Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U7805

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Professional Elective

Mechanical Engineering

21MEV805 POWER PLANT ENGINEERING
(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Economizer is used to heat _____ CO1-U

   (a) Feed water (b) Air (c) Flue gages (d) All the above

2. The alternator is used in power plants which convert _____ CO1- U

   (a) Electrical Energy into Mechanical Energy

   (b) Electrical energy into Solar Energy

   (c) Mechanical Energy into Electrical Energy

   (d) Mechanical Energy into Nuclear Energy

3. The major heat loss in a steam power station occurs in _____ CO1- U

   (a) Heat chamber (b) Penstock (c) Spillways (d) Condenser

4. Which of these terms defines the pressure difference in the furnace? CO1- U

   (a) Chimney (b) Duct (c) Stack (d) Draught

5. The commonly used material for shielding is CO1- U

   (a) thick galvanized sheets (b) lead and tin

   (c) lead or concrete (d) graphite or cadmium

6. A boiling water reactor uses following as fuel CO1- U

   (a) natural uranium (b) plutonium (c) thorium (d) enriched uranium

7. To improve the thermal efficiency of open cycle gas turbine plant CO1- U

(a) inter-cooling (b) Reheating (c) Regeneration (d) All of the above

8. The major field(s) of application of gas turbine is CO1- U

(a) Aviation (b) Oil and gas industry (c) Marine propulsion (d) All of the above

9. Photovoltaic solar energy conversion system makes use of CO1- U

(a) Fuel cell (b) Solar cell (c) Solar pond (d) None of the above

10. Open cycle OTEC uses _____ surface water directly to make electricity. CO1- U

(a) Hot (b) Warm (c) Cool (d) Icy

PART – B (5 x 2= 10Marks)

11. How do you improve the overall efficiency of a thermal power plant? CO1 -U

12. List the different types of draught system. CO1 -U

13. Show the functions of control rods. CO1 -U

14. Outline the essential Components of Diesel electric plant. CO4 -App

15. Summarize the concept of biogas technology. CO1 -U

PART – C (5 x 16= 80Marks)

16. (a) Explain the layout of Steam power plant and its advantages, disadvantages, applications. CO1 -U (16)

Or

(b) Explain the layout of open MHD generator and its advantages, disadvantages, application CO1 -U (16)

17. (a) (i) Describe the different types of over feed stokers and discuss its merits and demerits of each over others. CO1 -U (8+8)

(ii) Calculate the overall efficiency of the steam power plant, if boiler efficiency is 85%, turbine efficiency is 40% and alternator efficiency is 95%. CO2 -App

Or

(b) (i) Explain the different types of pulverizing mills with neat sketches. CO1 -U (8+8)

(ii) Calculate the overall efficiency of the steam power plant, if boiler efficiency is 78%, turbine efficiency is 45% and alternator efficiency is 91%. CO2 -App

18.	(a)	(i) Explain the working principle of pressurized water reactor (PWR) with a neat diagram.	CO1 -U	(8+8)
		(ii) A nuclear reactor having 40% efficiency, in which energy produced per second by fission reaction, is 4400 Joules. Calculate the useful power produced by the reactor.	CO2 -App	
		Or		
	(b)	(i) Explain the details of safety & security measures adopted in modern nuclear plants.	CO1 -U	(8+8)
		(ii) A nuclear reactor having 48% efficiency, in which energy produced per second by fission reaction, is 6000 Joules. Calculate the useful power produced by the reactor.	CO2 -App	
19.	(a)	(i) Discuss the essential components of the diesel power plant with neat layout.	CO1 -U	(8+8)
		(ii) An 850-kWh diesel generating unit has a generator efficiency of 90%. If the mass of the fuel is 209 kilograms, then compute for the engine fuel rate.	CO3 -App	
		Or		
	(b)	(i) Explain about open cycle and closed cycle gas turbine power plant with neat sketch.	CO1 -U	(8+8)
		(ii) In a closed gas turbine, heat supplied per kg of air without regenerator is 817 kJ/kg and heat supplied per kg of air with regenerator is 486 kJ/kg. If the net work done is 154 then calculate the thermal efficiency.	CO3 -App	
20.	(a)	(i) Explain the principle, construction and working of a wind power plant and list out the advantages and disadvantages.	CO1 -U	(8+8)
		(ii) A transformer costing Rs 90,000 has a useful life of 20 years. Determine the annual depreciation charge using straight line method. Assume the salvage value of the equipment to be Rs 10,000.	CO3 -App	
		Or		
	(b)	(i) Explain the various power tariff types for energy consumption.	CO1 -U	(8+8)
		(ii) A generating station has installed to deliver 220×10^6 units per annum. The total annual charges are Rs. 168×10^5. Determine the cost per unit generated.	CO3 -App	