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BIMEE-031

DIPLOMA IN MECHANICAL ENGINEERING

(DMEVI)

00707

Term-End Examination

June, 2013

BIMEE-031 : I.C. ENGINES

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any five** questions. All questions carry **equal** marks. Use of calculator is **permitted**.*

1. (a) Define compression ratio. What is its range for (a) the SI engine (b) the CI engine ? What factors limit the compression ratio in each type of engine. 6

(b) Define the following efficiencies : 8

(i) Indicated thermal efficiency

(ii) Brake thermal efficiency

(iii) Mechanical efficiency

(iv) Volumetric efficiency.

2. (a) Briefly explain the stages of combustion in SI engines elaborating the flame front propagation. 6

(b) In an ideal Otto cycle the air at the beginning of isentropic compression is at 1 bar and 15°C. The ratio of compression is 8. If the heat added during the constant volume process is 1000 kJ/kg. 8

Determine :

(i) Maximum temp. in cycle.

(ii) the air standard efficiency

(iii) the work done per kg of air.

Take $C_V = 0.718 kJ/kg/K$

3. (a) In SI engine, what are the mixture requirements for : 4

(i) starting and warm up

(ii) acceleration

(b) Why there is maldistribution of air fuel mixture in multi cylinder engines using single carburettor ? 3

(c) With neat sketches discuss the following important design of overhead valve combustion chamber : 7

(i) Bath tub type

(ii) Wedge type

4. (a) What are the basic differences in the combustion process of SI and CI engines ? 4

(b) What is meant by delay period in CI engines and what is its importance ? 3

(c) In a Diesel cycle, air at 0.1MPa and 300K is compressed adiabatically until the pressure rises to 5MPa. If 700 kJ/kg of energy in the form of heat is added at constant pressure, determine : 7

(i) compression ratio

(ii) cut off ratio

(iii) thermal efficiency.

5. (a) What are the two conventional types of ignition systems that are normally used in automobiles ? 4

(b) What are the functional requirements of an injection system ? 3

(c) What is the purpose of using a governor in CI engines ? With a neat sketch discuss the working principle of a pneumatic governor. 7

6. (a) Mention the various parameters which affect the engine heat transfer and explain their effects ? 4

(b) Explain the reasons for engine cooling requirements. 3

(c) Explain the following : 7

(i) Evaporative cooling system

(ii) Pressure cooling system

7. (a) Describe the causes of hydrocarbon emissions from SI engines. 4

(b) What are particulates ? Describe how particulate emissions are caused. 3

(c) A six cylinder, gasoline engine operates on the four stroke cycle. The bore of each cylinder is 80 mm and the stroke 100mm. The clearance volume per cylinder is 70cc. At a speed of 4000 rpm torque developed is 150 Nm. 7

Calculate :

(i) the brake power

(ii) the brake mean effective pressure

(iii) compression ratio

8. Write short notes on the following (*any two*) : **14**

(a) Super charging

(b) MPFI

(c) Catalytic converters

(d) Abnormal combustion in SI engines.