Total No. of Questions—**12**] [Total No. of Printed Pages—**4+2**

Seat No.	

S.E. (Mechanical/Automobile Engineering) (Second Semester)

EXAMINATION, 2014

IC ENGINES

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer *three* questions from Section I and *three* questions from Section II.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Derive an expression for air standard efficiency of a Diesel cycle with usual notations. [6]

P.T.O.

(*b*) What are the assumptions made in analyzing the air standard cycle ? [5]

(*c*) Draw theoretical and actual valve timing diagram for four-stroke diesel engine. Explain the reasons for the difference. [7]

Or

2. (*a*) Compare Otto, diesel and dual cycles for given compression ratio and heat addition with Pv and Ts diagram. [5]

(*b*) In an air-standard diesel engine cycle with a compression ratio of 14, the condition of air at the start of the compression stroke are 1 bar and 300 K. After addition of heat at constant pressure, the temperature rises to 2775 K. Determine the thermal efficiency of cycle, net work done per kg of air and the mean effective pressure. [7]

(*c*) Define compression ratio. How does it affect the air standard efficiency of an Otto cycle ? [6]

3. (*a*) Describe the stages of combustion in S. I. engines with the help of P-θ diagram. [8]

(*b*) Define normal and abnormal combustion in SI engine. Explain phenomenon of detonation in SI engines. [8]

Or

4. (*a*) Explain with neat sketches the following systems of a modern carburetor (any *two*) :

(*i*) Main Metering System

(*ii*) Choke

(*iii*) Acceleration Pump System. [8]

(*b*) With a neat sketch explain the working principle of a simple carburetor. [8]

5. (*a*) Explain the phenomenon of knock in CI engines and compare it with the SI engines knock. [8]

(*b*) Draw a schematic diagram of a Bosch type fuel pump and explain its construction and working. [8]

Or

6. (*a*) Explain various factors that influence the flame speed in SI engines. [8]

(*b*) Describe the construction and working of a distributor fuel injection system in brief with the help of a diagram. [8]

SECTION II

7. (*a*) What is meant by ignition ? With a neat sketch explain the magneto-ignition system. [8]

(*b*) Explain with neat sketch dry sump lubrication system. [8]

Or

8. (*a*) List various ignition systems in use. Describe any *one* of them. State its advantages over conventional ignition system. [8]

(*b*) What are the various types of liquid cooling system ? Explain any *one* in detail. [8]

9. (*a*) A six cylinder, gasoline engine operates on the four-stroke cycle. The bore of each cylinder is 80 mm and the stroke 100 mm. The clearance volume per cylinder is 70 cc. At a speed of 4000 rpm the fuel consumption is 20 kg/h and the torque developed is 150 Nm. Calculate :

(*i*) Brake power

(*ii*) Brake mean effective pressure

(*iii*) Brake thermal efficiency if the CV = 43000 KJ/kg

(*iv*) The relative efficiency on a brake power basis assuming the engine works on the constant volume cycle. $\gamma = 1.4$ for air. [10]

(*b*) Describe the Morse Test. What is the assumption made in this test ? [6]

Or

10. (*a*) Explain in brief the following terms used in testing of IC engines : [8]

(*i*) Indicated mean effective pressure

(*ii*) Brake mean effective pressure

(*iii*) Indicated power

(*iv*) Brake power.

(*b*) Explain Motoring test method and give out its limitations. [8]

11. (*a*) Explain various important qualities of C.I. engine fuels. [6]

(*b*) Explain Octane No. and Cetane No. [6]

(*c*) Discuss various types of exhaust emissions from C.I. engine. [6]

Or

12. Write short notes on the following (any *three*) : [18]

(*i*) Refining process of petroleum

(*ii*) Alternative fuels for IC engines

(*iii*) Factors affecting formation of NOx

(*iv*) Diesel engine emissions

(*v*) E.G.R.