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BME-053

DIPLOMA IN MECHANICAL ENGINEERING (DME)

Term-End Examination

00012

December, 2016

BME-053 : APPLIED THERMAL ENGINEERING

Time : 2 hours *Maximum Marks : 70*

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

1. (a) Derive an expression for the thermal efficiency of the diesel cycle.

(b) An engine working on Otto cycle has pressure 1 bar and temperature 30°C at the beginning of the compression stroke. At the end of the compression stroke, the pressure is 11 bar. The maximum temperature in the cycle is 1000°C. Determine the (i) compression ratio, (ii) work done/kg of air in the cycle, and (iii) efficiency. 7+7

2. (a) Explain the Battery Ignition system with a neat sketch.

(b) What are the types of Electronic Ignition systems ? State their advantages. 7+7

3. (a) Explain in brief the methods of cooling of IC Engines.

(b) What do you mean by radiator ? Explain with a neat sketch. 7+7

4. (a) Define Viscosity. How does the viscosity of liquids and gases change with increasing or decreasing of temperature ?

(b) Explain the working principle of Dry Sump Lubricating system with a neat sketch. 7+7

5. (a) Explain any ***two*** of the following : $2 \times 3\frac{1}{2} = 7$

(i) Specific fuel consumption

(ii) Brake mean effective pressure

(iii) Specific power output

(b) A diesel engine consumes fuel at the rate of 6 gm/s and develops power 80 kW. If the mechanical efficiency is 90%, determine BSFC and ISFC. The lower heating value of fuel is 44 MJ/kg. 7

6. (a) What is intercooling ? Discuss the significance of intercooling in the reciprocating air compressors.

(b) An air compressor has a volumetric efficiency of 70%, the discharge state being 550 kPa, 150°C and the inlet state 100 kPa, 20°C. If the clearance is 4%, determine the (i) polytrophic compression index, and (ii) volumetric efficiency. 7+7

7. (a) What are the advantages of closed cycle gas turbine power plants over open cycle gas turbine power plants ?

(b) State the major elements of gas turbine power plants and explain any one of them. 7+7

8. Write short notes on any ***two*** of the following : 7+7

(a) Octane Number

(b) Producer Gas

(c) Fuel-Air Ratio