

	CO Statements	POs											PSOs		
Course Code	192PE1E04-Advanced Well Logging Techniques & Well Testing Analysis (Elective-II)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Apply theoretical knowledge of well logging	2	1	2	-	-	-	-	-	-	-	-	2	-	-
CO2	Interpret the Data from well logging using advanced tools	-	-	3	-	-	-	-	-	-	-	-	2	-	-
CO3	Calculate reservoir fracture porosity using pressure build-up tests	2	3	2	-	-	-	-	-	-	-	-	2	1	-
CO4	Interpret Dip meter logs to obtain structural dips and correlation of the same with the nearby offset wells.	2	-	-	3	2	-	-	-	-	-	-	-	1	1
CO5	Apply Multi rate analysis in Naturally fractured reservoirs	-	-	2	-	2	-	-	-	-	-	-	1	2	1
Course Code	192HS1T01-Research Methodology and IPR	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Apply Research approaches through various methodology in Petroleum Engineering.	-	3	-	3	-	-	-	-	-	-	-	-	2	-
CO2	Review Literature from quality Journals and articles.	-	-	-	3	-	-	-	-	-	-	-	-	-	2
CO3	Develop good research design plan.	-	-	3	3	-	2	-	-	-	-	-	-	-	-
CO4	Analyse the sampled data through different statistical approaches.	-	-	-	3	3	-	-	-	-	-	-	-	-	-
CO5	Distinguish the different research proposals through report writing and research grant.	-	-	-	3	-	-	-	3	-	-	-	1	-	-
Course Code	192PE1L01-Advanced Numerical Methods and Applied Statistics Laboratory (MATLAB Based)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Apply numerical methods to evaluate integrals using MATLAB.	-	2	3	1	1	-	-	-	-	-	-	-	3	-
CO2	Apply numerical methods to solve first order differential equations using MATLAB.	1	3	3	1	2	-	-	-	-	-	-	-	3	-
CO3	Solve partial differential equations using MATLAB.	2	2	3	1	2	-	-	-	-	-	-	-	3	-
CO4	Solve problems concerned with linear and non-linear algebraic equations	2	3	3	1	2	-	-	-	-	-	-	1	2	-
CO5	Compute probabilities of two dimensional random variables	1	3	3	1	2	-	-	-	-	-	-	1	2	-
Course Code	192PE1L02-Drilling Simulation Laboratory	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Familiarize with abnormal drilling operations	-	2	3	1	1	-	-	-	-	-	-	-	3	-
CO2	Handle any drilling simulation without any panic	1	3	3	1	2	-	-	-	-	-	-	-	3	-
CO3	Be conversant with the BOP, Control Panel, Remote Control panel Etc.	2	2	3	1	2	-	-	-	-	-	-	-	3	-
CO4	Identify the abnormal activities much in advance and plan to prevent the kick, blowout etc.	2	3	3	1	2	-	-	-	-	-	-	1	2	-
CO5	Become a very good drilling engineer by improving the rate of drilling even in critical conditions	1	3	3	1	2	-	-	-	-	-	-	1	2	-
II SEM															
Course Code	192PE2T05-Artificial Lift Techniques	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain the fundamental concepts of artificial lift techniques such as reservoir pressure, well productivity and reservoir fluids.	2	1	-	-	-	-	-	-	-	-	-	2	-	-

	CO Statements	POs											PSOs			
CO2	Apply sucker rod lift system, polished rod motion, FRP sucker rods, criteria for rod string design with advantages and limitations.	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	Apply gas lift, gas compression requirements sonic flow, subsonic flow, volumetric efficiency advantages and limitations.	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Explain electrical submersible pumps, principle hydraulic piston pumping advantages and limitations	2	1	-	-	-	-	-	-	-	-	-	-	-	1	-
CO5	Explain hydraulic jet pumping advantages and disadvantages.	2	1	-	-	-	-	-	-	-	-	-	-	-	-	1
Course Code	192PE2T06-Reservoir Modeling & Simulation	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Apply properties of single phase fluid, porous media, reservoir discretization, multidimensional flow in Cartesian, radial, cylindrical coordinates.	2	1	-	-	-	-	-	-	-	-	-	2	-	-	
CO2	Calculate flow equations using CVFD terminology, cylindrical coordinates and block ordering scheme.	3	2	-	-	-	-	-	-	-	-	-	3	-	-	
CO3	Apply reservoir discretization for block centred and point distributed using boundary conditions and its use in solving practical problems.	3	2	-	-	-	-	-	-	-	-	-	3	-	-	
CO4	Apply single and multi-block wells, practical considerations dealing with modelling and well conditions.	2	1	-	-	-	-	-	-	-	-	-	-	1	-	
CO5	Calculate nonlinear terms in flow equations for various fluids, linearization of nonlinear terms, equations in time and direct solution methods.	2	1	-	-	-	-	-	-	-	-	-	-	-	1	
Course Code	192PE2E05-Advanced EOR Techniques (Elective-III)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Identify specific reservoir before designing of any EOR project.	-	-	-	-	3	-	2	-	-	3	-	2	-	-	
CO2	Classify various techniques of EOR.	-	-	-	-	-	3	3	2	-	-	2	3	-	-	
CO3	Make use of safety precautions while handling of various types of chemicals used in EOR.	2	3	-	3	-	-	-	-	-	-	-	3	-	-	
CO4	Explain reservoir managers/production engineers in monitoring the reservoir after post-project activities in CO2 flooding.	-	2	-	-	-	-	-	-	-	3	-	-	1	-	
CO5	Apply the regulations and economics to EOR operations.	-	-	-	-	-	3	3	2	3	2	-	-	-	1	
Course Code	192PE2E06-Advanced Well Completions (Elective-III)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Understand about Basic well completion techniques and Sand Control	3	2	1	2	-	-	-	-	-	-	-	3	-	1	
CO2	Select of Equipment for Well Operations, Material Selection and Tubing Stress Analysis	2	2	1	2	-	1	-	-	-	-	1	2	-	-	
CO3	Identify different well completions equipment for various types of Wells	3	2	1	2	-	-	-	-	-	-	-	2	1	-	
CO4	Recognise different well completion techniques required for different Equipments	3	2	-	1	1	-	-	-	-	-	1	2	-	-	

	CO Statements	POs											PSOs		
CO5	Familiarize with installation procedure for different well completion techniques.	2	2	-	2	1	-	1	-	1	1	-	3	2	3
Course Code	192PE2E07-Flow Assurance (Elective-IV)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Solve flow assurance calculations and size the piping & distribution system.	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	Explain the concepts of non-Newtonian fluid & friction, transient flow, transient flow and heat transfer fundamentals.	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	Apply the concepts of emulsion, phase behavior, hydrocarbon flow, single, two, three & four phase regimes during design.	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Apply three phase gas-liquid-solid flow.	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO5	Explain the concepts of wax management, asphaltenes, hydrate remediation interpret phase behavior and hydrocarbon flow.	2	1	-	-	-	-	-	-	-	-	-	-	-	1
Course Code	192PE2E08-Advanced Horizontal Well Technology (Elective-IV)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Summarize the overview of horizontal well technologies.	3	-	-	-	-	-	-	-	-	-	-	2	2	-
CO2	Apply flow performance calculations to horizontal wells.	3	2	-	-	-	-	-	-	-	-	-	3	2	-
CO3	Identify different horizontal well completion techniques.	3	2	-	-	-	-	-	-	-	-	-	3	2	-
CO4	Solve Challenges for different flow rates.	3	2	-	-	-	-	-	-	-	-	-	3	2	-
CO5	Design a horizontal well.	3	2	-	-	-	-	-	-	-	-	-	3	2	-
Course Code	192PE2L03-Reservoir Simulation Laboratory	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Apply properties of single-phase fluid, porous media, multidimensional flow in cartesian coordinates, radial, cylindrical coordinates.	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	Calculate flow equations in radial, cylindrical coordinates, block ordering scheme.	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	Apply reservoir discretization for transmissibility, symmetry and its use in solving practical problems	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Apply single block wells, multi-block wells, practical considerations dealing with modeling and well conditions, pressure dependence of fluid and rock properties	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO5	Calculate nonlinear terms inflow equations and equations in time.	2	1	-	-	-	-	-	-	-	-	-	-	-	1
Course Code	192PE2L04-Flow Assurance Laboratory	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Familiarize with abnormal drilling operations	-	2	3	1	1	-	-	-	-	-	-	-	3	-
CO2	Handle any drilling simulation without any panic	1	3	3	1	2	-	-	-	-	-	-	-	3	-
CO3	Be conversant with the BOP, Control Panel, Remote Control panel Etc.	2	2	3	1	2	-	-	-	-	-	-	-	3	-
CO4	Identify the abnormal activities much in advance and plan to prevent the kick, blowout etc.	2	3	3	1	2	-	-	-	-	-	-	1	2	-

	CO Statements	POs											PSOs		
CO5	Become a very good drilling engineer by improving the rate of drilling even in critical conditions.	1	3	3	1	2	-	-	-	-	-	-	1	2	-
Audit Course-1 & Audit Course-2 I & II SEMs															
Course Code	192MC1A01-192MC2A01-English for Research Paper Writing	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand how to improve the writing skills and level of readability.	-	-	-	2	-	-	-	2	2	-	-	-	-	2
CO2	Illustrate what to write in each section.	-	-	-	2	-	-	-	2	2	-	-	-	-	2
CO3	Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission.	-	-	-	2	-	-	-	2	2	-	-	-	-	2
Course Code	192MC1A02-192MC2A02-Disaster Management	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.	-	-	-	-	-	-	-	-	-	1	-	-	2	-
CO2	Evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives	-	-	-	-	-	-	-	-	-	1	-	-	2	-
CO3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.	-	-	-	-	-	-	-	-	-	1	-	-	2	-
CO4	Understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.	-	-	-	-	-	-	-	-	-	1	-	-	2	-
Course Code	192MC1A03-192MC2A03-Sanskrit for Technical Knowledge	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understanding basic Sanskrit language.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO2	Develop the brain functioning in association with Sanskrit Language.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO3	Use logical language will help to develop logic in students.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO4	Understand the importance of Sanskrit Language to explore ancient literature.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Course Code	192MC1A04-192MC2A04-Value Education	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand value of education and self- development.	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO2	Explain the need of good values in students.	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO3	Developing the overall personality.	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO4	Explain the need of character in a student.	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Course Code	192MC1A05-192MC2A05-Constitution of India	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Describe the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.	-	-	-	-	-	-	-	-	-	1	-	1	-	-
CO2	Explain the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.	-	-	-	-	-	-	-	-	-	1	-	1	-	-

	CO Statements	POs											PSOs			
CO6	Classify the usage of high performance concretes for repairing works.	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Course Code	192ST3002-Green Building Systems (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Explain the principles of green building planning, its bylaws.	-	1	-	2	2	1	-	-	-	-	-	-	-	-	
CO2	Explain the concepts of green building materials.	-	1	-	2	2	1	-	-	-	-	-	-	-	-	
CO3	Use concept of energy and resource conversion in green building construction	1	2	1	3	3	2	-	-	-	-	-	-	-	-	
CO4	Use of renewable energy resources in green building design.	2	3	2	3	3	3	-	-	-	-	-	-	-	-	
CO5	Design climate for green buildings.	-	1	-	2	2	1	-	-	-	-	-	-	-	-	
Course Code	192ST3003-Basic Concrete Technology (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Explain the properties and tests on cement.	-	1	-	2	2	1	-	-	-	-	-	-	-	-	
CO2	Classify the different types of aggregates.	-	1	-	2	2	1	-	-	-	-	-	-	-	-	
CO3	Outline the mixing of Fresh concrete.	1	2	1	3	3	2	-	-	-	-	-	-	-	-	
CO4	Interpret the various tests on workability of Fresh concrete.	2	3	2	3	3	3	-	-	-	-	-	-	-	-	
CO5	Demonstrate the behaviour of hardened concrete.	-	1	-	2	2	1	-	-	-	-	-	-	-	-	
CO6	Illustrate various types of Special Concrete	-	2	-	2	2	1	-	-	-	-	-	-	-	-	
Course Code	192ST3004-Basic Foundation Engineering (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Recognize the types of available foundations for different structures.	1	-	-	-	-	-	-	-	-	-	-	-	-	-	
CO2	Classify the given soil based on index and engineering properties.	1	3	-	2	2	-	-	-	-	-	-	-	-	-	
CO3	Interpret the shear strength of cohesive and cohesionless soils.	1	2	2	3	1	-	-	-	-	-	-	-	-	-	
CO4	Analyse a shallow foundation for a given soil condition and loading.	-	3	3	3	3	1	-	-	-	-	-	-	-	-	
CO5	Analyse a deep foundation for a given loading and soil conditions.	-	3	3	3	2	1	-	-	-	-	-	-	-	-	
Course Code	192PD3001-Renewable Energy Technologies (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Identify alternate energy sources.	1	-	-	2	-	-	-	-	-	-	2	-	-	-	
CO2	Analyze and design induction generator for power generation from wind.	-	-	-	-	-	-	-	-	-	3	-	-	-	-	
CO3	Analyze different wind power plants.	2	3	3	3	-	-	-	-	2	-	-	-	-	-	
CO4	Design MPPT controller for solar power utilization.	3	-	-	-	2	-	-	-	-	-	-	-	-	-	
CO5	Illustrate the basic operation of fuel cells.	1	2	-	-	-	-	-	-	-	-	-	-	-	-	
Course Code	192PD3002-Hybrid Electric Vehicles (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Illustrate the performance characteristics of converter fed DC drives.	2	1	2	-	-	-	-	-	1	-	-	-	-	-	
CO2	Analyze the two quadrants and four quadrant controls of DC motor drives.	2	3	3	-	-	-	-	-	1	-	-	-	-	-	
CO3	Develop the mathematical models of DC drive components.	1	2	3	2	-	-	-	-	-	-	-	-	-	-	
CO4	Analyze the four quadrant and closed loop control of DC-DC converter fed DC drive.	2	3	3	3	1	-	-	1	2	-	-	-	-	-	
CO5	Propose various controlling techniques of DC drives for industrial applications.	3	3	3	3	3	-	-	3	3	3	-	-	-	-	
CO6	Design various power electronic converters to control the DC motors.	3	3	3	3	3	-	-	3	3	3	-	-	-	-	

	CO Statements	POs											PSOs			
CO4	Explain the thermal energy auditing technologies and procedures.	2	1	1	-	-	1	-	-	-	-	-	-	-	-	-
CO5	Analyse various types of energy storage devices and perform the selection based on techno-economic view point.	2	1	1	1	-	1	-	-	1	1	-	-	-	-	
CO6	Explain various measurement techniques useful for the evaluation of Energy Conservation Schemes.	2	-	1	-	-	1	-	-	1	1	-	-	-	-	
Course Code	192TE3002-Fuels and Combustion (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Explain detailed classification of solid fuels and their conversion process.	1	1	1	-	-	-	-	-	-	-	-	-	-	-	
CO2	Differentiate various rate of reactions.	1	1	1	-	-	-	-	-	-	-	-	-	-	-	
CO3	Evaluate thermodynamics related to combustion process.	3	2	2	2	-	-	-	-	1	-	1	-	-	-	
CO4	Explain the parameters involved in Flame propagation.	1	1	1	1	-	-	-	-	-	-	-	-	-	-	
CO5	Identify the various sources of air pollution.	1	1	1	1	-	-	-	-	-	-	-	-	-	-	
Course Code	192TE3003-Green Engineering Technology (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Distinguish the various solar energy collection methods and measuring instruments.	3	1	-	3	-	-	-	-	3	2	-	-	-	-	
CO2	Explain the different methods of solar energy storage and their applications.	3	3	1	3	-	-	1	-	3	3	-	-	-	-	
CO3	Illustrate the various types of wind mills and performance characteristics.	3	3	2	1	-	-	1	-	2	2	-	-	-	-	
CO4	Explain the principle of Biomass production, Geothermal energy sources and Ocean thermal energy conversion	3	3	2	1	-	-	1	-	2	2	-	-	-	-	
CO5	Illustrate the various types of electrical systems and mechanical systems.	1	2	1	1	-	-	1	-	1	1	-	-	-	-	
CO6	Compare the various energy efficient process.	2	1	1	1	-	-	2	-	2	2	-	-	-	-	
Course Code	192TE3004-IC Engines (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Predict the engine combustion characteristics.	3	3	2	3	1	3	-	-	-	-	-	-	-	-	
CO2	Evaluate engine performance.	3	3	2	3	1	3	-	-	-	-	-	-	-	-	
CO3	Interpret the formation of engine emission and their control strategies.	3	3	2	3	1	3	-	-	-	-	-	-	-	-	
CO4	Distinguish the usage of different alternative fuels and their compatibility with fossil fuels	3	3	3	3	1	3	-	-	-	-	-	-	-	-	
CO5	Explain the constructional and working principles of electrical vehicle and their accessories.	1	2	1	1	1	3	-	-	-	-	-	-	-	-	
Course Code	192TE3005-Automotive Technology (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Summarize the vehicle chassis layout and constructional features of vehicle body	3	2	1	-	-	-	-	-	1	1	-	-	1	-	
CO2	Explain the constructional and working principles of sprung masses.	2	1	1	1	-	-	-	-	-	1	-	-	1	-	
CO3	Explain the constructional and working principles of unsprung masses.	3	2	1	1	-	-	-	-	-	1	-	-	1	-	

	CO Statements	POs											PSOs		
CO4	Summarize the functionalities of various electrical systems of a typical automobile.	2	1	1	-	-	1	-	-	1	1	-	-	1	-
Course Code	192ES3O01-Embedded System Design (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Apply processor based embedded system design concepts to develop an embedded system.	1	2	1	3	-	-	-	-	-	-	-	-	-	-
CO2	Analyze the hardware components, processor performance of an embedded system design.	2	3	2	3	-	-	-	-	-	-	-	-	-	-
CO3	Make use of operating systems and embedded programming languages to develop a real-time system.	1	2	1	3	-	-	-	-	-	-	-	-	-	-
CO4	Utilize modern development tools, CAD tools for integrating software and hardware components in embedded system designs	1	2	1	3	3	-	-	-	-	-	-	-	-	-
CO5	Develop an embedded system by understanding the various processor architecture case studies along with its applications	1	2	1	3	-	-	-	-	-	-	-	-	-	-
Course Code	192ES3O02-Digital System Design (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Examine CAMP Algorithms for minimizing the complexity of digital system design.	2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO2	Simplify digital circuits using PLA minimization algorithm (IISc algorithm) and PLA folding algorithm.	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Construct digital circuits using CPLDs, FPGAs and ASICs.	1	2	1	3	3	-	-	-	-	-	-	-	-	-
CO4	Analyze the functionality of combinational circuits using different fault diagnosis & test methods.	2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO5	Analyze the testing aspects and fault diagnosis methods of sequential circuits	2	3	2	-	-	-	-	-	-	-	-	-	-	-
Course Code	192ES3O03-Programming Languages for Embedded Systems (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Develop the moderate complex programs in embedded C.	1	-	1	-	-	-	-	-	-	-	-	-	2	-
CO2	Compare the different programming techniques in object-oriented programming.	2	3	-	-	-	-	-	-	-	-	-	2	-	-
CO3	Analyze the algorithm in C++.	1	-	1	-	-	-	-	-	-	-	-	-	-	-
CO4	Distinguish the different types of overloading & Inheritance.	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	Understand the templates and scripting languages.	-	1	-	-	-	-	-	-	-	-	-	2	-	-
Course Code	192ES3O04-Sensors & Actuators (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Classify various sensors/transducers based on their applications.	-	-	-	2	2	1	-	-	-	-	-	2	-	-
CO2	Dissect various types of Resistive, Inductive and Capacitive Sensors.	2	3	-	3	3	3	-	-	3	-	3	3	-	-
CO3	Analyze various approaches, procedures and results related to Thermal and Magnetic sensors.	2	3	2	3	3	1	-	-	3	-	3	3	-	1
CO4	Examine the radiation sensors based on their characteristics.	2	3	2	3	3	-	2	-	3	-	3	3	-	1

	CO Statements	POs											PSOs		
CO5	Apply Smart Sensors in the field of Communication, Automation and Manufacturing.	1	3	1	3	3	2	-	-	3	-	2	3	2	-
CO6	Perceive various control values and types of actuators.	3	3	-	3	3	3	-	-	3	-	3	3	-	3
Course Code	192VD3001-Physical Design Automation (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand the relationship between design automation algorithms and various constraints posed by VLSI fabrication and design technology	-	1	-	2	-	-	-	-	-	-	-	-	-	-
CO2	Adapt the design algorithms to meet the critical design parameters.	-	3	-	3	-	-	-	-	-	-	-	-	-	-
CO3	Identify layout optimization techniques and map them to the algorithms	1	-	-	3	-	-	-	-	-	-	-	-	-	-
CO4	Develop proto-type EDA tool and test its efficacy	-	-	-	-	3	-	-	-	-	-	-	-	-	-
CO5	Analyze the different partitioning algorithms and its evolution.	2	3	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	192VD3002-VLSI Technology (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Summarize characteristics of MOS transistors.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Outline the MOS fabrication process and short channel effects.	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	Identify the basic rules in layout designing.	3	3	2	-	3	-	-	-	-	-	-	-	-	-
CO4	Analyze various combinational logic networks and sequential systems.	3	3	2	2	3	-	-	-	-	-	-	-	-	-
Course Code	192VD3003-Nano-electronics (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Demonstrate challenges due to scaling on CMOS devices	-	3	-	2	2	3	-	1	1	1	3	2	1	-
CO2	Analyse and explain working of novel MOS based silicon devices and various multi gate devices.	2	3	2	2	2	3	-	1	1	1	3	2	3	1
CO3	Analyse working of spin electronic devices	2	3	2	2	2	3	-	1	1	1	3	2	3	1
CO4	Summarize nano electronics systems and building blocks such as: low dimensional semiconductors, hetero structures, carbon nano tubes, quantum dots, nanowires etc.	1	2	-	3	-	-	-	-	-	-	-	2	1	-
CO5	Develop nano electronics systems and building blocks such as: carbon nanotubes, quantum dots, nanowires etc.	-	2	-	3	3	2	-	2	2	2	2	3	2	-
CO6	Explain various design methodologies for chip design.	3	2	3	1	1	2	1	-	-	-	2	1	2	2
Course Code	192CS3001-Python Programming (CSE) (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Apply fundamental concepts of Python programming language.	3	3	-	-	3	-	-	-	-	-	-	-	-	-
CO2	Develop programs using control statements.	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Use data structures in Python to solve various problems.	-	2	1	1	-	-	-	-	-	-	3	-	-	-
CO4	Develop programs using functions, strings and files.	3	-	-	-	3	-	-	-	-	-	-	-	-	-
CO5	Make Use of Standard libraries like math, turtle, tkinter, re etc. in building real time applications.	-	-	-	1	3	-	-	-	-	-	3	-	-	-
CO6	Discuss on Object Oriented Programming concepts and Exceptions.	-	1	-	-	2	-	-	-	-	-	2	-	-	-
CO7	Design various applications using database connectivity.	3	2	1	1	3	-	-	-	-	-	3	-	-	-

	CO Statements	POs											PSOs		
Course Code	192PE3001-Introduction to Petroleum Engineering (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand the role of petroleum engineers in various facets of petroleum exploration, production, transportation, refining and processing.	3	2	1	2	-	-	-	-	-	-	-	-	-	-
CO2	Students get motivated to work for the energy security after knowing the present scenario of petroleum and natural gas.	2	2	1	2	-	1	-	-	-	-	-	-	-	-
CO3	Analyze various case studies available in petrochemical, fine chemical, bioprocesses and carbon capture.	3	2	1	2	-	-	-	-	-	-	-	-	-	-
CO4	Explain the principal involved in gathering oil and gas storage.	3	2	-	1	1	-	-	-	-	-	-	-	-	-
CO5	Understand the basic concepts of Downstream processing.	2	2	-	2	1	-	1	-	-	1	1	-	-	-
Course Code	192PE3002-Process Intensification (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Apply the basic principles and mechanisms that are responsible for process intensification.	3	2	1	2	-	-	-	-	-	-	-			
CO2	Analyze various modifications to process equipment and designs with which process intensification becomes a reality in unit operations and unit processes.	2	2	1	2	-	1	-	-	-	-	-			
CO3	Analyze various case studies available in petrochemical, fine chemical, bioprocesses and carbon capture.	3	2	1	2	-	-	-	-	-	-	-			
CO4	Correlate textbook reported methodologies with Computational Fluid Dynamics	3	2	-	1	1	-	-	-	-	-	-			
CO5	Correlate textbook reported methodologies with experimental process intensification.	2	2	-	2	1	-	1	-	-	1	1			
Course Code	192PE3003-Fundamentals of Liquefied Natural Gas (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain the LNG value chain.	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Classify the different liquefaction technologies of LNG.	3	2	-	-	1	-	-	-	-	-	-	-	-	-
CO3	Explain the components of LNG receiving terminals.	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Summarize LNG storage and transportation facilities.	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Identify major equipment and safety aspects of LNG industry.	3	2	-	-	3	-	-	-	-	-	-	-	-	-
Course Code	192PE3004-Subsea Engineering (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain Overall View of subsea engineering.	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Explain the Subsea Distribution System.	-	3	-	-	-	-	2	1	-	-	-	-	-	-
CO3	Identification and monitoring of Subsea Control.	2	3	-	1	-	-	-	-	-	-	-	-	-	-
CO4	Studies on Subsea Power Supply, Subsea systems engineering.	1	-	-	-	-	3	-	-	-	-	-	-	-	-
CO5	Understanding the Hydrates, Wax and Asphaltenes.	-	-	2	-	2	-	-	-	-	-	1	-	-	-
Course Code	192PE3005-Geology (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain the general facts of the earth.	2	-	-	-	-	2	2	1	-	-	-	-	-	-

