D 12076 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) [14 SCHEME] DEGREE EXAMINATION, NOVEMBER 2016

ME 14 505—INTERNAL COMBUSTION ENGINES

Time : Three Hours Maximum : 100 Marks

Design data and Heat and Mass Transfer hand book may be permitted.

Part A

Answer any **eight** *questions.*

1. Explain the effect of stroke to bore ratio on the design of an IC engine.
2. Derive the Mean Effective Pressure (MEP) on Diesel cycle.
3. Explain the ideal and actual port timing diagrams of a 2-stroke and four stroke S.I engine.
4. In an engine working on the diesel cycle air fuel ratio is 50 : 1. The temperature of air at the beginning of compression is 873 k and the compression. ratio used is 14 : 1. What is ideal efficiency o f the engine ? Calorific value of fuel used is 42000 kJ/Kg, CP = 1.005 kJ/kg-K and CV = 0.717KJ/ Kg-K for air.
5. Draw the neat sketch and explain supercharging of C.I Engine.
6. Draw the neat sketch and explain turbo charging in C.I Engine.
7. Explain the engine fuels rating.
8. Describe the methods of finding friction power using Morse test.
9. Explain the phenomenon of knock in CI engines and compare it with SI engine knock.
10. Discuss the advantages and disadvantages of the two types of combustion chambers of CI engines.

(8 × 5 = 40 marks)

Part B

11. (a) Compare and contrast the Otto, Diesel and Dual cycles.

Or

(b) The pressure and temperature at the beginning of compression in an air-standard dual cycle are 1 bar and 30°C, respectively. The compression ratio is 9. The maximum pressure in the cylinder is limited to 60 bar. The heat is added during constant pressure process upto 4% of the stroke. Assuming cylinder bore and stroke as 250 mm and 300 mm, respectively determine :

(i) Air standard efficiency of the dual cycle.

(ii) Power developed, if the numbers of working cycles are 3 per second.

Turn over

12. (a) Design and sketch a cast iron piston for a single acting four stroke IC engine with 0.14 m cylinder bore, 0.19 m stroke and 0.375 m connecting rod length. The maximum gas pressure is 3.5 N/mm^2 and engine speed is 600 rev/min. It develops a brake mean effective pressure of 0.7 N/mm^2 and uses 4.65 kJ per kW per second. Check the piston for heat flow.

Or

(b) How are the ignition system classified ? Describe briefly about the types of ignition system.

13. (a) A single cylinder four-stroke diesel engine was tested and the following data were obtained while running on full load : Area of the indicator card = 3 cm^2 ; length of the indicator diagram = 4 cm ; spring constant = 10 bar/cm, speed of the engine = 400 r.p.m, load on the brake = 380 N, Spring balance reading = 50 N, Diameter of the brake drum = 1.2 m, Fuel consumption = 2.8 kg/hr, Calorific value of fuel = 42,000 kJ/kg ; Diameter of the cylinder = 160 mm and stroke of the piston = 200 mm.

Determine indicated mean effective pressure, indicated power, brake power, brake mean effective pressure, brake specific fuel consumption and brake thermal efficiency and indicated thermal efficiency.

Or

(b) (i) Describe the important qualities of S.I engine fuels. (7 marks)

(ii) Describe the important qualities of C.I engine fuels and also rating of C.I engine fuels. (8 marks)

14. (a) Design a flywheel for a four cylinder engine to develop 22.5 kW at 1200 r.p.m. Fluctuation of energy is 30% of that of one revolution; fluctuation of speed is 2% ; radius of gyration 0.175 m. *Calculate :*

(i) Energy to be absorbed/revolution.

(ii) Weight of steel rim.

(iii) Thickness of rim width.

(iv) Inner and outer radius of rim.

(v) Diameter of shaft, safe stress 35 MN/m^2.

(vi) Diameter of boss.

(vii) Size of the key.

Sketch with dimensions a sectional elevation and end view.

Or

(b) What are the different methods used in CI engines to Create turbulence in the mixture ? Explain its effect on power output and thermal efficiency of the engine.

(4 × 15 = 60 marks)