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

Question Paper Code : 42859

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Seventh Semester
Mechanical Engineering
ME 2403 – POWER PLANT ENGINEERING
(Common to PTME 2403 – Power Plant Engineering for B.E.(Part – Time) Seventh Semester – Mechanical Engineering – Regulations 2009)
(Regulations 2008)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A (10×2=20 Marks)

1. List the advantages of MHD power plant.
2. What is the working principal of super critical boilers ?
3. State the characteristics of a good Fuel handling plant.
4. What is the use of cooling towers ?
5. What do you mean by 'fusion of nuclear fuel' ?
6. What is a surge tank ?
7. Name the types of Diesel plants.
8. State the limitations of gas turbine power plant.
9. What are the two major merits of geo thermal power plant ?
10. List the types of tariffs for power generated by power plant.

PART – B (5×16=80Marks)

11. a) i) Explain working of the combined power cycles with the help of schematic diagram. (6)

ii) The peak load on a power station is 30 MW. The loads having maximum demands of 25 MW, 10 MW, 5MW and 7 MW are connected to the power station. The capacity of the power station is 40 MW and annual load factor is 50%. Find the average load on the power station, energy supplied per year and Demand factor. (10)

(OR)

b) i) Explain the working principle of fluidized bed combustion system. (6)

ii) In a rankine cycle, the steam at inlet to turbine is saturated at a pressure of 35 bar and the exhaust pressure is 0.2 bar. Determine : the pump work, the turbine work, the Rankine efficiency, the condenser heat flow and the dryness at the end of expansion. Assume the steam flow rate of 9.5 kg/s. (10)

12. a) i) Explain the working principle of electro static precipitator. (6)

ii) Draw the schematic diagram of ash handling system and explain the working in detail. (10)

(OR)

b) i) Compare the forced draught system with induced draught system. (6)

ii) The steam condensed in a surface condenser is 12500 kg/h and the amount of air leakage is 5 kg/h. The vacuum near the suction pump is 70 cm of Hg and temperature is 34°C . The air and condensate is removed by a wet air pump. Find a) the capacity of wet air pump, if the volumetric efficiency of the pump is 80% Take barometric pressure is 76 cm of Hg. (10)

13. a) i) List the essential components of a nuclear reactor and their functions. (6)

ii) Explain the function of PWR with its merits and demerits. (10)

(OR)

b) i) Explain the criteria for selection of turbines. (6)

ii) Explain a process for governing of impulse and reaction turbines. (10)

14. a) i) Explain brake power, mean effective pressure and torque and SFC of diesel engine. (6)

ii) The following readings were taken during the test of a single cylinder 4 stroke oil engine :
Cylinder diameter = 250 mm
Stroke length = 400 mm
Gross mean effective pressure = 7 bar
Pumping mean effective pressure = 0.5 bar
Engine speed = 250 rpm
Net load on the brake = 1080 N
Effective diameter of the brake = 1.5 m
Fuel used per hour = 10 kg
Calorific value of fuel = 44300 kJ/kg
Calculate the indicated power, brake power, mechanical efficiency and indicated thermal efficiency. (10)

(OR)

b) i) Draw the layout of open cycle gas turbine power plant with its merits and demerits. (6)

ii) The following are the data related to a gas turbine plant :
Power developed = 5 MW
Inlet pressure and temperature of the air to the compressor = 1 bar; 30° C
Pressure ratio of the cycle = 5
Isentropic efficiency of the compressor = 80%
Isentropic efficiency of both turbines = 85%
Maximum temperature in both turbines = 550° C
Take : Cpa = 1.0 kJ/kg K, Cpg = 1.15 kJ/kg K, γ (air) = 1.4, γ (gases) = 1.33, if a reheater is used between two turbines at a pressure 2.24 bar, calculate the mass flow rate of air, and the overall efficiency. Neglect the mass of fuel. (10)

15. a) i) Explain the working principle of OTEC with neat sketch. (6)

ii) Describe the working principle of solar pond based electric power plant. (10)

(OR)

b) i) Lists the fixed cost and the operation cost of thermal power plant. (6)

ii) Compare hydro power station and thermal power station with 10 aspects. (10)
