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

Seat No.	

[5459]-117

S.E. (Mechanical/Automobile/Sandwich) (II Sem.)

EXAMINATION, 2018

APPLIED THERMODYNAMICS

(2015 PATTERN)

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

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

(*ii*) Answer for the four questions should be written in same answer book attach supplement if required.

(*iii*) Neat and labeled diagrams should be drawn wherever necessary.

(*iv*) Use of pocket calculator and different gas charts as applicable is allowed.

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

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

1. (*a*) In a tabular format list down the name of various components, materials used and method used for manufacturing for IC Engines. [6]

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

P.T.O.

Or

2. (*a*) With a neat and labeled sketch explain actual combustion curve for SI Engines on Pressure *Vs*. Crank angle diagram. [6]

(*b*) List down and explain in short different losses in real cycles vis-a-vis ideal reversible cycles. [6]

3. (*a*) Draw a neat and labeled diagram for Common Rail Diesel Injection system (CRDI) fuel supply system. [6]

(*b*) Explain Morse test for measuring Friction Power for multi-Cylinder IC Engines in detail. [6]

Or

4. (*a*) Explain the concept of knocking in CI Engines. [6]

(*b*) The following data was recorded from a test on a single cylinder four-stroke oil engine : [6]

Cylinder bore = 0.15 m, Engine stroke = 0.25 m, Indicated mean effective pressure = 7.355 bar, Engine speed = 400 rpm, Brake torque = 225 N-m, Fuel consumption = 3 kg/hr, CV = 44200 kJ/kg, Cooling water flow rate = 4 kg/min, Cooling water temperature rise = 42 deg. C., C*p* water = 4.187 kJ/kg K. Calculate :

(*i*) Mechanical Efficiency

(*ii*) Brake thermal efficiency

(*iii*) Specific fuel consumption.

5. (*a*) Explain the need of lubrication of Engine in Automobiles. List down the different Engine components lubricated in the Automobiles. [6]

(*b*) Draw neat, labeled and self-explanatory sketch of magneto ignition system. [7]

Or

6. (*a*) Discuss with neat sketch working of Exhaust gas re-circulation system for control of Nox. [6]

(*b*) What are the pollution norms adopted in Bharat Stage 6 and give the numbers in tabular format for acceptable emissions limits. [7]

7. (*a*) Draw P-v diagram for ideal compressor with zero clearance volume and compressor with clearance volume and label all the processes and volumes. Write down the formula for volumetric efficiency for with and without clearance volume compressor. [6]

(*b*) A single stage single acting reciprocating compressor sucks air at 1 bar and 30 deg. C and delivers 0.6 kg of air per minute at 6 bar. The clearance volume is 3% of stroke volume. Taking the index for compression and expansion as 1.3, calculate :

(*i*) The volumetric efficiency of the compressor,

(*ii*) Indicated power

(*iii*) Power required if the mechanical efficiency is 85%. [7]

Or

8. (*a*) Explain with neat sketch working of Vane type rotary compressors. [6]

(*b*) A single stage reciprocating compressor takes 1 m^3 of air per minute at 1.013 bar at 15 deg. C and delivers it at 7 bar according to law $PV^{1.35}$ = Constant, and the clearance is negligible. Calculate : [7]

(*i*) Mass of the air delivered per minute

(*ii*) Delivery temperature

(*iii*) Indicated Power.

Take Individual gas constant R = 287 J/kg K.