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

Roll No .....

MMTP - 105

M.E./M.Tech. I Semester

Examination, December 2013

Internal Combustion Engines & Alternate Fuels

Time : Three Hours

Maximum Marks : 70

Note : Attempt any five questions. All questions carry equal marks.

1. a) Explain the effect of the following engine variables on flame propagation: 7
   i) Compression ratio ii) Fuel-air ratio
   iii) Engine speed iv) Turbulence
   b) Explain the phenomenon of pre-ignition? How pre-ignition leads to detonation and vice versa? 7

2. a) Describe with suitable sketches the following systems of a carburettor. 7
   i) Idling system
   ii) Power enrichment system
   iii) Acceleration pump system
   iv) Choke
   b) Explain the working of a Transistorized Coil Ignition (TCI) system. 7

3. a) Briefly explain various methods of supercharging an engine. 7
   b) Explain the internationally accepted methods of measuring the following invisible emission: 7
   i) Oxides of Nitrogen ii) Carbon Monoxide

4. A gas engine working on the constant volume cycle gave the following results during a one-hour test run. Cylinder diameter 25cm; stroke 50cm; effective diameter of brake wheel 1.25m; net load on brake 1250N; average speed 230rpm; average explosion per minute 80; indicated mean effective pressure 7.5bar; gas used 12.5m^3; lower calorific value of gas 22000 kJ/m^3; cooling water used 625kg; inlet temperature 25°C; outlet temperature 60°C. Determine mechanical and indicated thermal efficiencies. Draw a heat balance for the engine on minute basis. 14

5. a) Describe with sketches the following methods of charge stratification: 7
   i) Texaco combustion process
   ii) Ford combustion process.
   b) Explain the working of a dual-fuel engine with neat sketch and discuss its performance characteristics. 7

6. a) Explain the geometry of Wankel rotary combustion engine. What is K factor? What is the effect of K factor on the shape of the engine? 7
   b) Compare the performance of a variable compression ratio engine with that of a conventional constant compression ratio engine. 7

7. a) Discuss different properties of ethanol and methanol and compare them with gasoline. 7
   b) Why hydrogen is considered most favourable substitute fuel for future? Discuss different properties of hydrogen if used as a substitute fuel for petrol. 7

8. a) Discuss different methods of producing ethanol and list out the merits and demerits. 7
   b) Discuss the use of biogas as a substitute fuel for S.I.engine. Mention the modification required with the engine system. 7

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