C 28754

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Name........

Reg. No........

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, JUNE 2012

ME 04 601—IC ENGINES AND GAS TURBINES

Time : Three Hours

Maximum : 100 Marks

Answer **Question 1** *and for Questions 2 to 5 answer* (a), (b) **or** (c), (d) *in each question.*

1. (a) Compare SI and CI Engines.

   (b) Compare Otto and Diesel Cycles with relevant diagrams and explain how it differs from actual cycles.

   (c) What are various methods of lubrication system ? Why four stroke petrol engines are not lubricated by Petroil lubrication system ?

   (d) Explain the working of Wankel engine ? What are the advantages and limitations ?

   (e) What do you understand by Detonation ? When it is possible ?

   (f) What are the additives used in Diesel engines ?. State the need.

   (g) What do you understand by reheating ? What is its effect on Gas turbine plant ?

   (h) Write short notes on gas turbine combustion chamber.

   (8 × 5 = 40 marks)

2. (a) Draw valve and port timing diagrams for petrol and diesel engines. (7 marks)

   (b) An engine working on the Otto cycle is supplied with air at 0.1 MPa, 35°C. The compression ratio is 8. Heat supplied is 2100 kJ/kg. Calculate the maximum pressure and temperature of the cycle, the cycle efficiency, and the mean effective pressure, (For air, C_p = 1.005, C_v = 0.718, and R = 0.287 kJ/kg K).

   (8 marks)

Or

   (c) Explain various methods of scavenging with neat sketches. (7 marks)

   (d) In an air standard dual cycle, the compression ratio is 12 and the maximum pressure in the cycle is 70 bar. The lowest pressure and temperature of the cycle are 1 bar and 300 K. Heal is added during constant pressure process upto 3% of the stroke. Taking diameter as 25 cm and stroke as 30 cm. Determine,

   (i) pressure and temperature at the end of the compression.

   (ii) The thermal efficiency.

   (iii) The mean effective pressure.

   (8 marks)

Turn over

3. (a) Explain the working of a fuel injection pump with a neat sketch.   (7 marks)

   (b) Explain Wet sump and Dry sump lubrication system.   (8 marks)

Or

   (c) Explain Supercharging and turbocharging with suitable sketches.   (8 marks)

   (d) Explain the working of Wankel engine with neat sketch.   (7 marks)

4. (a) Explain flame propagation in Internal Combustion Engines.   (7 marks)

   (b) Write a brief note on combustion chambers of SI Engines.   (8 marks)

Or

   (c) Write short notes on normal and abnormal combustion.   (8 marks)

   (d) What is after burning ? Explain the factors which causes after burning.   (7 marks)

5. (a) Air at temperature 290 K flows in a centrifugal compressor running at 20,000 r.p.m. The slip factor is 0.80; Isentropic total head efficiency is 0.75; Outer diameter of the blade is 500 mm. Assume the absolute velocities of air at inlet and exit of the compressor are same. Take $Cp = 1.0035$ kJ/kg.K

Calculate :

    (i) The temperature rise of air passing through the compressor.

    (ii) The static pressure ratio.

(8 marks)

   (b) Explain with neat sketch the ramjet engine.   (7 marks)

Or

   (c) Discuss the analysis of basic closed cycle for gas turbine. (Brayton or Joule cycle). (8 marks)

   (d) Discuss elementary and vortex theories.   (7 marks)

(4 × 15 = 60 marks)