

ADITYA ENGINEERING COLLEGE An Autonomous Institutuion

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Department of Petroleum Technology

M.Tech. (Petroleum Engineering) - AR19 - Course Articulation Matrix

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

	CO Statements						POs	3						PSOs	
		I SE	M												
Course Code	192PE1T01-Offshore Drilling.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain deep-water applications of subsea technology.	3	-	-	-	-	3	-	-	-	-	-	2	-	-
CO2	Classify offshore oil and gas operations considering the real scenarios.	-	-	3	-	3	=	=	-	-	-	-	3	-	-
CO3	Interpret offshore drilling and well completion operations.	-	-	-	-	3	-	-	-	-	2	-	3	-	-
CO4	Explain develop directional drilling techniques considering MWD, LWD.	2	1	ı	-	-	3	=	=	3	-	-	i i	1	-
CO5	Demonstrate the concepts of decompression chambers, life boats-Offshore	ı	-	ı	-	-	-	-	-	3	-	-	ı	-	1
Course Code	192PE1T02-Fundamentals of Petroleum Geology and Reservoir Engineering. (NON-PE stream)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Classify origin of source rocks, different from reservoir rocks, different	3	2	-	-	3	-	-	-	2	-	-	2	-	-
CO2	source and characterization of reservoir rocks	2	-	-	-	3	-	-	-	-	3	-	3	-	-
CO3	Explain how and why fluid hydrocarbons migrate from a source rock to	3	-	=	=	-	-	-	-	=	2	-	3	-	-
CO4	reservoir rock, entrapment, and accumulation of hydrocarbons.	-	1	-	-	-	3	2	-	-	-	-	-	1	-
CO5	Apply some basic concepts in reservoir engineerings such as recovery	-	2	2	-	3	-	-	-	-	-	-	-	-	1
Course Code	192PE1T03-Reservoir Stimulation (PE stream)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain various approaches to properties of formation materials	1	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	Solve the data for the formation damage, well test and perforations	-	-	-	-	-	-	-	3	1	-	-	3	-	-
CO3	Apply the hydraulic fracturing approaches using geometry, fluid temperature and conductivity.			3	-	3		-	-	-	-	-	3	-	-
CO4	Solve practical problems in reservoir fracturing and remedies to resolve the same in matrix acidizing of sandstones	-	-	3	-	-	2	-	-	2	-	-	=	1	-
CO5	Apply gravel packing consolidation techniques and sand control	2	=	-	2	-	=	=	=.	-	-	-	-	-	1

	CO Statements						POs							PSOs	
Course Code	192PE1T04-Petroleum Well Drilling and Production Engineering. (NON-PE stream)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Apply drilling concepts from well planning to rig mobilization to thelocation.	3	2	3	-	-	2	-	-	-	-	-	2	-	-
CO2	Explain the suitable casing, cementation design, well control, stuckpipe, fishing problems and drillers log.	-	2	-	1	-	-	=	=	-	=	=	3	=	-
CO3	Calculate productivity index (PI), inflow performance relationships(IPR) for oil and gas wells.	2	-	ı	=	-	-	II.	2	=	ı	=	3	=	-
CO4	Calculate well performance with concepts of single and multi-phasefluid flow in pipes considering energy and pressure losses.	-	-	2	=	-	2	II.	=	=	ı	=	=	1	-
CO5	Apply nodal analysis by performance prediction and surface pressure optimization evaluation of choke performance	-	-	-	3	-	3	-	-	-	-	-	-	-	1
Course Code	192PE1E01-Advanced Numerical Methods and Applied Statistics (Elective-I)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Compute the values of single and double integrals using numerical methods.	-	-	3	1	1	-	=	=		Ξ	=	2	=	-
CO2	Solve ordinary differential equations using numerical methods	2	3	3	1	2	=	-	-	-	Е	=	3	=	=
CO3	Apply implicit and explicit methods to solve partial differential equations	2	2	3	1	-	-	-	-	-	-	-	3	-	-
CO4	Solve boundary value problems using finite element methods	2	3	3	1	2	-	-	-	-	-	-	-	1	-
CO5	Find probabilities of two-dimensional random variables, hazard rate and reliability of probability distributions	1	3	-	3	-	-	-	-	-	-	-	-	-	1
Course Code	192PE1E02-CBM& Shale Gas Engineering (Elective-I)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Master the fundamentals of Coal Bed Methane.	3	2	3	-	-	2	-	-	-	-	-	2	-	-
CO2	Construct different Isotherms and evaluate different logs for CBM Reservoirs.	3	2	-	1	-	-	-	-	1	-	-	3	-	-
CO3	Understand Reservoir, Drilling and production of CBM.	2	-	-	-	-	-	-	2	-	-	-	3	-	-
CO4	Illustrate the Origin and Characterize Shale Gas.	-	-	2	-	-	2	-	-		ı	-	-	1	-
CO5	Evaluation and analysis of play of different shale gas reservoirs.	3	-	-	3	-	3	-	-	-	П	=	=	=	1
Course Code	192PE1E03-Transportation of Oil and Gas (Elective-II)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain pipe line operations & maintenance.	-	-	-	-	-	2	-	3	1	-	-	2	-	-
CO2	Illustrate flow assurance challenges for subsea pipelines.	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	Demonstrate wax and asphaltenes management strategy and philosophies.	-	3	2	2	=	-	=	=	2	=	=	3	-	-
CO4	Classify transportation of crude oil and natural gas pipelines.	2	-	-	-	3	-	-	-	-	-	-	-	1	-
CO5	Calculate the computer simulation of the subsea systems, hydrates by	-	2	-	-	3	-	-	-	-	-	-	-	-	1

	CO Statements						POs	3						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	-
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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	1						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	-	-	-	ı	-	-	-	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	-	1	=	=	-	-	-	Ξ	=	3	=	-
CO4	Apply single and multi-block wells, practical considerations dealing with modelling and well conditions.	2	1	=	-	Ü	П	=	=	=	Ü	=	Ü	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	=	=	ı	ı	-	=	=	3	=	ı	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	ı	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	3						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	ı	=
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	3						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 & A	Audit	Course	e-2 I &	k II SE	Ms	ı								
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	-	-	-	1	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	-	-	-	-	-	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	
СОЗ	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution	-	-	-	-	-	-	-	-	-	1	-	1	-	-
CO4	Demonstrate the passage of the Hindu Code Bill of 1956.	-	-	-	-	-	-	-	-	-	1	-	1	-	-
Course Code	192MC1A06-192MC2A06-Pedagogy Studies	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Distinguish the various pedagogical practices are being used by teachers in formal and informal classrooms in developing countries.	-	-	-	-	-	-	-	-	1	-	-	-	-	1
CO2	Explain the evidence on the effectiveness of various kinds of pedagogical practices, in different conditions.	-	-	-	-	-	-	-	-	1	-	-	-	-	1
CO3	Discuss the teacher's attitudes and beliefs in line with pedagog strategies.	-	-	-	-	-	-	-	-	1	-	-	-	-	1
CO4	Prepare school curriculum and guidance material best support effective pedagogy.	-	-	-	-	-	-	-	-	1		-	-	-	1
CO5	List the research gaps.	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Course Code	192MC1A07-192MC2A07-Stress Management by Yoga	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Develop healthy mind in a healthy body to improve social health.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Course Code	192MC1A08-192MC2A08-Personality Development through Life Enlightenment Skills	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Develop his/her personality and achieve the highest goal in life.	-	-	-	-	-	-	-	-	1	=	-	-	-	-
CO2	Capable of lead the nation and mankind to peace and prosperity.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO3	Develop versatile personality of students.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Course Code	192MC1A09-192MC2A09-Soft Skills	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Summarize the basic grammatical skills.	-	-	-	-	-	-	-	2	-	-	-	-	-	-
CO2	Understand interview skills & importance of business etiquette.	-	-	-	-	-	-	-	2	-	-	-	-	-	-
CO3	Apply typical write-up skills for business need.	-	-	-	-	-	-	-	2	-	-	-	-	-	1
CO4	Prepare a professional resume.	-	-	-	-	-	-	-	2	-	-	-	-	-	-
CO5	Use the tools of the soft skills.	-	-	-	-	-	-	-	2	-	-	-	-	-	-
	Open E	lective	e - III S	SEM											
Course Code	192ST3O01-Repair & Rehabilitation of Structures (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Identify the causes of deterioration of concrete structures.	1	-	-	-	3	-	-	-	-		-	-	-	
CO2	Illustrate the various materials for repair and rehabilitation techniques.	-	-	-	-	2	-	-	-	-	_	-	-	-	
CO3	Construct the various strengthening and stabilization techniques.	1	-	-	-	3	-	-	-	-	-	-	-	-	
CO4	Determine various repair techniques of damaged structures.	3	-	-	-	3	-	-	-	-	-	-	-	-	-
CO5	Evaluate the usage of different types of concretes and durability aspects.	3	-	-	-	3	-	-	-	-	-	-	-	-	-

	CO Statements						POs	5						PSOs	
CO6	Classify the usage of high performance concretes for repairing works.	3	-	-	-	3	-	-	=.	-	-	-	-	-	-
Course Code	192ST3O02-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	192ST3O03-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	192ST3O04-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	192PD3O01-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.	-				-	- 1	-	-	-	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	192PD3O02-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	-	1	-	-	-	-	-	-	-	-
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	
Course Code	192PD3O03-Energy Audit and conservation Management (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain energy efficiency, conservation and various technologies.	2	1		-	2	2	3	2	3	3	2	=	=	=
CO2	Design energy efficient lighting systems.	-	=		-	2	2	3	-	ı	3	=	=	=	=
CO3	Calculate power factor of systems and propose suitable compensation techniques.	2	-	-	-	-	=	3	-	=	=	-	-	-	-
CO4	Explain energy conservation in HVAC systems	-	-		-	-	1	-	-	1	=	=	=	-	-
CO5	Calculate life cycle costing analysis and return on investment on energy efficient technologies.	3	3	·	2	3	-	3	-	-	1	-	-	-	-
Course Code	192PD3O04-Neural Networks and Fuzzy Logic (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Demonstrate different models of artificial neuron.	2	1			2									
CO2	Identify various learning methods of ANN.	3	2	1	1	3									
CO3	Analyze the various feed forward neural networks and Hopfield Network.	3	3	2	2	2									
CO4	Compare and Contrast Classical and Fuzzy sets.	2	1			2									
CO5	Utilize different modules of Fuzzy Logic Controller for rule base and decision making Systems.	3	2	1	1	3									
CO6	Analyze the application of fuzzy logic control to real time systems.	3	3	2	2	2									
Course Code	192PD3O05-Industrial Safety (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand the general industrial requirements like lighting, cleanliness prevention from hazards and accidents.	2	-	-		-	=	-	=	=	=	-	-	-	-
CO2	Analyze maintenance requirements of the industry and cost associated.	=	1	-	-	-	=	-	=	=	=	-	-	-	-
CO3	Analyze wear and corrosion aspects of the industry and their prevention.	=	1	-	-	-	=	-	=	=	=	-	-	-	-
CO4	Identify the faults prone areas and their repair and periodic maintenance.	2	-	T.	-	-	ı	-	-	Ü	-	-	-	-	-
Course Code	192PD3O06-Composite Materials (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand characteristics and advantages of composite materials	2	-	-		-	-	-	-	-	-	-	-	-	-
CO2	Acquire knowledge of reinforcement, glass fiber, etc.	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Identify the usage of metal matrix composites	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Understand manufacturing of polymer matrix composites	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Identify different types of failures.	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	192TE3O01-Energy Systems (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain the working principle of various energy systems.	2	-	-	-	-	1	-	-	-	-	-	-	-	-
CO2	Calculate the availability analysis of the energy systems and cycles.	2	1	2	-	-	1	-	-	-	-	-	-	-	-
CO3	Explain the design and working principles of combustion systems.	2	1	1	-	-	1	-	-	-	-	-	-	-	-

	CO Statements						POs	3						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	192TE3O02-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	192TE3O03-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	ı	-	-	-	3	2	ı	ı	ı	-
CO2	Explain the different methods of solar energy storage and their applications.	3	3	1	3	I	-	1	=	3	3	II.	II.	ll.	=
CO3	Illustrate the various types of wind mills and performance characteristics.	3	3	2	1	=	=	1	-	2	2	=	=	1	Ε
CO4	Explain the principle of Biomass production, Geothermal energy sources and Ocean thermal energy conversion	3	3	2	1	ı	-	1	-	2	2	ı	ı	ı	-
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	192TE3O04-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	-	-	-	-	ı	ı	-	-
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	-	-	-	ı	ı	ı	ı	-
CO5	Explain the constructional and working principles of electrical vehicle and their accessories.	1	2	1	1	1	3	-	-	-	1	1	1	1	-
Course Code	192TE3O05-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	=	=	-	ī	ı	Ü	ū	-	=	ı
CO2	Analyze the hardware components, processor performance of an embedded system design.	2	3	2	3	=	=	П	II.	II.	II.	II.	-	=	ll .
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	-	-	-	-	-	-	-	ı	-	2	-
CO2	Compare the different programming techniques in object-oriented programming.	2	3	=	-	-	=	1	11	11	1	=	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	2	3		2		3		3	3		1

	CO Statements						POs	3						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	192VD3O01-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.	1	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	192VD3O02-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	192VD3O03-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	192CS3O01-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	192CS3O02-Principles of Cyber Security (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3		
CO1	Illustrate cybercrime fundamentals.	2	1	-	-	2	-	-	-	-	-	-	-	-	-		
CO2	Analyze cyber offence planning.	3	3	2	2	3	-	-	-	-	-	-	-	-	-		
CO3	Interpret cybercrime on mobile and wireless devices.	3	3	3	3	3	-	-	-	-	-	-	-	-	-		
CO4	Distinguish type of tools and methods used in cyber crimes.	3	3	2	2	3	-	-	-	-	-	-	-	-	-		
CO5	Explain the importance of cyber security.	2	1	-	-	2	,	-	-	-	-	-	-	-	-		
Course Code	192CS3O03-Internet of Things (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3		
CO1	Summarize on the term 'internet of things' in different contexts.	3	-	-	1	-	-	-	-	-	-	-	-	-	-		
CO2	Analyze various protocols for IoT.	3	3	2	-	-	-	-	-	-	-	-	-	-	-		
CO3	Design a PoC of an IoT system using Rasperry Pi/Arduino.	3	2	3	-	-	-	-	-	-	-	-	-	-	-		
CO4	Apply data analytics and use cloud offerings related to IoT.	3	3	1	2	-	-	-	-	-	=	=	=	=	-		
CO5	Analyze applications of IoT in real time scenario.	3	3	2	-	-	-	-	-	-	-	-	-	-	-		
Course Code	192CS3O04-Machine Learning (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3		
CO1	Domain Knowledge for Productive use of Machine Learning and Diversity of Data	3	2	=	=	2	=	ı	=	i i	=	=	=	=	=		
CO2	Demonstrate on Supervised and Computational Learning problems.	3	2	1	-	3	-	-	-	-	-	-	-	-	-		
CO3	Analyze on Statistics in learning techniques and Logistic Regression.	3	2	1	-	3	-	-	-	-	-	-	-	-	-		
CO4	Illustrate on Support Vector Machines and Perceptron Algorithm.	3	2	1	-	3	-	-	-	-	=	-	-	-	-		
CO5	Design a Multilayer Perceptron Networks and classification of decision tree.	3	3	3	-	3	-	-	-	-	-	-	-	-	-		
Course Code	192CS3O05-Artificial Intelligence (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3		
CO1	Describe the fundamentals of Artificial Intelligence and its applications.	2	1	-	-	2	-	-	-	-	-	-	-	-	-		
CO2	Illustrate the time and space complexities of searching techniques.	2	1	-	-	2	-	-	-	-	-	-	-	-	-		
CO3	Apply various logical systems to inference the different logical problems.	3	2	1	1	3	-	-	-	-	-	-	-	-	-		
CO4	Create knowledge structure using traditional and complex structures and Advanced knowledge representation techniques.	3	2	1	1	3	-	-	-	-	-	-	-	-	-		
CO5	Apply Fuzzy Logic and Reasoning to handle Uncertainty for solving scientific Problems.	3	2	1	1	3	-	-	-	=	=	-	-	=	=		
Course Code	192CS3O06-Deep Learning (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3		
CO1	Demonstrate the basic concepts fundamental learning techniques and layers.	II.	1	=	=	=	=	ı	=	i i	=	=	=	=	=		
CO2	Discuss the Neural Network training, various random models.	-	1	-	2	-	=	-	-	-	-	-	=	-	-		
CO3	Identify different types of deep learning network models.	1	3	3	-	3	-	-	-	-	-	-	-	-	-		
CO4	Classify the Probabilistic Neural Networks.	1	-	3	-	3	-	-	-	-	-	-	-	-	-		
CO5	Implement tools on Deep Learning techniques.	1	2	3	3	-	-	-	-	-	-	-	-	-	-		

	CO Statements				PSOs										
Course Code	192PE3O01-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	-	-	-	-	-	-	-	-	-	ı
CO4	Explain the principal involved in gathering oil and gas storage.	3	2	-	1	1	T	-	-	-	=	-	-	-	1
CO5	Understand the basic concepts of Downstream processing.	2	2	-	2	1	-	1	-	-	1	1	-	-	-
Course Code	192PE3O02-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	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	ı	1	=	=	1	1			
Course Code	192PE3O03-Fundamentals of Liquified 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	-	-	-	1	1	-	-	-	-	-	-	-	-
CO4	Summarize LNG storage and transportation facilities.	3	1	-	-	-	-	-	=	-	=	-	=	-	-
CO5	Identify major equipment and safety aspects of LNG industry.	3	2	-	-	3	-	-	-	-	-	-	-	-	=
Course Code	192PE3O04-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	-	-	-	1	2	1	-	-	-	-	-	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	-	-	1
Course Code	192PE3O05-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	-	-	-	-	-	-

	CO Statements	POs												PSOs			
CO2	Analyze the different processes for the formation of land forms.	2	2	-	-	-	=	-	-	-	-	-	-	-	-		
CO3	Analyze the different structures like folds, faults etc.	2	2	1	-	-	T	-	-	-	-	-	-	-	-		
CO4	Compare and classify various kinds of rocks.	-	2	-	-	-	÷	-	-	·	-	-	-	-	-		
CO5	Explain the process of transportation, generation of sedimentary structures	2	2	-	2	1	-	2	-	-	2	1	-	-	-		
Course Code	192PE3O06-HSE in Petroleum Industry (Open Elective)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3		
CO1	Explain the environmental issues in drilling and production operations.	-	-	-	-	-	2	-	3	1	-	-	-	-	-		
CO2	Summarize impacts of petroleum industry wastes and waste treatment methods.	3	3	-	-	=	=	-	=	-	=	=	-	Ξ	=		
CO3	Demonstrate the oil mines regulations in various petroleum industry operations.	ı.	3	2	2	=	ī	=	=	2	П	ı	=	ï	-		
CO4	Make use of the hazop study concepts for safe practices in Petroleum industry.	2	-	-	-	3	ı	-	-	-	-	-	-	-	-		
CO5	Illustrate the fire triangle, different methods of suppression of hydrocarbon fires.	-	2	-	-	3	-	-	-	ij	-	-	-	-	-		