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Printed Pages : 3

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BT-5/D-13

IC ENGINE OF GAS TURBINE

Paper-ME-301-E

Time allowed : 3 hours]   *[Maximum marks : 100*

Note : *Attempt five questions in all, selecting at least **one** question from each unit. Use of Steam tables and Thermodynamic charts and tables is allowed.*

Unit-I

1. Fuel supplied to an SI engine has a calorific value 42000kJ/kg. The pressure in the cylinder at 30% and 70% of the compression stroke are 1.3 bar and 2.6 bar respectively. Assuming that the compression follows the law $pV^{1.3}$ = constant. Find the compression ratio. If the relative efficiency of the engine compared with the air-standard efficiency is 50%. Calculate the fuel consumption in kg/k W h.   20

2. (a) Explain Dual Combustion Cycle.   10

    (b) Write a note on mean effective pressure.   10

Unit-II

3. (a) Explain mixture requirements for various operating conditions.   10

    (b) Explain different types of ignition systems.   10

4. (a) Explain phenomenon of detonation.   10

    (b) Write a note on delay period.   10

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Unit-III

5. Explain Wet sump lubrication system with the help of a diagram.   20

6. Following are the observations in a test on a four-cylinder, four-stroke engine, diameter = 100 mm, stroke = 120 mm, speed of the engine = 1600 rpm, fuel consumption = 0.2 kg/min, calorific value = 44000 kJ/kg, difference in tension on either side of the brake pulley = 40 kg, brake circumference = 300 cm. If the mechanical efficiency is 80%, calculate

    (i)   brake thermal efficiency,

    (ii)   indicated thermal efficiency,

    (iii) indicated mean effective pressure, and

    (iv)   brake specific fuel consumption.   20

Unit-IV

7. (a) Write a note on emission control.   10

    (b) A compressor draws 42.5m³ of air per minute into the cylinder at a pressure of 1.05 bar. It is compressed polytropically ($pV^{1.3}$ = C) to a pressure of 4.2 bar before being delivered to a receiver. Assuming a mechanical efficiency of 80% find

        (i)   indicated power

        (ii)   shaft power, and

        (iii) overall isothermal efficiency.   10

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8. A gas turbine plant with a pressure ratio of 1:5 takes in air at 15°C. The maximum temperature is 600°C and develops 2200kW. The turbine and compressor efficiency are equal to 0.85. Taking C_p = 1kJ/kg K and C_v = 0.714 kJ/kg K, determine

   (i) actual overall efficiency of the turbine, and

   (ii) mass of air circulated by the turbine.   20

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