Guru Gobind Singh Foundation's

Guru Gobind Singh College of Engineering and Research Centre, Nashik

Guru Gobind Singh College of Engineering & Research Centre, Nashik

Mechanical Engineering [2022-23]

Course Outcome

Year : FINAL YEAR - SEM-8: BEME-B
Subject : Energy Engineering(Theory | Regular)
Course Code : 402049_Th

CO Id	Course Outcome
CO1	Understand the power generation scenario, role of Govt., energy policies, layout, components of power plant and Evaluate the performance of Rankine cycle applied to thermal power plant
CO2	Evaluate performance of steam condensers, Understand the cooling tower system and Recognize environmental impact of energy systems and methods to control the same.
CO3	Evaluate the performance of diesel power plant and understand the hydel and nuclear energy systems.
CO4	Evaluate the performance of the gas turbine power plant, understand the cogeneration process and evaluate the steam power plant with process heating
CO5	Understand the thermal energy storage system, power plant instrumentation and analyze the cost of electricity based on load and its demand
CO6	Analyze the various renewable energy sources

Guru Gobind Singh College of Engineering & Research Centre, Nashik

Mechanical Engineering [2022-23]

CO PO Desired Mapping Report

Year : FINAL YEAR - SEM-8: BEME-B
Subject : Energy Engineering - Theory
Faculty : Milind Patil
Course Code : 402049_Th

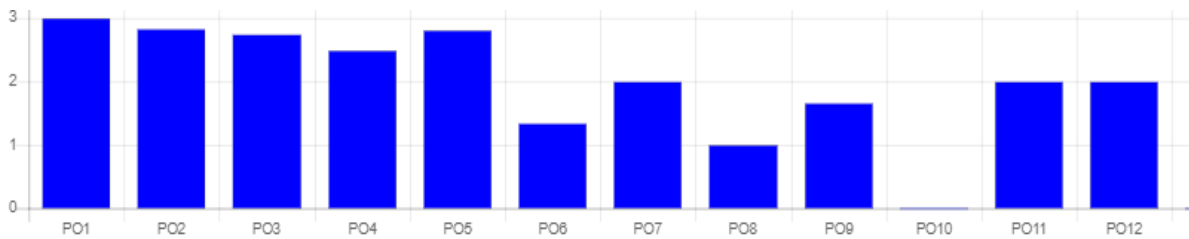
Course Outcome Details

#	Course Outcome	Description
1	CO1	Understand the power generation scenario, role of Govt., energy policies, layout, components of power plant and Evaluate the performance of Rankine cycle applied to thermal power plant
2	CO2	Evaluate performance of steam condensers, Understand the cooling tower system and Recognize environmental impact of energy systems and methods to control the same.
3	CO3	Evaluate the performance of diesel power plant and understand the hydel and nuclear energy systems.
4	CO4	Evaluate the performance of the gas turbine power plant, understand the cogeneration process and evaluate the steam power plant with process heating
5	CO5	Understand the thermal energy storage system, power plant instrumentation and analyze the cost of electricity based on load and its demand
6	CO6	Analyze the various renewable energy sources

Desired Attainment Details

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	3	1	1	1	2					
CO2	3	3	3	3	3	1	3							
CO3	3	3	2		2	1	3							
CO4	3	3	3	2	3	1	1		1					
CO5	3	3			3	2		1	2		2			
CO6	3	2		2		2						2		
Average	3.00	2.83	2.75	2.50	2.80	1.33	2.00	1.00	1.67		2.00	2.00		

Desired Attainment Average : 2.17



Guru Gobind Singh College of Engineering & Research Centre, Nashik

Mechanical Engineering [2022-23]

Justification Report for CO-PO/PSO Desired Mapping

Year : FINAL YEAR - SEM-8: BEME-B
Subject : Energy Engineering - Theory
Faculty : Milind Patil
Course Code : 402049_Th

Justification

Course Outcome	Program Outcome	Level	Justification
CO1	PO1	3	Student will apply the knowledge of mathematics, science and engineering fundamentals, for the solution of complex Rankine cycle applied to thermal power plant.
CO1	PO2	3	Student will Identify, formulate, review literature, and analyze thermal power plant cycle reaching substantiated conclusions of optimum operating parameters using fundamentals of engineering.
CO1	PO3	3	Student will design solutions for reheat and regenerative Rankine cycle that meets the specified needs like power generation and maximum efficiency with appropriate consideration for minimum energy consumptions and environmental considerations
CO1	PO4	3	Student will use research-based knowledge for %u2022 Analysis and interpretation of data for reheat and regenerative Rankine cycle %u2022 Provide valid conclusions for appropriate working variables for maximum efficiency
CO1	PO5	3	Student will use engineering software to create mathematical model for analysis of the reheat and regenerative Rankine cycle
CO1	PO6	1	Student will conversant to assess societal, health, and safety issues and the consequent responsibilities relevant to the engineering practices in thermal power plant
CO1	PO7	1	Understand the impact of thermal power plant in societal and environmental contexts, and demonstrate the need for sustainable development.
CO1	PO8	1	Apply ethical principles and commit to professional ethics and responsibilities while preparing the energy review, understanding the role of government and energy policies

Course Outcome	Program Outcome	Level	Justification
CO1	PO9	2	Student will work in group to create a review report on Indian energy scenario
CO2	PO1	3	Student will apply the knowledge of mathematics, science and engineering fundamentals, for the solution of complex condensing system applied to thermal power plant.
CO2	PO2	3	Student will Identify, formulate, review literature, and analyze steam condensers reaching substantiated conclusions of operating parameters and minimum cooling water requirement.
CO2	PO3	3	Student will design solutions for steam condensers that meets the specified needs like minimum water requirement maximum condenser efficiency and minimum size of air extraction pump
CO2	PO4	3	Student will use research-based knowledge for %u2022 Analysis and interpretation of data for condenser performance %u2022 Provide valid conclusions for appropriate working variables
CO2	PO5	3	Student will use engineering software to create mathematical model for analysis of the steam condensers
CO2	PO6	1	Student will conversant to assess societal, health, and safety issues relevant to use of cooling towers in thermal power plant
CO2	PO7	3	Understand the impact of thermal power plant in societal and environmental contexts, and demonstrate the need for sustainable development.
CO3	PO1	3	Student will apply the knowledge of mathematics, science and engineering fundamentals, for the solution of complex diesel engine and hydro power plant.
CO3	PO2	3	Student will Identify, formulate, review literature, and analyze hydro graph reaching substantiated conclusions of hydro power plant selection.
CO3	PO3	2	Student will design solutions for hydro power plant site selection that meets the specified needs of power plant output and selection of turbine.
CO3	PO5	2	Student will use hydrographs, flow and mass curves for the selection of hydro power plant
CO3	PO6	1	Student will conversant to assess societal, health, and safety issues relevant to use of cooling towers in thermal power plant
CO3	PO7	3	Understand the impact of diesel, hydro and nuclear power plant in societal and environmental contexts, and demonstrate the need for sustainable development.

Course Outcome	Program Outcome	Level	Justification
CO4	PO1	3	Student will apply the knowledge of mathematics, science and engineering fundamentals, for the solution of complex gas turbine and cogeneration power plant.
CO4	PO2	3	Student will Identify, formulate, review literature, and analyze gas turbine power plant reaching substantiated conclusions of operating parameters.
CO4	PO3	3	Student will design solutions for gas turbine and steam power plant with process heating application that meets the specified needs like maximum condenser efficiency and minimum energy consumption
CO4	PO4	2	Student will use research-based knowledge for %u2022 Analysis and interpretation of data for gas turbine performance %u2022 Provide valid conclusions for appropriate working variables
CO4	PO5	3	Student will use engineering software to create mathematical model for analysis of the gas turbine power plant for optimum pressure ratio
CO4	PO6	1	Student will conversant to assess societal, health, and safety issues relevant to use of cooling towers in thermal power plant
CO4	PO7	1	Understand the impact of gas turbine power plant in societal and environmental contexts, and demonstrate the need for sustainable development.
CO4	PO9	1	Student will work in group to create a energy analysis software programming
CO5	PO1	3	Student will apply the knowledge of mathematics, science and engineering fundamentals, for the solution of cost of electricity
CO5	PO2	3	Student will Identify, formulate, review literature, and analyze electrical energy cost and tariff based on fluctuating load power plant.
CO5	PO5	3	Student will use engineering software to create mathematical model for analysis of the electricity cost
CO5	PO6	2	Student will conversant to assess societal, health, and safety issues relevant to use of cooling towers in thermal power plant
CO5	PO8	1	Apply ethical principles and commit to professional ethics and responsibilities while preparing the energy cost analysis report
CO5	PO9	2	Student will work in group to create a review report on Indian energy economics report

Course Outcome	Program Outcome	Level	Justification
CO5	PO11	2	Demonstrate knowledge and understanding of the engineering and management principles for understanding the economics of power generation
CO6	PO1	3	Student will apply the knowledge of mathematics, science and engineering fundamentals, for the solution of various renewable energy sources applications, economics and technical feasibility
CO6	PO2	2	Student will Identify, formulate, review literature, and compare the different renewable energy sources
CO6	PO4	2	Student will use research-based knowledge for %u2022 Analysis and interpretation of data for renewable energy systems %u2022 Provide valid conclusions on technical feasibility and economics
CO6	PO6	2	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to non conventional energy resources
CO6	PO12	2	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Guru Gobind Singh College of Engineering & Research Centre, Nashik

Mechanical Engineering [2022-23]

Course Outcome

Year : FINAL YEAR - SEM-8: BEME-B
Subject : Energy Engineering(Practical | Regular)
Course Code : 402049_Pr

CO Id	Course Outcome
CO1	To design shell and tube condenser for 200 MW thermal power plant with allowable pressure drop of 25 kPA and analyze the performance at different water velocity
CO2	To understand, compare and select methods of production of biodiesel, its properties and analyze the performance as an alternative fuel for IC engine
CO3	To estimate the wind energy from the wind parameters using an ANN and to select the components for wind mill
CO4	Understand the cogeneration process in Sugar industries and evaluation of the performance
CO5	Understand thermal energy storage system, select energy storage materials, evaluate and analyze the system
CO6	To understand the thermal power plant layout, components and their functions and prepare the report on various systems
CO7	Evaluate the performance of the steam power plant
CO8	Evaluate the performance of the diesel power plant

Guru Gobind Singh College of Engineering & Research Centre, Nashik

Mechanical Engineering [2022-23]

CO PO Desired Mapping Report

Year : FINAL YEAR - SEM-8: BEME-B
Subject : Energy Engineering - Practical
Faculty : Milind Patil
Course Code : 402049_Pr

Course Outcome Details

#	Course Outcome	Description
1	CO1	To design shell and tube condenser for 200 MW thermal power plant with allowable pressure drop of 25 kPA and analyze the performance at different water velocity
2	CO2	To understand, compare and select methods of production of biodiesel, its properties and analyze the performance as an alternative fuel for IC engine
3	CO3	To estimate the wind energy from the wind parameters using an ANN and to select the components for wind mill
4	CO4	Understand the cogeneration process in Sugar industries and evaluation of the performance
5	CO5	Understand thermal energy storage system, select energy storage materials, evaluate and analyze the system
6	CO6	To understand the thermal power plant layout, components and their functions and prepare the report on various systems
7	CO7	Evaluate the performance of the steam power plant
8	CO8	Evaluate the performance of the diesel power plant

Desired Attainment Details

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	2	2	2		2	2				
CO2	3	2	2	3	1	2	2		2	2				
CO3	3	3	3	3	3		2		3	3				
CO4	3	3	2	3	1		2		2	2				
CO5	3	3	2	3	1		2		2	2				
CO6	3	2	1	2	2		3		2	2				
CO7	3	2	2	2	2		2		2	2				
CO8	3	2	2	2	3		2		2	2				
Average	3.00	2.50	2.13	2.63	1.88	2.00	2.13		2.13	2.13				

Desired Attainment Average : 2.28

Guru Gobind Singh College of Engineering & Research Centre, Nashik

Mechanical Engineering [2022-23]

Justification Report for CO-PO/PSO Desired Mapping

Year : FINAL YEAR - SEM-8: BEME-B
Subject : Energy Engineering - Practical
Faculty : Milind Patil
Course Code : 402049_Pr

Justification

Course Outcome	Program Outcome	Level	Justification
CO1	PO1	3	Student applies the knowledge of mathematics, science, engineering fundamentals for the solution of complex design of shell and tube condenser of 210 MW thermal power plant
CO1	PO2	3	Student identifies need of condenser, formulate the mathematical model, review research literature for heat transfer correlations, and analyze 210 MW thermal power plant condenser reaching substantiated conclusions of number of tubes, shell diameter, length of tube and pump power required.
CO1	PO3	3	Student design solution for thermal power plant condenser that meet the specified need of 210 MW power output and steam flow rate under given conditions of the steam pressure
CO1	PO4	3	Student analyze the complex design of condenser for various velocities of the cooling water that meets the specified need and provide
CO1	PO5	2	Student uses engineering equation solver program for obtaining the various thermal and physical properties of the working fluid and materials
CO1	PO6	2	Student will conversant to relevant to the engineering practices in the design of steam condenser of a thermal power plant
CO1	PO7	2	Student will observe the effect on environment due to use of large cooling water and cooling towers
CO1	PO9	2	Student will work in a team and as a member of team for designing of the condenser and evaluation of the properties for the given constraints
CO1	PO10	2	Student will prepare the comprehensive design report and present the same

Course Outcome	Program Outcome	Level	Justification
CO2	PO1	3	Student applies the knowledge of mathematics, science, engineering fundamentals for the production of biodiesel and evaluation of properties
CO2	PO2	2	Student identifies need of biodiesel and review research literature for biodiesel production process and understand the methods to evaluate the biodiesel properties reaching substantiated conclusions for its use in diesel engine.
CO2	PO3	2	Student understands the methods and solution for the biodiesel production and use that meet the specified need of alternative fuels for diesel engine
CO2	PO4	3	Student understands and analyze the complex process of evaluation of diesel engine performance using biodiesel and interprets the parameters and their causes
CO2	PO5	1	Student understands the use of computerized diesel engine test setup for the evaluation diesel engine performance
CO2	PO6	2	Student will conversant to assess societal, health, and safety issues and the consequent responsibilities relevant to the use of biodiesel and evaluation of its properties
CO2	PO7	2	Student will understand the impact of biodiesel emissions on the environment
CO2	PO9	2	Student will work in a team and as a member of team for case study report on biodiesel production and performance of diesel engine
CO2	PO10	2	Student will prepare the comprehensive case study report and present the same
CO3	PO1	3	Student applies the knowledge of mathematics, science, engineering fundamentals for the development of ANN model for wind energy prediction
CO3	PO2	3	Student reviews research literature on ANN application and model development reaching substantiated conclusions for better prediction coefficients.
CO3	PO3	3	Student understands the methods and solution for the wind energy prediction using wind data and the developed ANN model
CO3	PO4	3	Student understands and analyze the complex process of predicting the wind energy and interprets the parameters and their causes
CO3	PO5	3	Student uses MATLAB and EES computer programme for the wind energy prediction

Course Outcome	Program Outcome	Level	Justification
CO3	PO7	2	Student will understand the impact of use of wind energy on the environment
CO3	PO9	3	Student will work in a team and as a member of team for the development of the computer programme
CO3	PO10	3	Student will prepare the comprehensive case study report and present the same
CO4	PO1	3	Student applies the knowledge of mathematics, science, engineering fundamentals to understand and evaluate the performance of cogeneration and process heat plant
CO4	PO2	3	Student reviews research literature on sugar production, cogeneration system and performance analysis of the system,.
CO4	PO3	2	Student provides the solution of complex cogeneration system for analysis of its performance
CO4	PO4	3	Student understands and analyze the complex process of cogeneration and process heat for evaluating and selecting the optimum parameters
CO4	PO5	1	Student uses EES computer programme for the solution of given case study of cogeneration system
CO4	PO7	2	Student will understand the impact of cogeneration system on the environment
CO4	PO9	2	Student will work in a team and as a member of team for the development of the computer programme
CO4	PO10	2	Student will prepare the comprehensive case study report and present the same
CO5	PO1	3	Student applies the knowledge of mathematics, science, engineering fundamentals to understand and evaluate thermal energy storage system
CO5	PO2	3	Student reviews research literature on thermal energy storage system, energy storage materials, compare the materials and select based on need
CO5	PO3	2	Student provides the solution of complex thermal energy storage system with an appropriate considerations of need and environmental considerations
CO5	PO4	3	Student understands and analyze the complex process of thermal energy storage system and selecting the optimum parameters
CO5	PO5	1	Student uses EES computer programme for the solution of given case study of thermal energy storage system

Course Outcome	Program Outcome	Level	Justification
CO5	PO7	2	Student will understand the impact of energy storage system on the environment
CO5	PO9	2	Student will work in a team and as a member of team for the development of the computer programme
CO5	PO10	2	Student will prepare the comprehensive case study report and present the same
CO6	PO1	3	Student applies the knowledge of mathematics, science, engineering fundamentals to understand power plant layout, its components, location and function.
CO6	PO2	2	Student reviews research literature on various systems of the thermal power plant and justify the necessity of the same
CO6	PO3	1	Student provides the solution of complex system layout and opportunities for the energy conservations
CO6	PO4	2	Student understands and analyze the complex thermal power plant and select the optimum operating parameters
CO6	PO5	2	Student reviews the modern PCR and ECR ICT systems used in thermal power plant
CO6	PO7	3	Student will understand the impact of thermal power plant on the environment
CO6	PO9	2	Student will work in a team and as a member of team for the development of the report
CO6	PO10	2	Student will prepare the comprehensive case study report and present the same
CO7	PO1	3	Student applies the knowledge of mathematics, science, engineering fundamentals to evaluate the performance of a steam power of 1kW capacity.
CO7	PO2	2	Student reviews research literature related to the evaluation of the performance of the steam power plant and develops the equations for the analysis
CO7	PO3	2	Student provides the solution of complex steam power plant system through the development of various equations for the analysis and obtaining the performance characteristics
CO7	PO4	2	Student understands and analyze the complex steam thermal power plant and select the optimum operating parameters
CO7	PO5	2	Student reviews the modern control tools and measuring devices used for steam power plant monitoring

Course Outcome	Program Outcome	Level	Justification
CO7	PO7	2	Student will understand the impact of thermal power plant on the environment
CO7	PO9	2	Student will work in a team and as a member of team to conduct the trial on steam power plant and evaluate the performance
CO7	PO10	2	Student will prepare the comprehensive performance analysis report and present the same
CO8	PO1	3	Student applies the knowledge of mathematics, science, engineering fundamentals to evaluate the performance of a diesel power of 3.5 kW capacity.
CO8	PO2	2	Student reviews research literature related to the evaluation of the performance of the diesel power plant and develops the equations for the analysis
CO8	PO3	2	Student provides the solution of complex diesel power plant system through the development of various equations for the analysis and obtaining the performance characteristics
CO8	PO4	2	Student understands and analyze the complex diesel thermal power plant and select the optimum operating parameters
CO8	PO5	3	Student uses the LABVIEW based computer programming diesel engine system for the analysis of diesel power plant
CO8	PO7	2	Student will understand the impact of diesel power plant emissions on the environment
CO8	PO9	2	Student will work in a team and as a member of team to conduct the trial on diesel power plant and evaluate the performance
CO8	PO10	2	Student will prepare the comprehensive performance analysis report and present the same