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Question Paper Code : X10712

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Third/Seventh Semester
Mechanical Engineering
ME 8792 – POWER PLANT ENGINEERING
(Common to Electrical and Electronics Engineering)
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Enlist any two merits and demerits of thermal power plants.
2. Mention any four equipment used for ash collection.
3. List the major components of gas turbine.
4. Define regenerator efficiency.
5. Enlist the desirable properties of a coolant.
6. Mention any four ways of Nuclear Power plant safety.
7. List the various types of turbines used in tidal power station.
8. Enlist the classification of fuel cell.
9. Mention the various cost included in fixed cost.
10. Write the various nuclear waste disposal methods.

PART – B

(5×13=65 Marks)

11. a) i) Discuss the working principle of circulating fluidized bed combustor using a suitable sketch. (8)
ii) Explain the construction and working principle of super critical Boilers with suitable sketch. (5)
(OR)
b) i) Explain briefly on draught and its types and also discuss the different types of draught systems. (8)
ii) Explain briefly on binary vapour cycle with a neat sketch. (5)

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12. a) Explain briefly the various auxiliary systems of diesel power plant system with neat sketch. **(13)**

(OR)

b) i) Outline the working of gas turbine cycle with regenerator using suitable sketches. **(8)**

ii) Discuss briefly on integrated gasification combined cycle and its benefits. **(5)**

13. a) Elaborately discuss the working principle and construction of Pressurized Water Reactor and Boiling Water Reactor. **(13)**

(OR)

b) Outline the construction and working principle of Heavy Water Cooled Reactor (HWR) with a neat sketch and discuss the advantages and disadvantages of HWR. **(13)**

14. a) Discuss the main components and working principle of Wind-Electric Generating power plant with neat sketch and explain the different types of Wind Machines. **(13)**

(OR)

b) Explain the principle of working and construction of solar power plant using suitable sketches. State their advantages, disadvantages and applications. **(13)**

15. a) i) List the various initial cost of a power station. **(4)**

ii) Explain depreciation and discuss the various methods of calculating the depreciation. **(9)**

(OR)

b) Discuss briefly on air pollution and water pollution caused by thermal power plants. **(13)**

PART – C

(1×15=15 Marks)

16. a) A new factory having a minimum demand of 100 kW and a load factor of 25% is comparing two power supply agencies.

i) Public supply tariff is Rs. 40 per kW of maximum demand plus 2 paise per kWh.

Capital cost = Rs. 70,000

Interest and depreciation = 10%



ii) Private oil engine generating station.

Capital cost = Rs. 2,50,000

Fuel consumption = 0.3 kg per kWh

Cost of fuel = Rs. 70 per tonne

Wages = 0.4 paise per kWh

Maintenance cost = 0.3 paise per kWh

Interest and depreciation = 15%.

(15)

(OR)

b) i) A hydro power plant is to be used as peak load plant at an annual load factor of 30%. The electrical energy obtained during the year is 750×10^5 kWh. Determine the maximum demand. If the plant capacity factor is 24% find reserve capacity of the plant.

(10)

ii) Determine the thermal efficiency of a steam power plant and its coal bill per annum using the following data :

Maximum demand = 24000 kW

Load factor = 40%

Boiler efficiency = 90%

Turbine efficiency = 92%

Coal consumption = 0.87 kg/Unit

Price of coal = Rs. 280 per tonne.

(5)
