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

PAPER ID : 140505

Roll No.

B.Tech. (Sem. V)

SPL. THEORY EXAMINATION, 2014-15

IC ENGINES & COMPRESSORS

Time : 2 Hours] *[Total Marks : 50*

Note: Attempt all the questions.

1. Attempt any TWO parts of the following: (7×2=14)

   (a) Draw the typical valve timing diagrams for low speed and high speed 4-stroke engines. Explain major differences if any, between these two sets of valve timing diagrams.

   (b) What are the difficulties experienced in using hydrogen as fuel for S.I. engines? What modifications are required to be carried out in the engine while using hydrogen as fuel?

   (c) During the Morse test on a 4-cylinder, 4-stroke engine

of 7.5 cm bore, 10 cm stroke, the following data were obtained:

B.P. with all cylinder working = 31.2 kW

B.P. with cylinder No. 1 cut - off = 22.2 kW

B.P. with cylinder No. 2 cut - off = 22.06 kW

B.P. with cylinder No. 3 cut - off = 21.76 kW

B.P. with cylinder No. 4 cut - off = 21.32 kW

Clearance volume = 100 c.c.

C.V. of fuel used = 21.32 kj/kg

Find I.P., F.P., mechanical efficiency and air standard efficiency.

2. Attempt any TWO parts of the following: (6×2=12)

  (a) Explain the following elements of an SI engine carburetor with their sketches:

    (i)   Idling system

    (ii) Acceleration pump system

  (b) What are the different Ignition systems for SI engines? Explain Magneto ignition system.

  (c) Give the stepwise procedure to design the combustion chamber of a SI engine.

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3. Attempt any TWO parts of the following: (6×2=12)

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

  (b) Explain how the induction swirl is created. What are the requirements of the injector with this type of swirl?

  (c) With the help of Pressure - Crank angle diagram, describe the combustion process in CI engine.

4. Attempt any TWO parts of the following: (6×2=12)

  (a) Give a neat sketch of Pressure lubrication system and explain its working.

  (b) What is supercharging of an I.C. engine? What are the advantages and limitations of supercharging? Differentiate between supercharging and Turbo-charging.

  (c) A centrifugal compressor has to deliver 8 kg/sec of air with a pressure ratio of 4.4:1 at 18000 rpm. Initial conditions are static air at 1 bar and 15°C. Assuming an Adiabatic Efficiency (based on total values) of 78%, ratio of whirl speed to tip speed 0.94 and neglecting all other losses, calculate the tip speed, diameter and the rise in total temperature. Also, determine the external diameter of eye for which the internal diameter is 12 cm and the axial velocity at inlet is 150 m/s. Assume C_p=1.05 kJ/kg K and ratio of specific heats=1.4.

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