Total No. of Questions—**8**] [Total No. of Printed Pages—**2**

Seat No.	

[5352]-519

S.E. (Mechanical/Automobile) (II Sem.) EXAMINATION, 2018
APPLIED THERMODYNAMICS
(2015 PATTERN)

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

N.B. :—
- (*i*) Answer **4** 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, if necessary.

Q1. a) Explain the valve timing diagram of 4-stroke S. I. Engine with the help neat diagram. **[6]**

b) Draw the schematic diagram of M.P.F.I. system. List down the sensors (minimum 4), explain their location and function. **[6]**

OR

Q2. a) Explain the following losses for an actual S.I. Engine cycle: **[6]**

(i) Time loss

(ii) Exhaust blowdown loss

Show above losses on P-V diagram.

b) Explain the effect of various engine variables on flame speed in SI engines. **[6]**

Q3. a) With neat sketch explain the construction and working of Compression Swirl type Combustion Chamber in C.I. Engine. **[6]**

b) A single cylinder 4-stroke Engine gave the following results on full load. **[6]**

Area of indicator card = 300 mm^2, Length of diagram = 40 mm,

Spring constant= 1 bar/mm,

Speed of engine= 400 rpm,

Load on brake = 370 N,

Spring balance reading= 50 N,

Diameter of brake drum= 1.2 m,

P.T.O.

Fuel consumption= 2.8 kg/h, C.V. of fuel= 41800 kJ/kg,

Diameter of cylinder = 160 mm, stroke of piston= 200 mm.

Calculate: i) Indicated MEP ii) Indicated thermal efficiency iii) Brake power iv) Brake Thermal Efficiency.

OR

Q4. a) Explain the various stages of combustion in CI engine. [6]

b) Explain the Willian's line method of determining friction power and write its drawbacks. [6]

Q5. a) Explain the variation of HC, CO and NOx emission with respect to air fuel ratio for S.I. engine. [6]

b) Explain the working of magneto ignition system with neat sketch. [7]

OR

Q6. a) How does Positive Crankcase Ventilation system reduce the pollution due to crankcase Blow-by? Explain with diagram. [6]

b) What is engine governing? Explain any one method of engine governing with neat sketch. [7]

Q7. a) Derive the expression for ideal intermediate pressure for two stage single acting reciprocating air compressor working under perfect intercooling condition. What is its effect on discharge temperature, pressure ratio and work required for each stage? [6]

b) A two stage air compressor with perfect intercooling takes in air at 1 bar and 27 ^{0}C. The law of compression in both the stages is $pv^{1.3}$ = constant. The compressed air is delivered at 9 bar from the H.P. cylinder to an air receiver. Calculate, per kg of air, (a) minimum work of compression, (b) heat rejected in intercooler, (c) work required for single stage compression to the same delivery pressure. [7]

OR

Q8. a) Explain Root's blower compressor with neat sketch. [6]

b) A single stage reciprocating air compressor has a swept volume of 2000 cm^3, runs at 800 rpm and takes in air 1.013 bar and 15^{0}C. It operates on a pressure ratio of 8, with a clearance of 5% of the swept volume. Assume polytropic compression and expansion with n = 1.25. Calculate (a) Volumetric efficiency, (b) Indicated power, (c) Isothermal efficiency, (d) actual power needed to drive the compressor, if the mechanical efficiency is 85% [7]