

Total No. of Pages : 2

Register Number :

7964

Name of the Candidate :

**DIPLOMA IN REFRIGERATION AND AIR-CONDITIONING
EXAMINATION MAY 2014.**

110 — THERMAL ENGINEERING

Time : Three hours

Maximum : 100 marks

Answer any FIVE questions.

(5 × 20 = 100)

1. (a) Explain the concept of control volume. (5)
 (b) Define first law of thermodynamics and explain its corollary. (10)
 (c) Explain the concept of energy. (5)
2. (a) Explain reversible and irreversible cycle. (5)
 (b) A turbine operates under steady flow conditions, receiving steam at the following state. Pressure 1.2 MPa, temperature 188°C, enthalpy 2785 KJ/Kg, velocity 33.3 m/s and elevation 3m. The steam leaves the turbine at the following state. Pressure 20 KPa, enthalpy 2512 KJ/Kg, velocity 100 m/s, and elevation 0m. Heat loss to the surrounding is 0.29 KJ/s. Steam flow rate is 0.42 Kg/s. Calculate power output of the turbine. (15)
3. (a) Explain reversed carnot cycle. (10)
 (b) Explain the working of reciprocating compressor. (10)
4. (a) Define the term's relative humidity and 'humidity ratio'. (5)
 (b) Explain with neat diagram the working principle of vapour compression refrigeration system. (15)
5. (a) Explain critical thickness of insulation. (5)
 (b) Hot air at 40°C is flowing through a steel pipe of 10 cm diameter. The pipe is covered with two layers of insulating materials of thickness 4 cm and 3 cm and their corresponding conductivities are 0.1 and 0.32 w/mc respectively. The inside and outside convective heat transfer coefficients are 50 and 10 W/m²c. Atmospheric temperature is 10°C. Calculate the heat loss from 10 m length of pipe. (15)
6. (a) Explain in detail free and forced convection heat transfer. (10)
 (b) Explain heat transfer by radiation. (10)

7. What is the function of heat exchanger? Explain with diagram the different types of heat exchanger. (5+15)
8. (a) What is fouling of heat exchanger? Explain. (5)
- (b) Give the limitations of first law of thermodynamics. (5)
- (c) What is laminar and turbulent flow? Explain with example. (10)
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