

6E3050

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B.Tech. (Sem.VI) (Main/Back) Examination, May -2013  
Mechanical Engineering  
I. C. Engine

[Time : 3 Hours]

[Total Marks : 80]

[Min. Passing Marks : 24]

**Instructions to Candidates :**

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

**UNIT -I**

1. (a) Explain the first law analysis of an internal combustion engine and also show by means of diagram the energy flow in internal combustion engine. [8]
  - (b) A four stroke, four-cylinder diesel engine running at 2000 rpm develops 60KW. Brake thermal efficiency is 30% and calorific value of fuel is 42 MJ/kg. Engine has a bore of 120mm and stroke of 100mm. Take  $\rho_a = 1.15\text{kg/m}^3$ , air-fuel ratio = 15% and  $\eta_m = 0.8$ . Calculate (i) fuel consumption (ii) air consumption ( $\text{m}^3/\text{sec}$ ) (iii) indicated thermal efficiency (iv) brake mean effective pressure. [8]
- OR**
1. (a) What are the emission standards in India as well as in world? Explain in details. [8]

- (b) Explain followings:  
 (i) Mean effective pressure  
 (ii) Specific fuel consumption  
 (iii) Air-fuel ratio  
 (iv) Heating value of fuel

[4×2=8]

**UNIT – II**

2. (a) Explain the knocking phenomenon in a C.I. engine and compare it with S.I. engines. Discuss the effects of operating variables on delay period and diesel knock. Is it true that the condition which encourages knocking in SI engine reduces knocking in C.I. engines? [8]  
 (b) What are the requirements of combustion chamber for C.I. engines? Describe the various types of combustion chambers. [8]

**OR**

2. (a) What are the important qualities of S.I. and C.I. fuel? Also explain in detail the knock rating of S.I. and C.I. engine fuels. [8]  
 (b) Explain alcohol as an alternative fuel for I.C. engine and also state its merits and demerits. [8]

**UNIT – III**

3. (a) Develop an expression for air-fuel ratio neglecting compressibility for a simple carburetor. [8]  
 (b) What are the requirements of fuel injection system for C.I. engines? Also explain the various methods of injection system. [8]

**OR**

3. (a) What are the various types of Ignition systems which are commonly used? Explain. [8]  
 (b) Explain the following :  
 (i) Firing order  
 (ii) CRDI  
 (iii) MPFI  
 (iv) Spark plug [4×2=8]

**UNIT – IV**

4. (a) What are the various desired properties of a lubricant? Explain how do additives help to achieve the desired properties. [8]  
 (b) Why is cooling of an I.C. engine required? Explain the various methods of cooling. [8]

**OR**

4. (a) What is meant by supercharging? What is its effect on engine performance? Also state the various methods of supercharging and explain any one? [8]  
 (b) Define the following:  
 (i) Delivery ratio (ii) Trapping efficiency  
 (iii) Relative efficiency (iv) Scavenging efficiency  
 (v) Charging efficiency (vi) Pressure loss coefficient  
 (vii) Excess air factor (viii) Index of compression. [8]

**UNIT – V**

5. (a) Describe the followings:  
 (i) Free Piston Engine  
 (ii) Rotary Engine  
 (iii) Stratified Charge Engine  
 (iv) Variable Compression Ratio Engine. [4×2=8]  
 (b) Explain the construction and working of dual fuel engine cycle? Also state its merits and demerits. [8]

**OR**

5. (a) What are requirements of diesel power plant? Give the layout of a diesel power plant. [8]  
 (b) What are the applications of diesel power plant? Also states the factors which are considered while selecting the site for a diesel power plant. [8]