No. of Printed Pages : 3

BME-052

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DIPLOMA IN MECHANICAL ENGINEERING (DME) / ADVANCED LEVEL CERTIFICATE IN MECHANICAL ENGINEERING (DMEVI/ACMEVI)

Term-End Examination

December, 2012

BME-052 : BASICS OF THERMAL ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Answer **any seven** questions. Each answer carry **10** marks. Use of scientific calculator is **permitted**. Use of steam table, Mollier diagram are permitted.*

1. What do you understand about thermodynamic properties ? How are these properties classified ? Differentiate between them, with suitable examples. **10**

2. A gas of mass 1.5kg under goes a quasistatic expansion which follows the relationship, P=a+bv where a and b are constants. The initial and final pressures are 1000 kPa and 200 kPa respectively and the corresponding volumes are 0.2 m^3 and 1.2 m^3. Calculate the work done during this process. **10**

3. A reversible engine receives heat from a reservoir A at 700°C and rejects heat at a temperature T_2. A second reversible engine B receives the heat rejected by the first engine and rejects heat to a sink at a temperature of 37°C. Calculate the temperature T_2 for, **10**

(a) equal efficiency of both engines

(b) equal work of both engines.

4. 10 kg of water at 45°C is heated at a constant pressure of 10 bar untill it becomes super heated vapour at 300°C. Find the changes in volume, enthalpy, internal energy and entropy. **10**

5. List out all the boiler mountings. Explain any one of them in detail. **10**

6. Explain in detail the factors, which influence the Rankine cycle efficiency. **10**

7. Explain the construcion and working of a multi-jet type condenser with neat diagram. **10**

8. Describe the functions of air pre-heater, economiser and re-heater with neat diagram. **10**

9. Explain with sketch construction details and working of a geothermal power plant. 10

10. Hot air at a temperature of 65°C is flowing through a steel pipe of 120 mm diameter. The pipe is covered with two layers of different insulating materials of thickness 60 mm and 40 mm, and their corresponding thermal conductivities are 0.24 and 0.4 W/m°c respectively. The inside and outside heat transfer co-efficients are 60 and 12 W/m°c. The atmospheric temperature is at 20°C. Find the rate of heat loss from 60 m length of pipe. 10