

Total No. of Questions :10]

P2987

SEAT No. :

[Total No. of Pages :3

[5154] - 542

B.E. (Mechanical)

POWER PLANT ENGINEERING

(2nd Course) (Semester - II)

Time : 2½ Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed.
- 4) Assume data wherever necessary and mention it.
- 5) Draw neat and suitable figures wherever necessary.

Q1) a) Explain the Principle of economic scheduling. [6]

b) Explain the following: [6]

- i) Dust Collector.
- ii) Coal-Oil Mixture.

OR

Q2) a) What is FBC. Explain with neat sketch. [6]

b) Define: Condenser Efficiency, Vacuum Efficiency. [6]

Q3) a) Write a short note on selection of Hydraulic turbine. [4]

b) A steam power plant operating on Rankine cycle receives steam from a boiler at 3.5 MPa and 350°C. It is exhausted to condenser at 10kPa. Calculate: [6]

- i) Energy supplied per kg of steam generated in a boiler.
- ii) Quality of steam entering the condenser.
- iii) Rankine cycle efficiency considering feed pump work.

OR

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- Q4) a)** Explain with neat sketch pumped storage peak load plant. [4]
- b) The capital cost of hydro power station of 100MW capacity is Rs. 10,000/kW. The annual depreciation charges are 15% of the capital cost. A royalty of Rs. 2/kW per year and Rs. 0.3/kWh generated is to be paid for using the river water for power generation. The maximum demand on power station is 70MW and annual load factor is 0.6. The annual salaries, maintenance charges are Rs. 10⁷. If 20% of this expense is also chargeable as fixed charges, calculate the generation charge in two - part tariff. [6]
- Q5) a)** Draw a typical layout of Diesel Power Station and Explain. [8]
- b) In an open cycle gas turbine power plant compressor is driven by the high pressure turbine power is produced by low pressure turbine. The exhaust gases are passed through the regenerator. Using the following data determine the air flow rate for 2MW power produced & thermal efficiency of the plant. [10]
- Isentropic efficiency of compressor and turbines: 88%.
 - Compressor inlet conditions: 27°C and 1 bar.
 - Pressure ratio: 7.
 - Regenerator effectiveness: 0.8.
 - Maximum temperature in the cycle: 900°C.
- Assume air flow rate to be equal to the gas flow rate, specific heat for air and gases as 1.005 and 1.128kJ/kgK, γ for air and gases as 1.4 and 1.34 respectively.
- OR
- Q6) a)** Why the starting of Diesel Plant is more difficult? What different methods are used for starting Diesel Engine? Which method is common and why? [8]
- b) An open cycle gas turbine plant uses heavy oil as fuel. The maximum pressure and temperature in the cycle are 5 bar and 650°C. The pressure and temperature of the air entering into the compressor are 1 bar and 27°C. The exit pressure of the turbine is 1 bar. Assuming isentropic efficiencies of the compressor and turbine to be 80% and 85% respectively. find the thermal efficiency of the cycle. Overall air fuel ratio used is 60:1. Take C_p (for air & gas)=1kJ/kg K γ for air and gas =1.4. [10]

Q7) a) What is the function of bus bar? Draw different types of Bus bar arrangements and discuss the relative merits and Demerits. [8]

b) Explain single basin and double basin tidal power plant with neat diagrams. [8]

OR

Q8) a) Explain the working of a fuel cell and list out its advantages over other nonconventional systems. [8]

b) What are high temperature solar thermal power plants? Discuss the working of central receiver tower power plant. [8]

Q9) a) State the function of relay system. How are relays classified Explain any one relay with neat sketch. [8]

b) What are the different methods presently adopted in the world to reduce the harmful Greenhouse Effect? [8]

OR

Q10) a) Write short notes on: [8]

i) Acid Rain

ii) Thermal Discharge Index.

b) What are different methods used to control SO_2 in the flue gases? Explain any two. [8]

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