Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[4957]-1018

S.E. (Mech./Auto) (Second Semester) EXAMINATION, 2016

APPLIED THERMODYNAMICS

(2012 PATTERN)

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

N.B. **:—** (*i*) Solve Q. **1** or Q. **2**, **3** or Q. **4**, **5** or Q. **6**, 7 or Q. **8**

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

(*iii*) Draw neat and labeled diagrams wherever necessary.

(*iv*) Use of Steam Tables, Mollier Charts and scientific calculator is allowed.

(*v*) Assume suitable data where ever neccssary.

(*vi*) Figures to the right side indicate full marks.

1. (*a*) Explain with the help of a p – V diagram the loss due to dissociation in an Otto cycle. [6]

(*b*) Explain with neat diagram stages of combustion spark ignition engines. [6]

Or

2. (*a*) Write short note on detonation and its effect on performance of SI engine. [6]

P.T.O.

(*b*) Explain with the help of a p – V diagram the loss due to variation of specific heats in a Diesel cycle. [6]

3. (*a*) Enlist factors affecting combustion phenomenon in CI engine. [6]

(*b*) Find the air-fuel ratio of a four strokes, single cylinder and air cooled engine with fuel consumption time for 10 cc as 20.0 sec. and air consumption time for 0.1 m^3 as 16.3 sec. The load is 16 kg at speed of 3000 rpm. Also find brake specific fuel consumption in and thermal brake efficiency. Assume the density of air as 1.175 kg/m^3 and specific gravity of fuel to be 0.7. The lower heating value of fuel is 44 MJ/kg and the dynamometer constant is 5000. [7]

Or

4. (*a*) Draw combustion chambers used in CI engine. [6]

(*b*) A six-cylinder, gasoline engine operates on the four-stroke cycle. The bore of each cylinder is 80 mm and the stroke is 100 mm. The clearance volume per cylinder is 70 cc. At the speed of 4100 rpm, the fuel consumption is 19.8 kg/hr. and the torque developed is 160 Nm.

Calculate : [7]

(*i*) Brake power

(*ii*) The brake mean effective pressure

(*iii*) Brake themal efficiency if the calorific value of the fuel is 44,000 kJ/kg. Taker r = 1.4 for air.

5. (*a*) Write short note on Battery ignition system. [6]

(*b*) Write short note on full pressure lubrication system. [6]

Or

6. (*a*) Explain with neat diagram governing system for IC engine. [6]

(*b*) Write short note on Bharat stage-IV norms. [6]

7. (*a*) What are the advantages of multi-staging in reciprocating air compressor ? [6]

(*b*) During an experiment on reciprocating air compressor the following observations are being taken;

Barometer reading = 75.6 cm Hg,

Manometer reading across orifice = 13 cm Hg.

Atmospheric temperature = 25°C.

Diameter of orifice = 15 mm.

Coefficient of discharge across the orifice = 0.65

Take density of Hg = 0.0135951 kg/cm^3

Determine the free air handled by compressor (m^3/min). [7]

Or

8. (*a*) Compare reciprocating compressors with rotary compressors. [6]

(*b*) A single stage single acting reciprocating air compressor has air entering at 1 bar, 20°C and compression occurs following polytropic process with index 1.2 up to the delivery pressure of 12 bar. The compressor runs at the speed of 240 rpm and has L/D ratio of 1.8 The compressor has mechanical efficiency of 0.88. Determine the isothermal efficiency and cylinder dimensions. Also find out the rating of drive required to run the compressor which admits 1 m^3 of air per minute. [7]