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B. TECH.
(SEM V) THEORY EXAMINATION 2018-19
I.C. ENGINES & COMPRESSORS

Time: 3 Hours *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.** 2 x 7 = 14
   a. Differentiate between two stroke and four stroke engines.
   b. Draw P-V & T-S diagram for Otto, Diesel and Dual Cycle.
   c. Explain Stoichiometric Air Fuel ratio.
   d. What are the alternate Fuels for I.C. Engines?
   e. Explain delay period in CI engine.
   f. Explain Octane number and Cetain no. in brief.
   g. Differentiate between Reciprocating and Rotary air compressor.

SECTION B

2. **Attempt any *three* of the following:** 7 x 3 = 21
   a. Derive the efficiency of Dual cycle.
   b. With the help of a neat sketch explain the working principle of simple carburetor.
   c. Explain the types of Combustion chamber design in CI engine.
   d. Explain the advantages and disadvantages of Supercharger. Also explain its types.
   e. Following data relates to 4 cylinders, 4 stroke petrol engine. Air/Fuel ratio by weight 16:1 Calorific value of the fuel = 45200 kJ/kg, Mechanical efficiency =82% Air standard efficiency =52%,Relative efficiency =70%, Volumetric efficiency =78%, Stroke/bore ratio = 1.25, Suction Conditions = 1 bar, 25 °C. Speed 2400 rpm. Power at brakes of 72 kW. Calculate (i) Compression ratio (ii) Brake specific fuel consumption (iii) Bore and stroke.

SECTION C

3. **Attempt any *one* part of the following:** 7 x 1=7
   a. Compare Otto, Diesel and Dual cycle for the
      (i) Same compression ratio & heat input.
      (ii) Same peak pressure & heat input.
   b. Fuel supplied to an SI engine has a calorific value 42000 kJ/kg. The Pressure in the cylinder at 30% and 70% of the compression stroke are 1.3 bar and 2.6 bar respectively. Assuming that compression follows the law $PV^{1.3}$=Constant. Find the compression ratio. If the relative efficiency of the engine compared with the air-standard efficiency is 50%. Calculate the fuel consumption in kg/kWh.

4. **Attempt any *one* part of the following:** 7 x 1=7
   a. Explain normal and abnormal combustion in SI engine. Also factors affecting knocking in SI engine.
   b. Compare Battery and Magneto ignition system? Sketch the constructional layout of Battery ignition system in details.

5. **Attempt any *one* part of the following:** 7 x 1=7
   a. Explain the stages of combustion on P-θ diagram in C.I. Engine.
   b. Classify fuel injection system. Why the air injection system is not used now a days. Also explain common rail fuel injection system with diagram.

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6. **Attempt any *one* part ofthefollowing:** 7 x 1=7

a. Describe advantages and disadvantages of Air and Water cooling. Explain Thermostat cooling system with diagram.

b. Explain the Willan's line and Morse test in detail.

7. **Attempt any *one* part ofthefollowing:** 7 x 1=7

a. Explainthe advantages of multistage compression with help of PV and TS diagram. Derive Optimumpressure ratio for two stage compressor and also find minimum work of Compression.

b. A two stage air compressor compresses air from 17° C and 1 bar to 65 bar. The air is Cooled in the intercooler to 30° C and intermediate pressure is steady at 7.7 bar. The low pressure Cylinder is 10 cm diameter and the stroke for both cylinders is 11.25 cm. Assuming a Compression law of $PV^{1.3n}$ constant, and that the volume of air at atmospheric conditionsDrawn in per stroke is equal to the low pressure cylinder swept volume, find the power of the Compressor while running at 250 rpm. Find also the diameter of HP cylinder.

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