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

Seat
No.

[5152]-118

S.E. (II Sem.) (Automobile/Mechanical Engineering)
EXAMINATION, 2017
APPLIED THERMODYNAMICS
(2012 PATTERN)

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

N.B. :— (*i*)   Answer Q. No. **1** *or* Q. No. **2,** Q. No. **3** *or* Q. No. **4**
        or Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

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

   (*iii*)   Draw neat and labelled diagram wherever necessary.

   (*iv*)   Use of steam tables, Mollier charts and scientifc calculator
        is allowed.

   (*v*)   Assume suitable data wherever necessary.

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

1.   (*a*)   Draw valve timing diagram for four-stroke low and high speed
        diesel engine.   [6]

   (*b*)   Explain with sketch the working principle of simple
        carburetor.   [6]

Or

2.   (*a*)   Draw valve timing diagram for two-stroke low and high speed
        petrol engine.   [6]

   (*b*)   Why are compensating devices necessary for simple
        carburetor ? Explain any *one* of them.   [6]

3. (*a*) Discuss the effect of the following engine variables on delay period in CI engine : [6]

(*i*) Intake Temperature

(*ii*) Compression ratio

(*iii*) Engine load

(*b*) During a test on the four cylinder, four-stroke oil engine the following data were recorded : [7]

Bore = 10 cm

Stroke = 12 cm

Speed = 1200 RPM

Break Torque = 120 Nm

Fuel consumption = 5 kg/hr

C.V. of fuel = 42 MJ/kg

Ambient Temperature = 17°C

Ambient Pressure = 1 bar.

Calculate :

(*i*) The thermal efficiency on break power basis.

(*ii*) The break mean effective pressure.

Or

4. (*a*) Explain the phenomena of diesel knock. Compare it with the phenomena of detonation in SI engines. [6]

(*b*) Find the air-fuel ratio of a 4-stroke, 1 cylinder, 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 g/kWh 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]

5. (*a*) Write a short note on capacitor discharge ignition (CDI) system. [6]

(*b*) Enlist at least six harmful effects of emission due to IC engines. [6]

Or

6. (*a*) Write a short note on water cooling system for IC engine. [6]

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

7. (*a*) Define the following terms in relation with reciprocating compressor : [6]

(*i*) Isothermal efficiency

(*ii*) Free air delivery

(*iii*) Volumetric efficiency.

(*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. [7]

Or

8. (*a*) Enlist advantages of rotary compressors over reciprocating compressors. [6]

(*b*) A reciprocating air compressor has four-stage compressions with 2 m^3/min of air being delivered at 150 bar when initial pressure and temperature are 1 bar, 27°C. Compression occur polytropically following polytropic index of 1.25 in four stages with perfect inter-cooling between stages. For the optimum inter-cooling conditions determine the intermediate pressures and the work required for driving compressor. [7]