ADITYA ENGINEERING COLLEGE

An Autonomous Institutuion

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Department of Electrical and Electronics Engineering

M.Tech (Power Electronics & Drives)-AR19-Course Articulation Matrix

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

	CO Statements	POs											PSOs		
I SEM															
Course Code	**192PD1T01-ELECTRICAL MACHINE MODELING & ANALYSIS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the behaviour of DC motor models for different applications.	**2**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO2	Evaluate the characteristics of different types of DC motors for designing suitable controllers	**3**	**3**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO3	Make use of the reference frame theory of AC machines to model the induction and Synchronous machines.	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	Evaluate the steady state and transient behaviour of induction machines to propose the suitability of drives for different industrial applications.	**2**	**-**	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**
CO5	Evaluate the steady state and transient behaviour of synchronous machines to propose the suitability of drives for different industrial applications.	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**3**
Course Code	**192PD1T02-ANALYSIS OF POWER ELECTRONIC CONVERTERS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the switching characteristics of different power switching devices.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO2	Describe and analyse the operation of AC-DC converters.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO3	Analyze the operation of power factor correction converters.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	Analyze the operation of three phase inverters with PWM control.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**

	CO Statements	POs											PSOs		
CO5	Describe the principles of operation of multi-level inverter and their applications.	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
Course Code	**192PD1E01-MODERN CONTROL THEORY (Professional Elective – I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the state variable approach is suitable for higher order.	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**
CO2	Examine the concepts of controllability and observability.	**-**	**3**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO3	Analyze the various non-linearities through describing functions and phase plane analysis.	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Illustrate the different issues of stability and instability of continuous time invariant systems.	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**-**
CO5	Discuss the various linear time invariant systems using time state equations.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**3**
Course Code	**192PD1E02-POWER QUALITY AND CUSTOM POWER DEVICES (Professional Elective – I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Identify the issues related to power quality in power systems.	**2**	**-**	**-**	**--**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**
CO2	Address the problems of transient and long duration voltage variations in power systems.	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	Analyze the effects of harmonics and study of different mitigation techniques.	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**2**
CO4	Identify the importance of custom power devices and their applications.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO5	Acquire knowledge on different compensation techniques to minimize power quality disturbances..	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**192PD1E03-PROGAMMABLE LOGIC CONTROLLERS&APPLICATIONS (Professional Elective – I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the PLCs and their I/O modules.	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**2**
CO2	Develop control algorithms to PLC using ladder logic etc	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**3**

	CO Statements	POs											PSOs		
CO3	Describe effective utilization of PLC registers in different applications	-	-	3	-	-	-	-	-	-	-	-	3	-	3
CO4	Illustrate data functions to control of two axis and their axis robots with PLC	-	-	3	-	-	-	-	-	-	-	-	-	2	-
CO5	Design PID controller with PLC	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Course Code	**192PD1E04-ARTIFICIAL INTELLIGENCE TECHNIQUES (Professional Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain neural networks and analyze different types of neural networks.	2	-	2	-	-	-	-	-	-	-	-	3	2	3
CO2	Design training algorithms for neural networks.	3	-	-	-	-	-	-	-	-	-	-	3	3	3
CO3	Develop algorithms using genetic algorithm for optimization.	2	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	Analyze and design fuzzy logic systems.	-	3	-	-	-	-	-	-	-	-	-	3	3	-
CO5	Apply AI Techniques in power electronics and DC drives.	-	-	-	-	-	-	-	-	-	-	-	-	3	-
Course Code	**192PD1E05-RENEWABLE ENERGY TECHNOLOGIES (Professional Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Identify alternate energy sources.	1	-	-	2	-	-	-	-	-	-	2	3	2	3
CO2	Analyze and design induction generator for power generation from wind.	-	-	-	-	-	-	-	-	-	3	-	2	1	2
CO3	Analyze different wind power plants.	2	3	3	3	-	-	-	-	2	-	-	3	-	-
CO4	Design MPPT controller for solar power utilization.	3	-	-	-	2	-	-	-	-	-	-	-	-	-
CO5	Illustrate the basic operation of fuel cells.	1	2	-	-	-	-	-	-	-	-	-	3	2	3

	CO Statements	POs											PSOs		
Course Code	**192PD1E06-HVDC TRANSMISSION AND FLEXIBLE AC TRANSMISSION SYSTEMS (Professional Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Compare HVDC and EHVAC transmission systems.	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Analyze converter configurations used in HVDC and evaluate the performance metrics.	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO3	Recognize controllers for controlling the power flow through a dc link and compute filter Parameters.	**-**	**1**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO4	Apply impedance, phase angle and voltage control for real and reactive power flow in ac transmission systems with FACTS controller.	**-**	**2**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO5	Analyze and select a suitable FACTS controller for a given power flow condition.	**-**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
Course Code	**192HS1T01-RESEARCH METHODOLOGY AND IPR**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Understand research problem formulation.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Analyze research related information.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO3	Demonstrate research ethics.	**2**	**1**	**-**	**-**	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**2**	**3**	**-**
CO4	Explain the today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.	**-**	**-**	**-**	**-**	**-**	**2**	**3**		**-**	**-**	**-**	**2**	**2**	**-**
CO5	Discuss that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**3**	**3**	**-**
CO6	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**3**	**-**	**-**

	CO Statements	POs											PSOs		
Course Code	**192PD1L01-POWER ELECTRONICS SIMULATION LABORATORY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze, model and simulate various converters such as DC-D converters, single-phase and three phase inverters, multi-level inverters and choppers.	**3**	**2**	**-**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO2	Compare, evaluate and choose appropriate converter topology for a given application.	**-**	**3**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO3	Design suitable PWM technique for a given converter application.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	Develop the PWM techniques in simulation.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
CO5	Choose appropriate control techniques and design the controller for various converters	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
Course Code	**192PD1L02-POWER CONVERTERS LABORATORY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze, model and simulate various converters such as DC-DC converters, single-phase and three phase inverters, multi-level inverters and choppers.	**3**	**2**	**-**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO2	Compare, evaluate and choose appropriate converter topology for a given application.	**-**	**3**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO3	Design suitable PWM technique for a given converter application.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	Develop the PWM techniques in simulation.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
CO5	Choose appropriate control techniques and design the controller for various converters.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
II SEM															
Course Code	**192PD2T03-SWITCHED MODE POWER CONVERSION**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the operation of non-isolated switch mode converters.	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**3**
CO2	Analyze the operation of isolated switch mode converters.	**-**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**

	CO Statements	POs											PSOs		
CO3	Analyze the operation and control of resonant converters	-	-	2	1	-	-	-	-	-	-	-	-	-	-
CO4	Apply different control schemes of switching converters.	1	-	3	2	-	-	-	-	-	-	-	3	2	-
CO5	Design the switch mode converters based on linearized models.	3	2	1	2	-	-	-	-	-	-	-	-	1	3
Course Code	**192PD2T04-POWER ELECTRONIC CONTROL OF ELECTRICAL DRIVES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain operation of induction motor and analyses speed control of AC drives by VSI fed drives.	2	3	3	3	-	-	-	-	-	-	-	3	-	3
CO2	Discuss the vector control of induction motors.	3	2	-	3	2	-	-	-	-	-	-	3	3	-
CO3	Analuze operation of traction drives.	-	3	3	-	-	-	-	-	-	-	-	-	3	-
CO4	Analyze control schemes to synchronous motor drives.	2	-	3	3	1	-	-	-	-	-	-	3	-	3
CO5	Examine the control of switched reluctance motor & stepper motor.	3	3	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**192PD2E07-CONTROL & INTEGRATION OF RENEWABLE ENERGY SYSTEMS (Professional Elective – III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Illustrate the different conventional & non-conventional dynamic energy conversion technologies.	2	1	2	-	-	-	-	-	1	-	-	2	1	2
CO2	Analyze the principles of static energy conversion technologies.	2	3	3	-	-	-	-	-	1	-	-	3	-	3
CO3	Explain basics of real & reactive power control with renewable generators.	-	2	3	2	-	-	-	-	-	-	-	3	2	3
CO4	Analyze the principles of standalone and grid connected systems.	2	3	3	3	1	-	-	1	2	-	-	-	3	-
Course Code	**192PD2E08-HYBRID ELECTRIC VEHICLES (Professional Elective – III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the architectures of HEVs with various components.	2	1	2	-	-	-	-	-	-	-	-	2	1	-

	CO Statements	POs											PSOs		
CO2	Illustrate the concept of Electric Vehicle and Hybrid Electric Vehicles.	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO3	Explain the Plan concept of Plug-in Electrical Vehicles.	**1**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**
CO4	Analyze the power electronics converters for HEVs.	**2**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO5	Apply various energy storage technologies in Hybrid Vehicles.	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
Course Code	**192PD2E09-DIGITAL CONTROL SYSTEMS (Professional Elective – III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the advantages of discrete time control systems and theory of z–transformations.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO2	Apply the discrete–time systems in state–space model.	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Analyze the significance stability of the system using different tests.	**3**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**
CO4	Illustrate concept of State Observers in State feedback systems.	**1**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**
CO5	Analyze the concept of Quadratic Optimal Control Systems and its discretization.	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
Course Code	**192PD2E10-ADVANCED DIGITAL SIGNAL PROCESSING (Professional Elective – IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Describe structure of digital filters.	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**1**	**2**
CO2	Design digital filters with different techniques.	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**3**	**-**	**3**
CO3	Analyze the implementation aspects of signal processing algorithms.	**1**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**3**
CO4	Illustrate the effect of finite word length in signal processing.	**2**	**3**	**3**	**3**	**1**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**3**	**-**
CO5	Analyze different power spectrum estimation techniques.	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**	**3**	**-**

	CO Statements	POs											PSOs		
Course Code	**192PD2E11-APPLICATIONS OF POWER CONVERTERS (Professional Elective – IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze power electronic application requirements.	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**1**	**2**
CO2	Identify suitable power converter from the available configurations.	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**3**	**-**	**3**
CO3	Develop improved power converters for any stringent application requirements.	**1**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**3**
CO4	Illustrate the existing control techniques to suit the application.	**2**	**3**	**3**	**3**	**1**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**3**	**-**
CO5	Design of Bi-directional converters for charge/discharge applications.	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**3**	**3**	**3**	**-**	**3**	**3**	**-**
Course Code	**192PD2E12-MICROCONTROLLERS (Professional Elective – IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Design the interfacing circuits for input and output to PIC micro controllers and DSP processors.	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**1**	**2**
CO2	Write ALP for DSP processors.	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**3**	**-**	**3**
CO3	Design PWM controller for power electronic circuits using FPGA.	**1**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**3**
Course Code	**192PD2L03-ELECTRIC DRIVES SIMULATION LABORATORY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the performance of various electrical drives.	**3**	**2**	**-**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO2	Choose appropriate converter topology for a specific drive application.	**-**	**3**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO3	Design a suitable multi-level converter for induction motor.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	Develop the PWM techniques for electric drives.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
CO5	Design a re-generative braking for inverter fed induction motor.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**

	CO Statements	POs											PSOs		
Course Code	**192PD2L04-ELECTRIC DRIVES LABORATORY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the performance of various electrical drives.	**3**	**2**	**-**	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO2	Choose appropriate converter topology for a specific drive application.	**-**	**3**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**
CO3	Design a suitable multi-level converter for induction motor.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	Develop the PWM techniques in simulation for electric drives.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
CO5	Design a re-generative braking for inverter fed induction motor.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**
Course Code	**192MC1A01 or 192MC2A01-ENGLISH FOR RESEARCH PAPER WRITING (Audit Course)**	**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**	**-**	**-**	**-**	**-**	**1**
CO2	Illustrate what to write in each section.	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**1**
CO3	Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission.	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**1**
Course Code	**192MC1A02 or 192MC2A02-DISASTER MANAGEMENT (Audit Course)**	**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**	**-**	**-**	**-**	**1**
CO2	Evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**
CO3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**
CO4	Understand the strengths and weaknesses of disaster management approaches.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**
Course Code	**192MC1A03 or 192MC2A03-SANSKRIT FOR TECHNICAL KNOWLEDGE (Audit Course)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**

	CO Statements	POs											PSOs		
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 or 192MC2A04-VALUE EDUCATION (Audit Course)**	**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 or 192MC2A05-CONSTITUTION OF INDIA (Audit Course)**	**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	-	-	-	-
CO2	Explain the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO3	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	-	-	-	-
CO4	Demonstrate the passage of the Hindu Code Bill of 1956	-	-	-	-	-	-	-	-	-	1	-	-	-	-

	CO Statements	POs											PSOs		
Course Code	**192MC1A06 or 192MC2A06-PEDAGOGY STUDIES (Audit Course)**	**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	-	-	-	-	-
CO2	Explain the evidence on the effectiveness of various kinds of pedagogical practices, in different conditions.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO3	Discuss the teacher's attitudes and beliefs in line with pedagogic strategies.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO4	Prepare school curriculum and guidance material best support effective pedagogy.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	List the research gaps.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	**192MC1A07 or 192MC2A07-STRESS MANAGEMENT BY YOGA (Audit Course)**	**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 or 192MC2A08-PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS (Audit Course)**	**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 or 192MC2A09-SOFT SKILLS (Audit Course)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Summarize the basic grammatical skills.	-	-	-	-	-	-	-	2	-	-	-	1	1	1
CO2	Understand interview skills & importance of business etiquette.	-	-	-	-	-	-	-	2	-	-	-	1	1	1
CO3	Apply typical write-up skills for business need.	-	-	-	-	-	-	-	2	-	-	-	1	1	1

	CO Statements	POs											PSOs		
CO4	Prepare a professional resume.	-	-	-	-	-	-	-	2	-	-	-	1	1	1
CO5	Use the tools of the soft skills.	-	-	-	-	-	-	-	2	-	-	-	1	1	1
III SEM															
Course Code	**192PD3E13-DIGITAL SIGNAL PROCESSING CONTROLLED DRIVES (Professional Elective – V)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the performance of various electrical drives.	3	2	-	1	3	-	-	-	-	-	-	3	3	-
CO2	Choose appropriate converter topology for a specific drive application.	-	3	2	2	3	-	-	-	-	-	-	3	3	-
CO3	Design a suitable multi level converter for induction motor.	3	3	2	-	-	-	-	-	-	-	-	3	-	-
CO4	Develop the PWM techniques in simulation for electric drives.	3	3	2	-	-	-	-	-	-	-	-	-	-	3
CO5	Design a re-generative braking for inverter fed induction motor.	3	3	2	-	-	-	-	-	-	-	-	-	-	3
Course Code	**192PD3E14-SMART GRID TECHNOLOGIES (Professional Elective – V)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the smart grids and its policies and developments.	2	-	-	-	3	-	-	-	-	-	-	3	-	-
CO2	Develop the basic concepts of smart grid technologies in hybrid electrical vehicles etc.	1	2	1	3	3	-	-	-	-	-	-	3	2	-
CO3	Explain the smart substations, feeder automation, GIS etc.	3	-	3	-	-	-	-	-	-	-	-	3	3	-
CO4	Illustrate micro grids and distributed generation systems.	-	1	-	2	-	-	-	-	-	-		-	-	2
CO5	Investigate the effect of power quality in smart grid and to understand latest developments in ICT for smart grid.	2	-	-	3	-	-	-	-	-	-	-	-	-	3
Course Code	**192PD3E15-MODELING AND SIMULATION OF POWER ELECTRONIC SYSTEMS (Professional Elective – V)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**

	CO Statements	POs											PSOs		
CO1	Understand the back ground activities i.e. numerical solution used in the simulation software.	**2**	**-**	**-**	**--**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**
CO2	Can judge or properly choose the required numerical solver to be used for analysis.	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**
CO3	Can understand and debug the convergence problems occurring during simulation.	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**2**
CO4	Analyze the concept of transient switching in circuit analysis.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO5	Gain knowledge on state space averaging technique of switching converters.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
Course Code	**192ST3O01-REPAIRANDREHABILITATION 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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs											PSOs		
CO4	Use concept of energy and resource conversion in green building construction.	**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														
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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs											PSOs		
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.	**-**		**-**		**-**	**-**	**-**	**-**	**-**	**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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
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**	**-**			
Course Code	**192PD3O03-ENERGY AUDIT, CONSERVATION AND 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**	**-**	**-**	**3**	**-**	**-**	**-**	**-**

	CO Statements	POs											PSOs		
CO3	Calculate power factor of systems and propose suitable compensation techniques.	**2**	-	-	-	-	-	**3**	-	-	-	-	-	-	-
CO4	Explain energy conservation in HVAC systems.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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	Explain 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	Illustrate the faults prone areas and their repair and periodic maintenance	**2**	-	-	-	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs											PSOs		
Course Code	**192PD3O06-COMPOSITE MATERIALS (Open Elective)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Illustrate 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**	-	-	-	-	-	-	-	-
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	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**	-	-	-	-	-	-	-	-	-	-	-

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

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

	CO Statements	POs											PSOs		
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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Compare the different programming techniques in object-oriented programming.	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Analyze the algorithm in C++.	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	Distinguish the different types of overloading & Inheritance.	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Understand the templates and scripting languages.	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**192ES3O04-SENSORS AND 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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	Dissect various types of Resistive, Inductive and Capacitive Sensors.	**2**	**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**	**-**	**-**	**-**
CO4	Examine the radiation sensors based on their characteristics.	**2**	**3**	**2**	**3**	**3**	**-**	**2**	**-**	**3**	**-**	**3**	**-**	**-**	**-**
CO5	Apply Smart Sensors in the field of Communication, Automation and Manufacturing.	**1**	**3**	**1**	**3**	**3**	**2**	**-**	**-**	**3**	**-**	**2**	**-**	**-**	**-**
CO6	Perceive various control values and types of actuators.	**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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

	CO Statements	POs											PSOs		
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	**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	-	-	-
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	-	-	-
CO3	Analyse working of spin electronic devices	2	3	2	2	2	3	-	1	1	1	3	-	-	-
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	-	-	-	-	-	-	-	-	-	-
CO5	Develop nano electronics systems and building blocks such as: carbon nanotubes, quantum dots, nanowires etc.	-	2	-	3	3	2	-	2	2	2	2	-	-	-
CO6	Explain various design methodologies for chip design	3	2	3	1	1	2	1	-	-	-	2	-	-	-

	CO Statements	POs											PSOs		
Course Code	**192CS3O01-PYTHON PROGRAMMING (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**	**-**	**-**	**-**
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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

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

	CO Statements	POs											PSOs		
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.	-	1	-	-	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-	-	-
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	**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	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	-	-	-	-	-	-	-	-	-	-

	CO Statements	POs											PSOs		
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	**192PE3O03-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	**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**	**-**	**-**	**-**	**-**	**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	**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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
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**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	Demonstrate the oil mines regulations in various petroleum industry operations.	**-**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**
CO4	Make use of the hazop study concepts for safe practices in Petroleum industry.	**2**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	Illustrate the fire triangle, different methods of suppression of hydrocarbon fires.	**-**	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Course Code	**192PD3P02-Dissertation I /Industrial Project**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Conduct technical survey to identify a real industrial problem to solve as a project work	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**2**	**-**
CO2	Estimate the resources & constraints in the process of execution	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**
CO3	Develop technical procedure of planning & scheduling to execute an identified project work in line with societal and environmental implications.	**-**	**2**	**-**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**-**
CO4	Estimate the costs of individual stages and overall cost of the project in light of optimum resources allocation	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**
CO5	Estimate the optimum project duration using quantitative techniques.	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**

	CO Statements	POs											PSOs		
Course Code	**192PD3P03-Dissertation II**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Demonstrate technical skills of data collection and data analysis adhering to professional ethics	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**1**	**2**	**-**
CO2	Design the solutions for the critical problem areas marked in data analysis in the light of environmental and societal adherence	**-**	**-**	**3**	**2**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**-**
CO3	Build a team of people to work together and communicate well in the critical stages of project progress.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**1**	**1**	**2**	**-**
CO4	Use modern tools to derive conclusions of the project work effectively	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**2**	**1**	**1**	**2**	**-**
CO5	Demonstrate the results of the project work as a functional product prototype/application/analytical solution for a specified operation	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**2**	**-**