(162)

Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

S.E. (Mechanical/Automobile) (II Sem.) EXAMINATION, 2014

APPLIED THERMODYNAMICS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer *four* questions out of 8.

(*ii*) Solve Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

(*iii*) *All* the *four* questions should be solved in one answer-book and attach extra supplements if required.

(*iv*) Draw diagrams wherever necessary.

(*v*) Use of scientific calculator is allowed.

(*vi*) Assume suitable data wherever necessary.

1. (*a*) Explain classification of I.C. Engine. State any 4 applications of I.C. Engines. [6]

(*b*) Explain detonation in S.I. Engine and factors affecting detonation. [6]

P.T.O.

Or

2. (*a*) Explain with neat sketch valve timing diagram of 4-S petrol engine. [6]

(*b*) Draw and explain with neat sketch simple carburettor. [6]

3. (*a*) Compare combustion in S.I. and C.I. Engine (**6** points). [6]

(*b*) During trial on single cylinder 4-S oil engine, following results were obtained :

Cylinder Diameter = 20 cm, Stroke = 2D, Mean Effective pressure = 6 bar, Torque = 407 N-m, Speed = 250 rpm, Oil Consumption = 4 kg/hr, Calorific Value of Fuel = 43 MJ/kg, Cooling water flow rate = 4.5 kg/min, Air used per kg of fuel = 30 kg, Rise in cooling water temperature = 45°C, Temperature of exhaust gases = 420°C, Room Temperature = 20°C, Mean specific heat of exhaust gas = 1 kJ/kg K, Specific heat of water = 4.187 kJ/kg K, Draw heat balance sheet for the test in kJ/hr. Calculate Mechanical efficiency. [6]

Or

4. (*a*) What are the requirements of a good combustion chamber design in C.I. engines (**6** valid points). [6]

(*b*) The air flow to 4 cylinder 4-S gasoline engine was measured by means of 8 cm diameter sharp edge orifice with C_d = 0.65. During a test the following data was recorded : Bore = 10 cm, Stroke = 15 cm, Engine speed = 2500 rpm, Brake power = 36 kW, Fuel Consumption = 10 kg/hr, Calorific Value of fuel = 42 MJ/kg, Pressure drop across orifice = 4 cm of water, Atmospheric Temperature and pressure are 17°C and 1 bar resp. Density of air = 1.2 kg/m^3. Calculate :

(1) Brake thermal efficiency

(2) Brake Mean Effective Pressure

(3) Volumetric Efficiency. [6]

5. (*a*) Explain with neat sketch Thermostatic cooling system used in automobiles. [7]

(*b*) Describe with schematic diagram working of electric starting system. [6]

Or

6. (*a*) Explain with neat sketch EGR system. [7]

(*b*) Compare magnetoignition system and Battery ignition system (**6** points). [6]

7. (*a*) Explain roots blower compressor with neat sketch. [6]

(*b*) A reciprocating compressor of single stage, double acting type delivers 20 m^3/min when measured at free air condition of 1 bar, 27°C. The compressor has pressure ratio of 7 and the conditions at the end of suction are 0.97 bar, 35°C. Compressor runs at 240 rpm with clearance volume of 5% of swept volume. The L/D ratio is 1.2. Determine the volumetric efficiency and dimensions of cylinder and isothermal efficiency taking the index of compression and expansion as 1.25. Also show the cycle on P-V diagram. [7]

Or

8. (*a*) Explain the methods of improving isothermal efficiency of reciprocating compressors with P-V diagram. [6]

(*b*) A three stage reciprocating air compressor compresses air from 1 bar and 170 C to 35 bar. The law of compression is PV1.25 = C and is same for all stages of compression. Assuming perfect intercooling, neglecting clearance, find the minimum power required to compress 15 m^3/min of free air. Also find the intermediate pressures. [7]