	-	-	-	-	-	-	-	-	3
CO3	Explain the various refrigeration cycles, their applications and performance.	3	1	-	-	-	2	1	-	-	-	-	-	-	-	3
CO4	Distinguish working principles various refrigeration systems.	3	1	-	-	-	-	-	-	-	-	-	-	-	-	3
CO5	Discuss various psychometric processes, their properties and storage.	3	2	1	-	-	2	-	-	-	-	-	-	-	-	3
Course Code	**191AG4T05 - FARM POWER AND TRACTOR SYSTEMS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the various energy sources of farm power and types I.C. engines.	3	1	-	-	-	-	-	-	-	-	2	2	1	-	-
CO2	Explain various I. C. engine systems with their construction details.	2	3	-	-	-	-	-	-	-	-	1	1	2	-	-
CO3	Identify different tractor systems with their functions and working principles.	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Explain traction theory, center of gravity of tractor and mechanics of tractor chassis.	3	2	-	1	-	1	-	-	-	-	-	-	3	-	-
CO5	Apply various testing procedures for testing of tractor and engine performance.	2	2	-	-	3	-	-	-	-	-	-	1	1	-	-
Course Code	**191AG4T06 - GROUNDWATER HYDROLOGY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain scenario, types and properties of various water bearing formations.	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	Select appropriate method for exploration and replenishment of ground water.	-	2	-	-	3	-	1	-	-	-	-	-	-	3	-
CO3	Explain design, development and construction of wells.	-	-	3	2	-	-	-	-	-	-	-	-	-	3	-
CO4	Determine the aquifer properties under unsteady state and steady state subsurface flow conditions.	1	-	2	-	-	-	-	-	-	-	-	-	-	2	-

	CO Statements	POs												PSOs		
CO5	Explain the types, working principles with components and diagrammatic representation of various water lifting devices and pumps.	1	1	-	-	-	-	-	-	-	-	-	-	-	2	-
CO6	Select the pump for irrigation by considering performance characteristics, installation and maintenance.	-	3	1	-	3	-	-	-	-	-	-	1	-	-	-
Course Code	**191AG4T07 - HEAT AND MASS TRANSFER**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the basic modes of heat transfer and the principles of conductive heat transfer for different bodies.	3	2	1	1	-	-	-	-	-	-	-	-	-	-	1
CO2	Interpret forced and free convection heat transfer mechanism.	3	2	1	1	-	-	-	-	-	-	-	-	-	-	2
CO3	Determine the heat transfer performance of the extended surfaces.	3	2	2	2	-	-	-	-	-	-	-	-	-	-	3
CO4	Apply LMTD & NTU for designing of heat exchangers.	3	2	1	1	-	-	-	-	-	-	-	-	-	-	2
CO5	Explain the principles of radiation heat transfer and mass transfer.	3	1	-	2	-	-	-	-	-	-	-	-	-	-	2
CO6	Explain the basic modes of heat transfer and the principles of conductive heat transfer for different bodies.	3	2	1	1	-	-	-	-	-	-	-	-	-	-	1
Course Code	**191AG4T08 - SURFACE WATER HYDROLOGY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Calculate the mean areal precipitation using various methods.	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-
CO2	Explain rainfall characteristics and measuring devices in India.	2	1	-	-	2	-	-	-	-	-	-	-	-	2	-
CO3	Explain runoff and stream flow measurement methods.	2	1	-	-	2	-	-	-	-	-	-	-	-	2	-
CO4	Estimate the discharge volume of runoff using hydrographs and unit hydrographs.	2	-	-	2	3	-	-	-	-	-	-	-	-	2	-
CO5	Apply various hydrograph techniques to convert multiple duration graph into single duration vice-versa.	1	2	-	-	3	-	-	-	-	-	-	-	-	2	-
CO6	Plan a reservoir using flood routing techniques for management of natural resources.	2	-	2	-	3	-	-	-	-	-	-	2	-	3	-
Course Code	**191AG4L04 - GROUND WATER HYDROLOGY LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain about different equipments used in drilling.	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-
CO2	Estimate specific yield and specific retention.	1	2	-	-	3	-	-	-	-	-	-	-	-	2	-
CO3	Estimate aquifer parameters by Theis, Coopers-Jacob, Chow's and Theis Recovery methods.	1	-	1	1	-	-	-	-	-	-	-	-	-	3	-

	CO Statements	POs												PSOs		
CO4	Explain testing of well screen, well losses, well efficiency and artificial groundwater recharge structures.	1	-	1	-	-	-	-	-	-	-	-	-	-	3	-
CO5	Select suitable pumps for various field conditions.	1	1	-	-	-	-	-	-	-	-	-	-	-	2	-
Course Code	**191AG4L05 - FARM POWER AND TRACTOR SYSTEMS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Demonstrate various makes and models of 4-wheel and 2-wheel drive tractors with their controls.	3	-	-	-	-	-	-	-	1	1	-	2	1	-	-
CO2	Apply safety rules in practice of tractor driving.	3	-	-	-	-	-	-	-	-	-	-	1	2	-	-
CO3	Explain maintenance of various tractors and their systems.	2	3	-	2	-	-	-	-	-	-	1	-	3	-	-
CO4	Identify troubles in all systems of tractors and also their remedial measures.	2	3	2	1	-	-	-	-	-	-	-	-	3	-	-
CO5	Measure the power required to operate an implement.	3	-	-	-	1	-	-	-	-	-	-	-	2	-	-
Course Code	**191AG4L06 - HEAT AND MASS TRANSFER LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Determine the thermal conductivity of various materials.	3	2	-	1	-	-	-	-	-	-	-	-	-	-	2
CO2	Determine the convective heat transfer coefficient in various conditions.	3	2	-	1	-	-	-	-	-	1	-	-	-	-	2
CO3	Evaluate the performance of heat exchanger in various arrangements.	3	2	-	-	-	-	-	-	-	1	-	-	-	-	2
CO4	Calculate the heat transfer through a pin-fin.	3	2	-	1	-	-	-	-	-	1	-	-	-	-	1
CO5	Compute the emissivity of different bodies and drying of agricultural commodities.	3	2	-	1	-	-	-	-	-	1	-	-	-	-	2
Course Code	**191MC4A05 - EMPLOYABILITY SKILLS– II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191MC4A06 - BIOLOGY FOR ENGINEERS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	**191AG5T09 - STRENGTH OF MATERIALS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the behavior of basic materials under the influence of different external loading conditions and the support conditions.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Develop the diagrams indicating the variation of the key performance features like bending moment and shear forces.	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Analyse the deflections in beams under various loading and support conditions.	3	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	Solve the load carrying capacity of columns using different empirical formulae.	2	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO5	Design of riveted and welded joints.	2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191AG5T10 - THEORY AND DESIGN OF AGRICULTURAL MACHINERY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the inversions of slider crank chain.	1	1	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	Determine the velocity ratio of power transmission devices by analytical methods.	2	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	Explain the functions and applications of flywheel and clutch in a mechanical system.	1	1	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Design shafts, springs, keys and couplings under varying load conditions.	1	1	2	-	-	-	-	-	-	-	-	-	2	-	-
CO5	Find the balancing mass in a system of rotating masses in a single plane and different planes.	1	2	-	-	-	-	-	-	-	-	-	-	1	-	-

	CO Statements	POs												PSOs		
Course Code	**191AG5T11 - AGRICULTURAL PROCESS ENGINEERING AND FOOD QUALITY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the functions of various unit operations and working of size reduction equipments for processing of fibrous and dry size reduction in processing of agriculture produce.	3	1	1	1	-	-	-	-	-	-	-	-	-	-	3
CO2	Explain the design and working of mixing equipments for powder, high and low viscosity liquids.	3	1	2	2	-	-	-	-	-	-	-	-	-	-	3
CO3	Classify separator equipment based on physical characteristics of grains.	3	2	1	2	-	-	-	-	-	-	-	-	-	-	3
CO4	Identify various methods for determining moisture content, EMC and drying process.	3	1	1	1	-	-	-	-	-	-	-	-	-	-	2
CO5	Explain the importance, design and working of milling and material handling devices.	3	2	2	2	-	-	-	-	-	-	-	-	-	-	3
CO6	Explain food quality control, food laws, food standards and HACCP.	3	2	-	-	-	2	-	2	-	-	-	-	-	-	3
Course Code	**191AG5E02 - MECHANICAL MEASUREMENTS AND INSTRUMENTATION (PROFESSIONAL ELECTIVE - I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the methods of measurement system, instruments and errors in measurements.	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	Differentiate various mechanical, electrical and electro-mechanical type pressure measuring transducers.	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Analyze the concepts of strain, force and torque measurements.	2	1	-	-	-	-	-	-	-	-	-	-	1	-	-
CO4	Categorize the methods and principles of temperature measuring transducers.	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Differentiate different instruments for measuring sound, speed and motion.	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191AG5E03 THEORY OF STRUCTURES (PROFESSIONAL ELECTIVE - I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Analysis and design of singly and doubly reinforced beams.	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
CO2	Design the structures subjected to shear, bond and torsion.	3	2	2	-	-	-	-	-	-	-	-	-	-	1	-
CO3	Determine the reinforcement details of flexural members & axially loaded columns.	3	2	2	-	-	-	-	-	-	-	-	-	-	1	-
CO4	Design of one-way and two-way slabs.	2	2	2	-	-	-	-	-	-	-	-	-	-	1	-
CO5	Design of isolated footings.	2	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO6	Solve problems on retaining walls under stability conditions.	3	2	-	-	-	-	-	-	-	-	-	-	-	1	-

	CO Statements	POs												PSOs		
Course Code	**191AG5E01 ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS (PROFESSIONAL ELECTIVE - I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Calculate the basic engineering properties of a biological material.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
CO2	Analyze the flow behavior of biological materials and force deformation.	3	1	1	-	1	-	-	-	-	-	-	-	-	-	3
CO3	Analyze the Maxwell and Kelvin model equations in the rheology for important biological materials.	3	2	2	2	-	-	-	-	-	-	-	-	-	-	3
CO4	Explain the applications of frictional and aerodynamic properties in the design of processing equipment.	-	2	-	-	-	-	-	-	-	-	-	-	-	-	3
CO5	Explain the applications of electrical and thermal properties in the design of processing equipment.	-	2	-	-	-	-	-	-	-	-	-	-	-	-	3
Course Code	**191CE5O01-BASIC CONCRETE TECHNOLOGY (OPEN ELECTIVE- I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explainthe 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**	**PSO3**
CO1	Describe electrical hazards and safety equipment	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Analyze and apply various grounding and bonding techniques	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-
CO3	Select appropriate safety method for low, medium and high voltage equipment	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Discuss safety managmenet and organizing structure	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Demonstrate proper maintenance of electrical equipment by understanding various standards	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191EE5O02-ELECTRICAL MATERIALS (OPEN ELECTIVE- I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Identify various types of dielectric materials, their properties in various conditions.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Analyze magnetic materials and their behaviour.	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
CO3	Evaluate semiconductor materials and technologies.	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Explain the application of Materials in electrical engineering	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Explain the application of Special Purpose Materials in electrical engineering.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191EE5O03-BASIC ELECTRICAL MEASUREMENTS (OPEN ELECTIVE- I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the behaviour of different types of torques in instruments.	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Select the right type of instrument for measurement of voltage, current, power &energy.	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Develop the suitable bridge for the measurement of electrical parameters.	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Analyze the behaviour of different types of Transducers and Sensors.	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Explain frequency and phase difference between signals using CRO.	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191ME5O01-RENEWABLE ENERGY SOURCES (OPEN ELECTIVE- I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Explain the working principle of Internal Combustion Engines and their performance.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Compute the parameters of mechanical components for power transmission.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191ME5O03-SUPPLY CHAIN MANAGEMENT (OPEN ELECTIVE- I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191EC5O01-SIGNALS AND SYSTEMS (OPEN ELECTIVE- I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Categorize signals and systems based on their characteristics.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
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**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-
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**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-
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**	**PSO3**
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	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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**	**PSO3**
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	**19AG5O01-BASIC CROP PRODUCTION PRACTICES (OPEN ELECTIVE- I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain factors affecting on crop growth and production.	1	1	-	-	1	-	-	-	-	-	-	2	-	-	-
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	-	-	-	-	-	-	-	-	-	-
Course Code	**191AG5L07 - SOIL MECHANICS LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Apply the knowledge of soil mechanics in the field of civil engineering.	2	1	-	-	-	2	-	-	-	-	2	-	-	-	-
CO2	Determine the identification of physical properties of various soils.	2	1	-	-	-	2	-	-	-	-	2	-	-	1	-

	CO Statements	POs												PSOs		
CO3	Interpret with permeability characteristics of soils.	3	2	-	-	-	2	-	-	-	-	2	-	-	1	-
CO4	Identify various types of drainage conditions.	2	2	-	-	-	2	-	-	-	-	2	-	-	1	-
CO5	Distinguish various types of shear parameters by using Tri-axial tests.	2	2	-	-	-	2	-	-	-	-	2	-	-	1	-
Course Code	**191AG5L08 - THEORY AND DESIGN OF AGRICULTURAL MACHINERY LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze 4-bar mechanism and their inversion.	3	-	-	-	2	-	-	-	2	-	-	1	3	-	-
CO2	Apply graphical and analytical method for finding the velocity of link in a mechansim.	3	1	-	-	1	-	-	-	-	-	-	1	3	-	-
CO3	Explain different types of gears and gear trains.	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	Identify different types of clutch.	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO5	Explain working of shafts and coupling.	2	1	-	-	2	-	-	-	-	-	-	-	2	-	-
Course Code	**191AG5L09 - AGRICULTURAL PROCESS ENGINEERING AND FOOD QUALITY LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Construct the flow chart and layout of a food processing.	2	1	-	-	-	-	2	-	-	-	3	-	-	-	3
CO2	Explain the basic unit operation of food processing in handling and processing equipment.	3	2	2	-	-	-	-	-	-	-	2	-	-	-	3
CO3	Explain the hammer mill, attrition mill, mixers, mixing index of a feed mixer, fineness modulus and average particle size and power requirement in different types of conveyors.	3	2	1	1	-	-	-	-	-	-	-	-	-	-	3
CO4	Determine the efficiency of cyclone separator, pneumatic separator, indented cylinder and screen pre cleaner.	3	1	1	-	-	2	-	-	-	-	-	-	-	-	2
CO5	Identify various methods for determining moisture content using different drying techniques.	3	1	1	-	-	-	-	-	-	2	-	-	-	-	2
CO6	Explain about sensory evaluation of food materials.	3	1	-	-	-	-	-	-	-	-	2	-	-	-	3
Course Code	**191HS5T06 - EMPLOYABILITY SKILLS– III**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
CO1	Conduct a literature survey in the selected area	1	-	-	-	-	-	-	-	1	1	1		2	-	-
CO2	Use scientific reasoning to gather, evaluate and interpret the survey data to identify the problem	-	2	-	-	-	2	2	-	-	-	-	2	3	-	-
CO3	Design and develop many solutions in the light of societal, cultural, legal and environmental issues	-	-	2	2	-	-	-	1	-	-	-	-	2	-	-
CO4	Select a final solution to the social problem and submit as a working prototype	-	-	-	2	-	-	-		-	-	-	-	2	-	-
CO5	Use modern tools to prepare the results of the project as a report adhering to professional ethics	-	-	-	-	2	-	-	2	-	-	1	1	2	-	-
Course Code	**191MC5A08 - INTELLECTUAL PROPERTY RIGHTS AND PATENTS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	**191AG6T12 - IRRIGATION AND DRAINAGE ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Apply irrigation terminology, soil moisture characteristic curves and evapotranspiration methods to quantify crop water requirement.	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	Choose appropriate irrigation methods, advantages, disadvantages, hydraulics design and components.	-	2	-	-	3	-	2	-	-	-	-	2	-	3	-
CO3	Estimate irrigation canals capacity by lacey's and kennedy's methods.	1	-	3	2	2	-	-	-	-	-	-	-	-	3	-
CO4	Identify types, functions, components and factors affecting on surface and sub-surface drainage systems.	-	1	-	-	2	-	-	-	-	-	-	-	-	3	-

	CO Statements	POs												PSOs		
CO5	Determine drain spacing under unsteady and steady state conditions by Hooghoudt's and Glover Dumm equations.	-	1	2	1	3	-	-	-	-	-	-	-	-	3	-
Course Code	**191AG6T13 - POST-HARVEST ENGINEERING FOR HORTICULTURAL PRODUCE**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain about various properties and factors affecting quality of fruits and vegetables.	3	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	Classify various post harvest operations involved in horticulture processing.	3	1	1	1	-	-	-	-	-	-	-	-	-	-	3
CO3	Identify various preservation techniques for processed foods.	3	2	2	2	-	-	-	-	-	-	-	-	-	-	3
CO4	Apply the advanced packaging technology in food preservation.	3	2	2	2	-	-	-	-	-	-	-	-	-	-	3
CO5	Categorize different beverages based on method of preparation.	3	1	1	1	-	-	-	-	-	-	-	-	-	-	2
CO6	Explain the procedure for extraction of oleoresins and essential oils.	3	1	1	1	-	-	-	-	-	-	-	-	-	-	2
Course Code	**191AG6T14 - AGRICULTURAL MACHINERY AND EQUIPMENT**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the process of selection, cost estimation and methods of ploughing of farm mechanization.	3	-	-	2	2	-	-	-	-	-	1	-	3	-	-
CO2	Calculate the forces acting on tillage implements.	-	1	-	-	3	-	-	-	-	-	2	1	2	-	-
CO3	Explain inter-culture equipments and understand the sowing, planting and transplanting operation with various implements used for these operations.	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	Explain the harvesting and threshing operation with various implements used for these operations.	3	-	-	-	1	-	-	-	-	-	-	-	1	-	-
CO5	Explain the operation of grain combines harvesting mechanism.	3	1	-	-	-	-	-	-	-	-	-	-	2	-	-
Course Code	**191AG6E06 - HUMAN ENGINEERING AND SAFETY (PROFESSIONAL ELECTIVE - II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain man-machine-environmental factors and anthropometric principles for work space design.	3	1	-	-	-	-	2	-	-	-	-	1	3	-	-
CO2	Explain muscle functions, conditions and important factors in physical work handling.	2	-	-	-	1	3	2	-	-	-	-	-	3	-	-
CO3	Explain the factors affecting the work capacity and measures taken for vision.	-	1	-	2	3	2	-	-	-	-	-	-	3	-	-
CO4	Measure the sound and noise levels of different machines during farming operation.	1	2	-	-	3	2	-	-	-	-	-	-	3	-	-
CO5	Identify advance effects of air pollution and safety regulation acts.	3	2	-	-	2	-	1	-	-	-	-	-	2	-	-

	CO Statements	POs												PSOs		
CO6	Demonstrate safety measures using different machines.	3	2	-	-	-	-	1	-	-	-	-	-	2	-	-
Course Code	**191AG6E04 AGRICULTURAL STRUCTURES (PROFESSIONAL ELECTIVE - II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Apply the concept hydraulic jump, runoff measuring structures and various permanent gully control structures.	1	1	3	-	-	-	-	-	-	-	2	-	-	2	-
CO2	Design diversion structures and canal falls.	1	1	3	-	-	-	-	-	-	-	2	-	-	2	-
CO3	Design of cross drainage work structures.	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO4	Classify the poultry houses, dairy barn planning and requirements.	-	-	-	-	-	1	-	-	-	-	1	1	-	2	-
CO5	Summarize the different grain storage structures.	-	-	-	-	-	1	-	-	-	-	-	1	-	1	-
Course Code	**191AG6E05 AGRO INDUSTRIES AND BY-PRODUCT UTILIZATION (PROFESSIONAL ELECTIVE - II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the basic applications of agro industries and by- products utilization, importance of rice husk and their uses and rice husk combustion	2	2	-	-	-	1	3	-	-	-	-	-	-	-	2
CO2	Describe the manufacturing of alcohol processes and production of furfural.	2	1	-	1	-	-	3	-	-	-	-	-	-	-	2
CO3	Explain by-products of coconut, mango, cashew nut and banana.	2	1	-	-	-	-	-	-	1	-	3	-	-	-	3
CO4	Explain about the feed manufacturing equipments, paper making process and different types of sugarcane by-products.	2	1	-	-	-	-	-	-	1	-	3	-	-	-	3
CO5	Explain the biological treatment with their advantages and disadvantages.	3	-	-	1	-	1	-	1	-	-	-	-	-	-	1
CO6	Explain the types of aeration systems and briquetting process, principles and factors affecting for establishing of agro processing.	3	2	-	1	-	-	1	-	-	-	-	-	-	-	2
Course Code	**191AG6E07 DESIGN OF AGRICULTURAL MACHINERY (PROFESSIONAL ELECTIVE - III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the basic concepts of machine design.	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	Apply principles of design to mechanical power transmission elements such as shafts, keys & couplings, bearings.	3	1	2	2	-	-	-	-	-	-	-	-	3	-	-
CO3	Examine basic principles in designing of cotter joint, knuckle joint, levers and springs.	1	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO4	Explain the design procedure of flywheel.	2	1	3	-	-	-	-	-	-	-	-	-	2	-	-
CO5	Classify the types of bearing used in machine design.	3	-	-	-	1	-	-	-	-	-	-	-	2	-	-

	CO Statements	POs												PSOs		
CO6	Apply principles of design in designing farm machinery implements.	2	2	1	-	3	-	-	-	-	-	-	-	3	-	-
Course Code	**191AG6E09 WATERSHED PLANNING AND MANAGEMENT (PROFESSIONAL ELECTIVE - III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain concept, importance and characteristics of watershed.	1	1	-	-	-	-	-	-	-	-	-	-	-	1	-
CO2	Illustrate how to delineate, measure water yield from watershed and integrated watershed management.	-	-	-	-	-	-	2	-	-	-	2	-	-	2	-
CO3	Interpret sediment yield and illustrate rainwater conservation and dry farming technologies.	1	-	-	-	1	-	1	-	-	-	2	-	-	3	-
CO4	Explain about budgeting of water and effects of cropping systems in a watershed.	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO5	Explain modes of peoples participation and cost-benefit analysis of watershed.	1	-	-	-	-	-	1	-	-	1	-	-	-	2	-
Course Code	**191AG6E08 SEED PROCESSING AND STORAGE ENGINEERING (PROFESSIONAL ELECTIVE - III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain various unit operations and seed cleaning equipment in seed processing industry.	2	1	-	-	-	-	-	-	-	3	2	-	-	-	3
CO2	Identify drying equipment based on different drying techniques.	3	2	1	1	-	-	-	-	-	-	-	-	-	-	2
CO3	Illustrate seed treatment and seed packaging.	3	1	1	1	-	-	-	-	-	-	-	-	-	-	2
CO4	Explain the changes during seed storage and concepts of storage.	2	1	1	-	-	3	-	-	-	-	-	-	-	-	2
CO5	Explain seed plant layout, seed storage structures and their importance.	3	1	1	-	-	-	-	-	-	-	-	-	-	-	3
Course Code	**191CE6O02-DISASTER MANAGEMENT (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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 SOURCES (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO5	Energy resources.	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Course Code	**191EE6O06-INSTRUMENTATION (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
CO1	Explain the concept of solar radiation and its measurement.	1	-	-	-	-	-	1	-	-	-	-	1	-	-	-

	CO Statements	POs												PSOs		
CO2	Describe the working principle of different types of collector 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**	**PSO3**
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**	**PSO3**
CO1	Describe the fundamentals of fluid power systems.	1	1	1	-	-	-	3	-	-	-	-	-	-	-	-
CO2	Illustrate the working of fluid power actuators, hydraulic motors, and Hydrauli components.	1	1	1	-	-	-	3	-	-	-	-	-	-	-	-
CO3	Analyze the concepts of hydraulic circuits.	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Explain the working of pneumatic systems.	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Examine the concepts of pneumatic circuits.	1	1	2	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191ME6O09-3D PRINTING (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-

	CO Statements	POs												PSOs		
CO5	Apply the AM techniques in different industries	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-
CO6	Select AM technologies using decision methods	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Course Code	**191ME6O10-ROBOTICS (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the basic concepts, parts of robots and types of robots.	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	Identify various robot configuration and components,	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	Select appropriate actuators and sensors for a robot based on specific application	2	1	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	Analyze the simple serial kinematic chains	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	Analyze the trajectory planning for a manipulator by avoiding Obstacles	1	2	1	-	-	-	-	-	-	-	-	1	-	-	-
Course Code	**191ME6O11-MANAGEMENT SCIENCE (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	Use scheduling techniques of project management PERT/CPM to calculate Critical path and Probability of completion of the project.	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**	**PSO3**
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	**191EC6O04-BIOMEDICAL INSTRUMENTATION (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Summarize the physiological relation of the human body with the environment.	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Make use of different electrodes and transducersfor 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	**191EC6O05-ECAD TOOLS (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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 Java Script.	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	**191CS6O08-CYBER SECURITY (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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 and 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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191IT6O03-COMPUTER ORGANIZATION (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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	Develop Expert System and 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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-
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'S IN MINES (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain about power systems used in mines.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Analyze various earthing methods used in mines.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Summarize various electrical equipment used in mines.	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Explain the instrumentation and control systems used in mines	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Analyze about mine telephone system and 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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191PT6O04-ASSET MANAGEMENT (OPEN ELECTIVE- II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-	-	-	-
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	**191AG6L10 - IRRIGATION AND DRAINAGE ENGINEERING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Measure irrigation water and irrigatio efficiency.	1	-	-	-	1	1	1	-	-	-	-	-	-	1	-

	CO Statements	POs												PSOs		
CO2	Calculate evapotranspiration by empirical method.	1	-	1	-	-	-	-	-	-	-	-	-	-	2	-
CO3	Analyse soil physical and chemical properties.	1	-	-	-	1	2	-	-	-	-	-	2	-	3	-
CO4	Evaluate performance of irrigation and drainage systems.	3	2	1	1	-	-	-	-	-	-	-	-	-	1	-
CO5	Use CROPWAT software for calculation of crop water requirement.	3	2	-	-	3	-	-	-	-	-	3	-	-	2	-
Course Code	**191AG6L11 - AGRICULTURAL MACHINERY AND EQUIPMENT LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the different types equipments for tillage operations.	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	Measure draft, field capacity and efficiency of various farm implements.	2	3	-	1	-	-	-	-	-	-	1	-	2	-	-
CO3	Determine the different parameters for different tillage implements.	3	-	2	-	1	-	-	-	-	-	-	1	2	-	-
CO4	Demonstrate working principles of various harvesting and threshing machinery.	3	-	-	-	-	-	-	-	-	-	2	-	3	-	-
CO5	Explain the constructional details and working of different harvesting and threshing method for different crops and fruits.	3	1	-	2	2	-	-	-	-	-	-	-	3	-	-
Course Code	**191HS6T07 - Employability Skills - IV**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
CO5	Apply adequate knowledge on global code of conduct.	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
VII SEM																
Course Code	**191AG7T15 - DAIRY AND FOOD ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain dairy plant layouts and design parameters.	2	2	3	1	-	-	-	-	-	-	-	-	-	-	3
CO2	Identify the preliminary processing steps in dairy industry.	3	1	1	-	-	2	-	-	-	-	-	-	-	-	2
CO3	Compare different thermal treatments of milk.	3	2	2	-	-	2	-	-	-	-	-	-	-	-	2
CO4	Select the accurate processing technique during milk processing.	3	2	1	-	-	2	-	-	-	-	-	-	-	-	3
CO5	Distinguish the changes in milk during preservation.	3	2	2	-	-	2	-	-	-	-	-	-	-	-	2
Course Code	**191AG7T16 - SOIL AND WATER CONSERVATION ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Identify different types of erosions and quantify the annual soil loss from a watershed using USLE and MUSLE.	1	1	2	-	-	-	-	-	-	-	-	-	-	2	-
CO2	Explain wind erosion, its control measures and land use capability classes.	1	1	2	-	2	-	-	-	-	-	1	-	-	3	-
CO3	Determine the peak runoff rate by rational method and runoff by curve number and cook's methods.	1	-	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	Design of contour bunds, graded bunds, terraces and vegetated waterways.	1	-	1	-	1	-	-	-	-	-	-	-	-	3	-
CO5	Explain sedimentation, water harvesting, farm pond and temporary gully control structures.	1	-	1	-	1	2	-	-	-	-	-	-	-	3	-
Course Code	**191AG7E11 - SOIL DYNAMICS IN TILLAGE AND TRACTION (PROFESSIONAL ELECTIVE - IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Distinguish various dynamic properties of soil and their methods of measurement.	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	Analyze the concept of soil tool interaction.	2	3	-	2	-	-	-	-	-	-	-	-	3	-	-
CO3	Interpret traction mechanics and prediction models.	2	1	-	-	3	-	-	-	-	-	-	2	2	-	-
CO4	Select different traction devices and their method of selection based on load and furrow type.	3	2	-	2	-	-	-	-	-	-	1	-	3	-	-
CO5	Evaluate performance of traction device.	2	1	-	-	3	-	-	-	-	-	-	1	3	-	-
CO6	Apply GIS in soil dynamics.	2	1	-	-	-	-	-	-	-	-	-	1	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191AG7E12 - WATER QUALITY AND POLLUTION CONTROL (PROFESSIONAL ELECTIVE - IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the various characteristics of water and know its quality standards.	-	-	-	-	-	2	2	-	-	-	-	-	-	1	-
CO2	Explain the methods of purification of water.	-	-	-	-	2	2	1	-	-	-	-	-	-	1	-
CO3	Outline the types of filters and methods of filtration of water.	-	-	-	-	-	2	2	-	-	-	-	-	-	1	-
CO4	Explain the methods of sterilization of water.	1	1	-	-	-	2	3	-	-	-	-	-	-	1	-
CO5	Select appropriate method of water treatment based on its nature.	-	-	-	-	2	3	2	-	-	-	-	-	-	2	-
Course Code	**191AG7E10 FOOD PACKAGING TECHNOLOGY (PROFESSIONAL ELECTIVE - IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the importance of packaging in food industry.	3	1	-	-	-	1	2	-	-	-	-	-	-	-	2
CO2	Explain food packaging laws and regulations.	-	-	-	-	-	2	3	2	-	-	-	-	-	-	3
CO3	Categorize paper and glass packaging material for manufacturing process.	3	-	-	-	-	1	1	-	-	-	-	-	-	-	2
CO4	Select metal and plastic packaging material recommended for food packaging.	3	-	-	-	-	1	1	-	-	-	-	-	-	-	2
CO5	Assess knowledge on advanced packaging technologies and testing of packaging material.	3	1	-	2	-	-	1	-	-	-	-	-	-	-	3
Course Code	**191AG7E15 - PRODUCTION TECHNOLOGY IN AGRICULTURAL MACHINERY (PROFESSIONAL ELECTIVE - V)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the concepts of non ferrous metals and heat treatment.	-	-	-	-	2	-	3	-	-	-	-	-	-	-	1
CO2	Distinguish between the different joining techniques.	-	-	-	-	2	-	1	-	-	-	2	-	-	-	3
CO3	Apply the different manufacturing process and use this in industry for component production.	-	-	-	-	3	-	2	-	-	-	-	-	-	-	2
CO4	Summarize the different types of Machining Process.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
CO5	Discuss principles of industrial safety and maintenance of machine tools.	-	-	-	-	-	-	-	-	-	-	-	**1**	-	-	-
Course Code	**191AG7E14 - MICROIRRIGATION ENGINEERING (PROFESSIONAL ELECTIVE - V)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain scenario, types and different components of sprinkler irrigation system.	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-

	CO Statements	POs												PSOs		
CO2	Inspect performance evaluation and design of sprinkler irrigation system.	1	-	3	-	2	-	-	-	-	-	-	1	-	3	-
CO3	Explain scenario and components of drip irrigation system.	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-
CO4	Identify performance evaluation and head losses calculation of drip irrigation.	-	-	3	-	2	-	-	-	-	-	-	-	-	3	-
CO5	Evaluate design of drip irrigation system.	-	-	3	-	2	-	-	-	-	-	-	-	-	3	-
Course Code	**191AG7E13 FOOD PROCESSING PLANT DESIGN AND LAYOUT (PROFESSIONAL ELECTIVE - V)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the parameters to be considered in a food plant layout.	3	1	1	1	-	-	-	-	-	-	-	-	-	-	2
CO2	Compare different food processing plants layouts.	2	1	1	3	-	-	-	-	-	-	-	-	-	-	3
CO3	Design specifications of food processing plant.	2	1	3	-	-	-	-	-	-	-	-	-	-	-	3
CO4	Design the machinery required in process control of the food processing plant.	2	2	3	1	-	-	-	-	-	-	-	-	-	-	3
CO5	Explain sanitation procedures used in the food processing plant and report making.	2	-	-	-	-	2	-	-	-	-	2	3	-	-	3
CO6	Estimate the cost of plant set up and operation.	2	1	-	-	1	-	-	-	-	-	-	-	-	-	3
Course Code	**191CE7O03-WASTE WATER MANAGEMENT (OPEN ELECTIVE- III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Summarize the importance of sanitation and waste water management.	2	1	-	-	-	2	3	-	-	-	-	-	-	-	-
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**	**PSO3**
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	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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	**191EE7O09-INDUSTRIAL ELECTRICAL SYSTEMS (OPEN ELECTIVE- III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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	-	-	-
CO3	Use non-linear optimization techniques such as classical optimization methods, integer programming.	2	2	1	-	-	-	-	-	-	-	-	1	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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**	**PSO3**
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**	**PSO3**
CO1	Explain the basic concepts, parts of robots and types of robots.	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	Identify various robot configuration and components,	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
CO5	Explain different architectural issues of subsystem design process and testability.	2	1	3	1	-	-	-	-	-	-	-	-	-	-	-
Course Code	**191EC7O08-MICRO ELECTRO MECHANICAL SYSTEMS (OPEN ELECTIVE- III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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	-	2	3	-	2	2	-	-	-	-	-	-	-	-	

	CO Statements	POs												PSOs		
Course Code	**191CS7O11-MOBILE APPLICATION DEVELOPMENT (OPEN ELECTIVE- III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
CO1	Describe Data Science and the skill sets needed to be a data scientist.	2	3	-	2	-	-	-	-	-	-	-	-	-	-	-
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**	**PSO3**
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**	**PSO3**
CO1	Illustrate fundamentals of quantum information processing	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Explain quantum basics and principles	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-	-
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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	**191AG7P03 INTERNSHIP**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	1	-	-
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	-
Course Code	**191AG7L12 DAIRY AND FOOD ENGINEERING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain Milk Properties.	3	1	1	1	-	-	-	-	-	-	-	-	-	-	2
CO2	Illustrate heat treatment processes used in milk preservation.	3	1	1	1	-	-	-	-	-	-	-	-	-	-	2
CO3	Determine the energy required to process the fresh milk.	2	3	2	1	-	-	-	-	-	-	-	-	-	-	2
CO4	Demonstrate the working of homogenizer and cream separator.	2	1	3	1	-	-	-	-	-	-	-	-	-	-	3
CO5	Examine the design and layout of dairy plant.	2	1	-	-	-	-	2	-	-	-	3	-	-	-	3
Course Code	**191AG7L13 SOIL AND WATER CONSERVATION ENGINEERING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain water and wind erosion.	1	-	-	1	-	-	-	-	-	-	-	-	-	2	-

	CO Statements	POs												PSOs		
CO2	Determine soil loss estimation.	1	-	-	3	-	1	-	-	-	-	-	-	-	2	-
CO3	Determine sedimentation rate.	1	-	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	Design different types of bunds, terraces.	1	-	1	-	-	3	-	-	-	-	-	-	-	3	-
CO5	Design vegetated waterways.	1	-	1	-	-	-	-	-	-	-	-	-	-	2	-
Course Code	**191AG7P04 PROJECT PART -1**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Conduct technical survey to identify a real industrial problem to solve as a project work.	1	1	-	-	-	-	-	-	-	1	-	1	1	-	-
CO2	Estimate the resources & constraints in the process of execution.	1	1	1	-	-	-	-	-	-	-	-	1	-	1	-
CO3	Develop technical procedure of planning & scheduling to execute an identified project work in line with societal and environmental implications.	-	2	-	-	-	2	2	-	-	-	-	1	-	-	1
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	3	-	-
VIII SEM																
Course Code	**191AG8E16 HYDRAULIC DEVICES AND CONTROL (PROFESSIONAL ELECTIVE - VI)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the fundamental concepts of hydraulic system.	3	1	-	-	2	-	-	-	-	-	-	-	2	-	-
CO2	Explain basic components in hydraulic system.	3	1	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	Identify various hydraulic control valves and accessories.	3	2	1	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Analyze the hydraulic circuit design.	2	3	2	1	-	-	-	-	-	-	-	-	3	-	-
CO5	Explain the maintenance of hydraulic system.	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO6	Classify various hydraulic devices and their application.	2	1	-	-	2	-	-	-	-	-	-	-	2	-	-
Course Code	**191AG8E17 INTRODUCTION TO REMOTE SENSING AND GIS (PROFESSIONAL ELECTIVE - VI)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Classify the information content of remotely sensed data.	1	1	-	-	2	-	-	-	-	-	-	-	-	1	-

	CO Statements	POs												PSOs		
CO2	Explain the energy interactions in the atmosphere and earth surface features.	1	-	-	1	-	-	-	-	-	-	-	-	-	1	-
CO3	Interpret the images for preparation of thematic maps.	1	1	-	1	2	-	-	-	-	-	-	-	-	1	-
CO4	Develop GIS and cartographic outputs for presentation.	1	1	2	-	1	-	-	-	-	-	-	-	-	1	-
CO5	Apply problem specific remote sensing data for agricultural engineering applications.	1	-	-	-	-	-	1	-	-	-	-	-	-	1	-
Course Code	**191AG8E18 NOVEL TECHNOLOGIES FOR FOOD PROCESSING AND SHELF LIFE EXTENSION (PROFESSIONAL ELECTIVE - VI)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain about various concepts of food processing, preservation and quality.	2	1	-	-	2	3	-	-	-	-	-	-	-	-	2
CO2	Explain various novel technologies involved in food processing.	3	2	2	2	-	-	-	-	-	-	-	-	-	-	3
CO3	Apply the advanced packaging technology in food preservation.	3	1	-	2	-	-	1	-	-	-	-	-	-	-	3
CO4	Identify various oil extraction methods.	3	2	-	-	-	1	-	-	-	1	-	-	-	-	2
CO5	Explain the procedure for micro encapsulation and its applications.	3	2	-	-	-	1	-	-	-	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**	**PSO3**
CO 1	Describe generation rates, composition, and issues of Solid waste	2	1	-	-	-	2	3	-	-	-	-	-	-	-	-
CO 2	Explain the issues, collection, recovery, reuse, processing of Municipal solid waste	2	1	-	-	-	2	3	-	-	-	-	-	-	-	-
CO 3	Illustrate the rules regarding MSW and current issues in Solid waste management	1	2	-	-	-	2	3	-	-	-	-	-	-	-	-
CO 4	Interpret Construction and demolition waste management	2	1	-	-	-	2	3	-	-	-	-	-	-	-	-
CO 5	Assess the issues related to E-waste generation and current managemen 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**	**PSO3**
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	-	-	-	-	-	-	-		-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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	Analyse the transient behaviour of electrical networks for DC excitations	2	1	-	-	2	-	-	-	-	-	-	-	-	-	-
Course Code	**191EE8O12-ELECTRICAL MACHINES (OPEN ELECTIVE- IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-
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	**191EE8O13-POWER ELECTRONICS (OPEN ELECTIVE- IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191EE8O14-NON CONVENTIONAL ENERGY SOURCES (OPEN ELECTIVE- IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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	-	-	-
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**	**PSO3**
CO1	Summarize the operation of micro systems, and their applications	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Distinguish the operation of various types of analog and digital meters.	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
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**	**PSO3**
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**	**PSO3**
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	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191IT8O12-GAME PROGRAMMING (OPEN ELECTIVE- IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-
Course Code	**191IT8O11-CLOUD COMPUTING (OPEN ELECTIVE- IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
Course Code	**191IT8O09-DEEP LEARNING (OPEN ELECTIVE- IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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**	**PSO3**
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	-	-	-
Course Code	**191PT8O07-CHEMICAL PROCESS SAFETY (OPEN ELECTIVE- IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
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	**191PT8O07-MECHANICAL UNIT OPERATION**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the fundamentals of Mechanical unit operations	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Explain storage of bulk solids and flow measurements.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs												PSOs		
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**	**PSO3**
CO1	Apply the knowledge of RS and GIS in land and water resources management.	1	-	-	-	3	-	-	-	-	-	-	1	-	-	-
CO2	Explain 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**	**PSO3**
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	-	-	-	-	-	-	-	-	-	-	-
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	**191EC8P05-PROJECT PART 2**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Demonstrate technical skills of data collection and data analysis adhering to professional ethics	1	1	-	-	-	-	-	2	-	-	-	1	1	-	-
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	-	-	-	-	-	1	-	-
CO3	Build a team of people to work together and communicate well in the critical stages of project progress.	-	-	-	-	-	-	-	-	1	2	1	1	1	1	-
CO4	Use modern tools to derive conclusions of the project work effectively	-	-	-	-	3	-	-	-	-	2	1	1	1	-	-
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	1	-