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**Question Paper Code : 40843**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Third/Fourth Semester

ME 8792 — POWER PLANT ENGINEERING

(Common to Electrical and Electronics Engineering/Mechanical Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the factors to be considered while choosing a site for steam power station.
2. Distinguish between Forced draught and induced draught.
3. List the reason why the cooling system is necessary for a diesel engine.
4. What is the environmental impact of a combined cycle plant?
5. Name the coolants used for fast breeder reactor.
6. What are the criteria for selecting cladding?
7. What is the purpose of surge tank?
8. What do you understand by tip-speed ratio?
9. What are the different methods used to calculate depreciation cost of power plant?
10. What is particulate emission?

PART B — (5 × 13 = 65 marks)

11. (a) Examine the effect of preparing coal for complete combustion and write the principle are involved (13)

Or

- (b) Explain in detail about mechanical dust collector and Electrostatic precipitator. Why both are used over a single unit in modern power plants. (13)

12. (a) (i) Discuss the effect of pressure ratio on Brayton cycle output and efficiency. (7)  
(ii) Explain the integrated gasifier based combined cycle system. (6)

Or

- (b) (i) Write a note on fuel system of diesel power plant (7)  
(ii) Explain how reheating improves the efficiency of a simple open cycle gas turbine plant. (6)
13. (a) Explain the working principle of nuclear power plant with neat sketch.

Or

- (b) Explain the working principle of pressurized water reactor with neat sketch.
14. (a) Explain the working principle of hydro electric power plant with neat sketch.

Or

- (b) Explain the working principle of fuel cell power system with neat sketch.
15. (a) What is a tariff? Discuss and compare various tariff used in practice.

Or

- (b) Explain the pollution control technologies including waste disposal option for nuclear power plant.

PART C — (1 × 15 = 15 marks)

16. (a) A steam generator comprises a boiler, a super heater, an economiser and an air preheater. The feed water enters the economiser at 140°C and leaves as saturated liquid. Air is preheated from a temperature of 25°C to 250°C. Steam leaves the boiler drum at 60 bar, 0.98 dry and leaves the super heater at 450°C. When using coal with a C.V. of 25.2 MJ/kg, the rate of evaporation is 8.5 kg steam per kg coal and the air fuel ratio is 15:1 by mass. Neglecting heat losses and pressure drops, estimate the heat transfer per kg fuel in each component and the efficiency of the steam generator. What are the percentages of the total heat absorption taking place in the economiser, boiler and the super heater, respectively? Assume  $C_p$  of air and water as 1.005 and 4.2 kJ/kg K respectively.

Or

- (b) A peak load on the thermal power plant is 75 MW. The loads having maximum demands of 35 MW, 20 MW, 15 MW and 18 MW are connected to the power plant. The capacity of the plant is 90 MW and annual load factor is 0.53. Calculate the average load on power plant, energy supplied per year, demand factor and diversity factor.