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

Seat
No.

[5252]-118

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

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

N.B. :— (*i*) Solve Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6** and
Q. **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 labelled diagrams wherever necessary.

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

(*v*) Assume suitable data wherever necessary.

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

1. (*a*) Explain any *three* factors affecting the combustion phenomena
of spark ignition engines in detail. [6]

(*b*) Draw ideal and actual valve timing diagram for two stroke
petrol engine. [6]

Or

2. (*a*) Explain with the help of a p-V diagram the loss due to variation
of specific heats in an Otto cycle. [6]

(*b*) Explain nozzle lip with a neat diagram in simple carburetor.[6]

P.T.O.

3. (*a*) Enlist various factors that influence the delay period in CI engine. [6]

(*b*) The air flow to a four cylinder four-troke engine is 2.15 m³/min. During a test on the engine the following data were recorded :

Bore = 10.5 cm

Stroke = 12.5 cm

Engine speed = 1200 rpm

Torque = 150 N-m

Fuel consumption = 5.5 kg/h

Calorific value of fuel = 43124 kJ/kg

Ambient temperature = 20ºC

Ambient pressure = 1.03 bars

Calculate :

(*i*) The brake thermal efficiency.

(*ii*) The brakes mean effective pressure.

(*iii*) The volumetric efficiency. [7]

Or

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

(*i*) Inlet temperature

(*ii*) Inlet pressure

(*iii*) Compression ratio

(*b*) In a four stroke single cylinder gas engine the indicated mean effective pressure = 0.46 MN/m², the brake power = 9 kW,

speed = 250 rpm, mechanical efficiency = 0.8, and bore to stroke ratio = 0.66. Calculate cylinder diameter and mean piston speed. [7]

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

(*b*) Write a short note on Emission control methods for SI and CI engines. [6]

Or

6. (*a*) Write a short note on splash and Circulating Pump Lubrication System. [6]

(*b*) Write a note on Air pollution due to IC engine and its effect. [6]

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

(*b*) A reciprocating air compressor has four stage compressions with 2 m³/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]

Or

8. (*a*) Compare reciprocating compressors with rotary compressors. [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 volume of free air handled by compressor in m^3/min. [7]