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S.E. (Mechanical/Automobile) (Second Semester) EXAMINATION, 2015

I.C. ENGINES

(2008 PATTERN)

Time : Three Hours

Maximum Marks : 100

- N.B. :—**
- (i) Answer *three* questions from Section I and *three* questions from Section II.
 - (ii) Answers to the two Sections should be written in separate answer-books.
 - (iii) Neat diagrams must be drawn wherever necessary.
 - (iv) Figures to the right indicate full marks.
 - (v) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
 - (vi) Assume suitable data, if necessary.

SECTION I

1. (a) Derive an expression for air standard efficiency of diesel cycle with usual notations. Hence show that the efficiency of diesel cycle is lower than that of Carnot cycle. [8]
- (b) Explain theoretical and actual valve timing diagram for 4-stroke Otto engine with neat sketch. Explain reasons for differences. [10]

Or

2. (a) In an engine working on diesel cycle, the ration of weight of air and fuel supplied is 50 : 1. The temperature of the
P.T.O.

air at the beginning of compression is 60°C and compression ratio used is 14 : 1. What is ideal efficiency of engine ? C.V. of fuel is 42000 kJ/kg. Assume $C_p = 1.004$ kJ/kgK and $C_v = 0.717$ kJ/kgK for air. [10]

- (b) Explain direct heat losses and time losses and their effect on engine output. [8]

3. (a) Explain working of simple carburettor with neat sketch. [8]
(b) Explain phenomenon detonation in S.I. Engine. Also list down factors influencing it. [8]

Or

4. (a) List down types of injection system. Explain unit injector system with neat sketch. [8]
(b) Explain stages of combustion in S.I. Engine. [8]
5. (a) Explain concept of supercharging and turbocharging. [6]
(b) What is dope and additives ? List down type of additives. [5]
(c) A six cylinder 4-stroke diesel engine develop 125 kW at 3000 rpm. Its break specific fuel consumption is 200 gm/kWh. Calculate quantity of fuel to be injected per cycle per cylinder. Specific gravity of fuel may be taken as 0.85. [5]

Or

6. (a) Explain the following factors which affect delay period : [8]
(i) Fuel
(ii) Injection pressure
(iii) Compression ratio
(iv) Speed.
(b) Draw a schematic diagram of Bosch type fuel pump and explain its construction and working. [8]

SECTION II

7. (a) Explain battery ignition system with neat sketch. [8]
(b) Explain working of spring loaded mechanical governor. [5]
(c) Write a short note on DTSi system. [5]

Or

8. (a) The following observations are made during a trial on a single cylinder oil engine : [12]

Cylinder Diameter = 20 cm

Stroke = 40 cm

Mean effective pressure = 6 bar

Torque = 407 Nm

Speed = 250 rpm

Oil consumption = 4 kg/hr

C.V. of fuel = 43 MJ/kg

Quantity of cooling water = 4.5 kg/min

Air supplied per kg of fuel = 30 kg

Rise in cooling water temp. = 45°C

Exhaust gas temp. = 420°C

Room temp. = 20°C

Take $C_{p_w} = 4.18$ kJ/kg and $C_{p_g} = 1$ kJ/kgK.

Determine :

- (i) Indicate power
(ii) Brake power
(iii) Draw a neat balance sheet on kW basis and percentage basis.
- (b) Explain Splash lubricating system with neat sketch. [6]

9. (a) Determine function of radiators. Discuss different type of matrices used with these radiators with neat sketch. [8]
(b) What are basic requirements of ideal ignition system ? [4]
(c) What are desirable properties of good lubricating oil ? [4]

Or

- 10.** (a) What is the function of dynamometer ? Name various types of dynamometer. Explain any *one* with neat sketch. [8]
- (b) Explain : [8]
- (i) Indicated power
 - (ii) Break mean effective pressure
 - (iii) BSFC
 - (iv) Heat Balance Sheet.
- 11.** (a) Explain Morse Test and its limitation. [8]
- (b) Explain different emission from IC engine. [8]

Or

- 12.** Write short notes on : [16]
- (a) Bharat Norms
 - (b) Electrical Control Unit
 - (c) Biodiesel
 - (d) Exhaust Gas Recirculation.