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

Seat No.	

[4757]-117

S.E. (Mech/Automobile) (Second Semester) EXAMINATION, 2015

IC ENGINE

(2008 PATTERN)

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

N.B. :— (*i*) Answer *three* questions from each Section.

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

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

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

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

SECTION I

1. (*a*) Compare Otto and Dual cycle for : [8]

(*i*) Constant maximum pressure and same heat input

(*ii*) Same compression ration and same heat input.

(*b*) In an ideal diesel cycle, the pressure and temperature are 1.03 bar and 27°C respectively. The maximum pressure in the cycle

P.T.O.

is 47 bar and the heat supplied during cycle is 545 kJ/kg. Determine :

(*i*) Compression ration.

(*ii*) The temperature at the end of compression.

(*iii*) The temperature at the end of constant pressure combustion

(*iv*) Air standard efficiency.

Assume r = 1.4, C_p = 1.004 J/kg-K for air [10]

Or

2. (*a*) Explain in brief how chemical equilibrium affects the performance of the engine. [6]

(*b*) Draw theoretical and actual valve timing diagram for four stroke petrol engine. Explain the reason for difference. [6]

(*c*) Explain pumping and friction losses and their effects on the power output of the engine. [6]

3. (*a*) Explain the phenomenon of pre-ignition. How pre-ignition leads to detonation and vice-versa ? Explain how pre-ignition can be detected. [8]

(*b*) Explain with neat sketch the following system of carburetor : [8]

(*i*) Idling system

(*ii*) Chock

Or

4. (*a*) Explain any *two* types of combustion chamber used in SI engines. [8]

(*b*) What are advantages and disadvantages of petrol injection system over conventional carburetor system. [4]

(*c*) Explain why rich mixture is required for : [4]

(*i*) Idling

(*ii*) Sudden acceleration.

5. (*a*) What are functional requirement of injection system ? [8]

(*b*) Explain with sketch the following type of injection system :

(*i*) Common rail system.

(*ii*) Unit injection system. [8]

Or

6. (*a*) Explain stage of combustion in CI engine. [8]

(*b*) Write short notes on the following : [8]

(*i*) Supercharging

(*ii*) Turbo charging.

SECTION II

7. (*a*) What are basic requirements of ideal ignition system ? [4]

(*b*) What are main functions of lubricating system ? Explain dry sump lubrication system. [8]

(*c*) Write short note on additives used in lubricating system. [4]

Or

8. (*a*) Define intake manifold and their functions. State material used. Discuss the requirement for design of intake manifold. [8]

(*b*) Explain working of spring loaded mechanical governor with the help of neat sketch used for diesel engine. [8]

9. (*a*) What is dynamometer ? Name various type of dynamometer. Explain Prony type of dynamometer with the help of neat sketch. [10]

(*b*) Write short notes on : [8]

(*i*) Heat balance sheet

(*ii*) Various factors affecting volumetric efficiency.

Or

10. (*a*) A six cylinder gasoline engine operate on four stroke cycle. The bore of each cylinder is 80 mm and stroke 100 mm. The clearance volume per cylinder is 70 CC. At a speed of 4000 r.p.m., the fuel consumption is 30 kg/hr and the torque developed is 150 Nm.

Calculate :

(*i*) The brake power

(*ii*) The brake mean effective pressure

(*iii*) The brake mean thermal efficiency.

Assume CV of fuel = 43,000 kJ/kg.

Also estimate relative efficiency when engine works on constant volume cycle with = 1.4 for air. [12]

(*b*) Compare battery ignition and magneto-ignition system. [6]

11. (*a*) Enlist the specification of an automobile engine. [6]

(*b*) Discuss various types of exhaust emission from automobile. Which of these are harmful ? [6]

(*c*) Mention the modification required if hydrogen is used in SI engine as a substitute fuel. [4]

Or

12. Write short notes on : [16]

(*i*) MPFI

(*ii*) DTSi

(*iii*) Bharat Norms

(*iv*) Fuel-Air Equivalence ration.