Total No. of Pages: 1

Register Number: **7217**

Name of the Candidate:

DIPLOMA EXAMINATION - 2010

(REFRIGERATION AND AIR CONDITIONING)

(PAPER – I)

110. THERMAL ENGINEERING

December) (*Time: 3 Hours*

Maximum: 100 Marks

Answer any FIVE questions.
Steam Table, Heat and Mass Transfer Data Books Permitted.
All questions carry equal marks. (5 × 20 = 100)

1. A closed system undergoes a reversible process at constant pressure process of 3.5 bar and its volume changes from 0.15 m^3 to 0.06 m^3 25kJ of heat is rejected by the system during the process. Determine the change in internal energy of the system.

2. In a certain steady flow process 12 kg of fluid per minute enter at a pressure of 1.4 bar, density 25kg/m^3 velocity l20m/s and internal energy 920kJ/kg. The fluid properties at exit are pressure 5.6bar, density 5kg/m^3 velocity 180m/s and internal energy 720kJ/kg. During the process the fluid rejects 6OkJ/sec of heat and rises through 60m. Determine work done during the process in kW.

3. What are the limitations of the first law of thermodynamics? Illustrate with suitable examples.

4. Draw a neat sketch of ammonia absorption refrigeration system and explain its working.

5. A hollow cylinder with inner radius 30mm and outer radius 50mm is heated at the inner surface at a rate of 105w^5/m^2 and dissipated heat by convection from outer surface into a fluid at 80°C with heat transfer coefficient of 400 W/m^2 K, there is no energy generation and thermal conductivity of the material is constant at 15W/mK.Calculate the temperatures of inside surfaces of the cylinder.

6. A vertical plate 0.5m high and 1m wide is maintained at uniform temperature of 124°C .It is exposed to ambient air at 30°C calculating the heat transfer rate from the plate.

7. Distinguish between sub cooled and nucleate pool boiling with suitable sketch.

8. A counter flow double pipe heat exchanger using superheated steam is used to heat the water at a rate of 3kg/s. The steam enters the exchanger at 180°C and leaves at 130°C. The inlet and exit temperature of water are 30°C and 80°C respectively. The overall heat

transfer coefficient is 820 W/m^{2}K. Calculate the heat transfer area required.

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