No. of Printed Pages : 3

BME-053

DIPLOMA IN MECHANICAL ENGINEERING (DME)

00950

Term-End Examination

June, 2014

BME-053 : APPLIED THERMAL ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Answer any **five** questions. Assume any missing data suitably. Use of scientific calculator is allowed.*

1. (a) In an air standard Carnot cycle heat is transferred to the working fluid at 510 K and rejected at 276 K. The heat transfer to working fluid is 110 kJ/kg. The minimum pressure in the cycle is 1 bar. Assuming constant specific heat of air, determine the cycle efficiency. Use R = 287 J/kg K. 7

(b) Explain the working of four stroke diesel cycle, with the help of a neat sketch diagram. 7

2. (a) Name three manufactured solid fuels and describe their characteristics. 7

(b) Mention the origin and composition of natural gas. Discuss its applications. 7

3. (a) Explain the working of coil ignition system with the help of a schematic diagram. 7

(b) Write the advantages and disadvantages of the water cooling system over air cooling system. 7

4. (a) Define the following terms : 8

(i) Viscosity

(ii) Flash point

(iii) Cloud point

(iv) Emulsification

(b) Explain the working of centrifuge type oil filter. 6

5. (a) Define the following terms with respect to IC engine testing : 5

(i) Brake specific fuel consumption

(ii) Volumetric efficiency

(iii) Mechanical efficiency

(iv) Mean effective pressure

(v) Thermal efficiency

(b) A six cylinder, four stroke gasoline engine having a bore of 100 mm and stroke of 120 mm has a compression ratio of 9. The relative efficiency is 70%, when the indicated specific fuel consumption is 3600 g/kWh. Estimate : (i) calorific value of the fuel (ii) corresponding fuel consumption given that imep is 9·5 bar and speed is 3000 rpm. 9

6. (a) Explain the Compression process on PV and TS diagram for a Reciprocating Compressor. *5*

(b) An air compressor cylinder has 20 cm bore and 20 cm stroke and 5% clearance. The machine operates between 200 kPa, 127°C and 600 kPa. The polytropic index is 1·3. calculate the volumetric efficiency of the compressor. *9*

7. (a) Explain the working of a simple open cycle gas turbine. *6*

(b) What is a combustor in a gas turbine and where is it placed inside the turbine ? Explain with the help of a neat sketch diagram. *8*

8. Write short notes on the following terms : $3\frac{1}{2} \times 4 = 14$

(a) Fuels used for Gas turbines

(b) Multistage Compression

(c) Hydraulic Dynamometer

(d) Splash system of Lubrication