



B.E DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Seventh Semester

MECHANICAL ENGINEERING

U18MET7002: Power Plant Engineering

COURSE OUTCOMES

- CO1: Illustrate the various circuits in steam power plant and working principle of boilers.
 CO2: Discuss the working of combustion equipment's, condensers, and cooling towers.
 CO3: Summarize the various nuclear reactors and waste disposal methods.
 CO4: Outline the steps involved in site selection and working principle of hydroelectric power plants.
 CO5: Explain the working of renewable power plants.
 CO6: Estimate the power plant load factor and utilization factor.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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| 1. What is the function of a boiler in a thermal power plant? | CO1 | [K ₁] |
| 2. Why is coal pulverized in a thermal power plant? | CO1 | [K ₂] |
| 3. What is the main difference between a stoker-fired boiler and a pulverized fuel-fired boiler? | CO2 | [K ₁] |
| 4. What is the function of an economizer in a thermal power plant? | CO2 | [K ₁] |
| 5. What is the function of a moderator in a nuclear reactor? | CO3 | [K ₁] |
| 6. What is a penstock in a hydel power plant? | CO4 | [K ₁] |
| 7. What is the role of an inverter in a photovoltaic system? | CO5 | [K ₁] |
| 8. Name two types of wind turbines used in windmills. | CO5 | [K ₁] |
| 9. What is the significance of fixed and variable costs in power plant economics? | CO6 | [K ₁] |
| 10. Why is it important to consider the cost per unit of energy generated? | CO6 | [K ₁] |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

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| 11. Explain the working principle and the major components involved in the functioning of a thermal power plant with a neat diagram. Discuss the various types of circuits involved in a thermal power plant, including the Boiler, Turbine, | 16 | CO1 | [K ₂] |
|--|----|-----|-------------------|

Condenser, and Feedwater systems. Explain the role of each component in ensuring efficient energy conversion and their interconnections.

12. Discuss the various stages involved in the coal handling system of a thermal power plant, explaining their functions and significance. Highlight the key equipment used in each stage and the safety measures adopted in coal handling processes. 16 CO2 [K₃]
13. A Boiling Water Nuclear Reactor (BWR) Power Plant is used for electricity generation. Describe the working principle of the BWR, along with its major components and their functions. Illustrate your answer with a neat and well-labeled diagram. 16 CO3 [K₂]
14. Explain the working principle, components, and advantages of a Run-off-River Hydel Power Plant. With the help of a neat diagram, discuss the design considerations, and the factors that affect its efficiency. Also, evaluate the environmental impact and operational challenges associated with such plants. 16 CO4 [K₂]
15. Explain the working principle, construction, and advantages of a floating dome biogas plant. Also, provide a neat diagram of the plant and describe the various components involved in the process. Discuss the factors that influence its efficiency and how it can be maintained for long-term operation. 16 CO5 [K₂]
16. Explain the different cost components involved in the economics of a power plant. Discuss how these costs affect the pricing of electricity and the financial viability of power plants. Use appropriate examples to illustrate the impact of fixed and variable costs, as well as capital recovery, on the overall cost structure. Additionally, analyze the role of Plant Load Factor (PLF) and Utilization Factor in optimizing the financial performance of a power plant. 16 CO6 [K₂]
