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BME-052

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

01299

Term-End Examination

June, 2014

BME-052 : BASICS OF THERMAL ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Answer any* ***five*** *questions. Use of scientific calculator is permitted. Use of Steam table, Mollier diagram is permitted.*

1. (a) Define a thermodynamic system. Explain different types of thermodynamic systems with suitable examples. 7

(b) Derive the equation for work done during an isothermal process. 7

2. (a) State and explain the first law of thermodynamics for a closed system. 7

(b) Explain the Joules experiment with neat sketch. 7

3. (a) Define Entropy. Derive the expression of the change in entropy. 7

(b) A pressure vessel contains 1·25 kg of steam at 5 bar and 0·7 dry. The vessel is cooled until the steam attains the final dryness fraction of 0·5.

Find : 7

(i) The final pressure of steam

(ii) Heat transfer during the process

4. (a) A boiler generates 5000 kg/hr of steam at 16 bar and 300°C from feed water at 30°C. Coal used is 600 kg/hr with calorific value of 30000 kJ/kg.

Determine : 7

(i) Equivalent of evaporation

(ii) Boiler efficiency

(b) Compare water tube boilers and fire tube boilers. 7

5. (a) What are the various methods of governing ? Describe any one method of governing of steam turbine. 7

(b) A simple impulse turbine has one ring of moving blade running at 150 m/s. The absolute velocity of steam at exit from the stage is 85 m/s at an angle of 80° with tangent of wheel. The back velocity coefficient is 0·82. The steam rate is 2 kg/sec. Assume moving blade to be equiangular.

Find : 7

(i) The blade angle

(ii) Absolute velocity of steam at inlet

(iii) Axial thrust

(iv) Power developed

6. (a) Enumerate the advantages of using steam condenser in a steam power plant. Explain the significance of vacuum efficiency and condenser efficiency. 7

(b) Give merits and demerits of a surface condenser over the jet condenser. 7

7. (a) What are the types of energy sources ? State various renewable and non-renewable energy sources. 7

(b) What is cooling tower ? How are the cooling towers classified ? Explain any one of them with a neat sketch. 7

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

(i) Thermal Convection

(ii) Geothermal Energy

(iii) Super Heater

(iv) Throttling Process