

Roll No.

Total Pages : 2

BT-5/DX

8529

I.C. ENGINE OF GAS TURBINE

Paper : ME-301(E)

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt five questions in all, selecting at least one question from each unit. Assume suitably missing data, if any.

UNIT-I

1. Derive expression for the efficiency of diesel cycle. 20
2. For an engine working on ideal dual cycle, the compression ratio is 10 and maximum pressure is limited to 70 bar. If the heat supplied is 1680 kJ/kg, find the pressures and temperatures at various salient points of the cycle and the cycle efficiency. The pressure and temperature of air at the commencement of compression are 1 bar and 100°C respectively. Assume $C_p = 1.004$ kJ/kg K and $G_v = 0.717$ kJ per kgK for air. 20

UNIT-II

3. Explain constructional details and working of Carburettor used in S.I. engine. 20
4. (a) Explain different stages of combustion in SI engine. 10
(b) Write a note on Octane rating. 10

UNIT-III

5. (a) What are the functions of Lubricating system ? 5
(b) Explain Wet Sump Lubricating system. 15

6. A six cylinder, petrol engine operates on 4-stroke cycle. The bore of each cylinder is 80 mm and the stroke is 100 mm. The clearance volume per cylinder is 70 ml. At a speed of 4000 rpm the fuel consumption is 20 kg/hour and the torque developed is 150 Nm. Calculate (i) Brake power, (ii) Brake mean effective pressure, (iii) Brake thermal efficiency if the calorific value of fuel is 43000 kJ/kg and (iv) The relative efficiency on a brake power basis assuming the engine works on the constant volume cycle. $\gamma = 1.4$ for air. 20

UNIT-IV

7. (a) Describe briefly pollutants in the exhaust of SI engine. 10
(b) Explain constructional details and working of single stage reciprocating air compressor. 10
8. In a simple gas turbine plant air enters the compressor at 1 bar and 27°C and leaves at 6 bar. It is then heated in the combustion chamber to 700°C and then enters the turbine to expand to 1 bar. The isentropic efficiency of compressor is 0.80 and turbine 0.85 and the combustion efficiency is 0.98. The fall in pressure through combustion chamber is 0.1 bar. Find (a) thermal efficiency, (b) work ratio, (c) air rate in kg/kW, (d) specific fuel consumption, and (e) air-fuel ratio. 20