Printed Pages — 04   ME — 602

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 4050 Roll No. ☐☐☐☐☐☐☐☐☐☐

B.Tech.

SIXTH SEMESTER EXAMINATION, 2004-2005

I. C. ENGINE

Time : 3 Hours   *Total Marks : 100*

Note : *(i)   Attempt **ALL** questions.*

(ii)   All questions carry equal marks.

1. Attempt *any four* parts of the following :   (5x4=20)

(a) Compare the advantages and disadvantages of 2 stroke and 4 stroke engines.

(b) How do exhaust temperature and mean effective pressure affect the engine performance ? Explain.

(c) What are the main constituents of exhaust emission from petrol engine ?

(d) What are the requirement of an ideal IC engine fuel ? What do you understand by the term 'Dopes' ?

(e) How the actual indicator diagram differs from that of theoretical one for an SI engine.

(f) What are different ignition system for SI engines ? Explain magneto ignition system.

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2. Attempt *any two* parts of the following :   (10x2=20)

   (a) Explain the phenomenon of knock in CI engines and compare it with SI engine knock.

   (b) A single cylinder 4-stroke diesel engine running at 1500 rpm uses 2.5 kg of fuel per hour of sp. gravity 0.88. If has an open type of injector with a single orifice nozzle and the injection period is 25° crank angle. If the average injection pressure is 150 bar and the average pressure inside the cylinder is 30 bar, estimate the diameter of the fuel orifice. Cd for nozzle = 0.88.

   (c) Write short notes of the following :
       (i)   Mist lubrication system
       (ii) Solid injection system

3. Attempt *any two* parts of the following :   (10x2=20)

   (a) Derive an expression for the air-fuel ratio of a simple carburettor.

   (b) In an ideal Diesel Cycle, the pressure and temperature are 1 bar and 27°C respectively. The maximum pressure in the cycle is 47 bar and the heat supplied during the cycle is 545 kJ/kg. Determine :
       (i)   compression ratio
       (ii) the temperature at the end of compression
       (iii) the air-standard efficiency
       Assume r = 1.4 and Cp = 1.005 kJ/kg k of air.

   (c) What are the different stages of combustion of SI engine ? Explain flame speed and ignition delay.

4. Attempt *any two* parts of the following :   (10x2=20)

(a) What is difference between reciprocating and centrifugal compressor ? Explain the effect of intercooling on the performance of reciprocating compressor. Obtain expression for optimum pressure ratio with one stage intercooling.

(b) Explain the working principle of centrifugal compressor with the help of neat sketches. Also show the velocity diagram for it.

(c) Write short notes on any two :

(i)   axial compressor

(ii) root blowers

(iii) classification of compressors with uses

5. Attempt *any two* parts of the following :   (10x2=20)

(a) Differentiate between open and closed cycle gas turbine. What do you understand by thermal refinements of gas turbine cycle ? Explain with line and T - s diagrams for different thermal refinement techniques and their combinations.

(b) A gas turbine unit delivers 1500 KW. Air at 1 bar and 20°C enters the compressor and the pressure ratio is 6. The maximum temperature at the turbine inlet is 800°C. Estimate the isentropic efficiency of the turbine and the mass flow rate of the air if the isentropic efficiency of the compressor and overall efficiency of the plant is 0.85 and 0.2 respectively. Assume r = 1.4.

(c) Answer *any two* of the following :

   (i) What are the advantages of rocket engine ?

   (ii) Discuss the merits and demerits of a closed cycle gas turbine cycle.

   (iii) Explain in brief, the prospective alternative fuels for IC engines.

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