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Question Paper Code : X20850

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020 AND
APRIL/MAY 2021

Fifth/Seventh Semester
Mechanical Engineering

ME 6701 – POWER PLANT ENGINEERING

(Regulations 2013)

(Common to Mechanical Engineering (Sandwich)/Electrical and Electronics
Engineering)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Why the counter flow is preferable than the parallel flow in condensers ?
2. What are the possible methods to improve the efficiency of the Rankine Cycle ?
3. Mention the various processes of diesel cycle.
4. What is meant by combined cycle power plant ?
5. How waste is disposed in nuclear power station ? What are main difficulties in handling radioactive waste ?
6. Distinguish between nuclear fission and nuclear fusion.
7. What is geothermal energy ?
8. Define load factor.
9. What is meant by fuel cell and what is the fuel that is used to power a fuel cell ?
10. A power station have a use factor of 47% and capacity factor of 40%. How many hours did it operate during the year ?

PART – B

(5×13=65 Marks)

11. a) Draw a typical layout and explain the working of thermal power plant and state its merits and demerits.

(OR)

- b) Explain the working principle of ash handling systems with neat sketches.



12. a) In an Otto cycle air at 1 bar and 290 K is compressed isentropic ally until the pressure is 15 bar the heat is added at constant volume until the pressure rises to 40 bar. Calculate the air standard efficiency and mean effective pressure for the cycle. Take $C_v = 0.717 \text{ KJ/Kg K}$ and $R_{\text{univ}} = 8.314 \text{ KJ/Kg K}$.
(OR)
- b) With neat sketch explain the construction and working of gas turbine power plant.
13. a) What is boiling water reactor ? How does it differ from pressurized water reactor ? Explain the construction and working of boiling water reactor.
(OR)
- b) With neat sketch explain CANDU types reactor and state its advantage and disadvantages of this reactor over other reactors.
14. a) Draw the layout of hydroelectric power plant and discuss the factors which should be considered while selecting a site for a hydroelectric plant.
(OR)
- b) With neat sketches explain the construction and working of Wind and Tidal Energy Systems.
15. a) Explain the different types of load duration curves with neat sketch.
(OR)
- b) Describe the pollution control technologies and waste disposal options for coal and nuclear power plants.

PART – C

(1×15=15 Marks)

16. a) The yearly duration curve of a certain plant can be considered as a straight line from 150 MW to 40 MW. Power is supplied with one generating unit of 100 MW capacity and two units of 50 MW capacity. Determine i) installed capacity ii) Load factor iii) Plant factor iv) Maximum demand.
(OR)
- b) Compute the monthly bill and unit energy cost for a total consumption of 1600 kWh and a maximum demand of 10 kW using Hopkinson demand rate quoted as follows :
- Demand Rates :**
 First kilo watts of maximum demand at Rs. 15 per kW per month.
 Next 5 kW of maximum demand at Rs. 12 per kW per month.
 Excess over 6 kW of maximum demand at Rs. 10 per kW per month.
- Energy Rates :**
 First 50 kWh at 15 paise per kWh
 Next 50 kWh at 12 paise per kWh
 Next 300 kWh at 8 paise per kWh
 Next 500 kWh at 6 paise per kWh
 Excess over 900 kWh at 4 paise per kWh.
 Also find the lowest possible bill for a month for 3 days and the unit energy cost on the given energy consumption.
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