DIPLOMA IN MECHANICAL ENGINEERING (DME)

Term-End Examination

December, 2013

BME-053 : APPLIED THERMAL ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *Answer **any five** questions. All questions carry **equal** marks. Use of scientific calculator is **permitted**. Assume **any** missing data suitably.*

1. IN a petrol engine the swept volume is $0.18m^3$ the temperature $T_1 = 1550K$, $T_2 = 877K$, $T_3 = 233K$ and $T_4 = 581K$. The engine produces power strokes once in 2 revolution. The engine runs at 950 rpm calculate (a) Heat supplied (b) Heat rejected (c) Workdone, CV of the fuel is 60000 J/kg what amount of fuel is required perminute ? Use $C_v = 713J/kg.K$, $m = 0.1615kg$. **14**

2. (a) Explain the working of Four stroke petrol engine with the help of a neat diagram. **5**

(b) A single cylinder four stroke diesel engine, having swept volume of $950 \times 10^{-6} m^3$ is tested at 450rpm when a braking torque of 75Nm is applied, analysis of indicator diagram shows the mean effective pressure of IMPa. Calculate Brake Power and Mechanical efficiency. **9**

3. (a) Discuss the importance of octane and cetane number of fuel. What is knocking ? 5

(b) What are the gases coming out from I.C. engines that cause air pollution. What measures can be adopted to reduce the pollutions ? 9

4. (a) Give the classification of fuel with advantages and disadvantages. 7

(b) Write the characteristics of the following gaseous fuels. 7

(i) Coal gas (ii) Producer gas

5. (a) Differentiate between battery and magneto ignition system 7

(b) Explain the working of water cooling system of 4 – cylinder engine with the help of circuit diagram. 7

6. A single cylinder and 4-stroke cycle I.C engine when tested, the following observations were obtained. 14

area of indicator diagram = 4sq.cm,
length of indicator diagram = 5cm,
Spring constant = 12bar/cm
Speed of engine = 500rpm,
Brake drum diameter = 150cm,
Dead weight on brake = 420N.
Spring balance reading = 75N.
Fuel consumption 3.2kg/hr,
CV = 50000kJ/kg,
cylinder diameter =20cm, piston stroke=24cm
Find.

(a) Frictional power
(b) Mechanical efficiency.
(c) brake specific fuel consumption
(d) Brake thermal efficiency.

7. (a) Explain the working of reciprocating compressor with the help of Ideal Indicator diagram. 4

(b) An air compressor has a volumetric efficiency of 80% when tested. The discharge state being 600KPa at 200°C and inlet state is 150KPa at 20°C. If the clearance volume is 6%, predict the new volumetric efficiency when the discharge pressure is increased to 800KPa. Assume that the ratio of real to ideal volumetric efficiency and the exponent n remain constant. 10

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

(a) Closed cycle Gas turbine Power plant.

(b) Inter cooling with two stage compression.

(c) Eddy current Dynamometer.