

7E4061	Roll No. : _____	Total Printed Pages : 3
	7E4061	
B. Tech. (Sem. VII) (Main/Back) Examination, December-2012 Mechanical Engg. 7ME2 Refrigeration & Air Conditioning		

Time : 3 Hours]

 [Maximum Marks : 80
 [Min. Passing Marks : 24

*Attempt any five questions. Selecting one question from each unit.
 All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

Use of following supporting material is permitted during examination.
 (Mentioned in form No. 205)

1. Refrigeration chart (R-12)
 3. Steam Table

2. Psychrometric Chart

- 1 (a) What will happen, if the carnot cycle for a heat engine is carried out in a reversed mode ? Explain and find the parameter used to measure its efficiency. 8
- (b) Calculate the COP of a simple saturated vapour compression refrigeration system working on R-12, when evaporator temperature is 15°C, condenser temperature is +30°C and Cp for superheated refrigerant is 0.628 kJ/KgK. Also calculate the mass of refrigerant per ton of refrigeration effect produced and power input. Assume isentropic process. 8

OR

- 1 (a) Define refrigeration, Tonne of refrigeration, COP and refrigerant fluid. 8
- (b) Describe with neat sketch the working of a vapour compression refrigeration cycle. How the actual cycle differs from theoretical one ? 8



UNIT - II

- 2 (a) Describe with neat sketch working of reversed Brayton cycle and compare it with reversed cornot cycle. 8
- (b) The air conditioning unit of a pressurized aircraft receives its air from the compressor driven by the engine at a pressure of 1.22 bar. The aircraft flying at the height of 10,000 m, where the surrounding air is at 0.227 bar pressure and -56°C temperature. The air conditioning is achieved by a unit consists of a secondary compressor and a turbine mounted on the same shaft. The pressure and temperature of air leaving turbine are 1 bar and 7°C . Assuming all processes reversible, calculate the pressure after the secondary compression and temperature of the air at exit from the cooler. Take $\gamma = 1.4$. 8

OR

- 2 (a) Why air cycle refrigeration is preferred in air craft. List its advantages. 8
- (b) Describe with neat sketch, the working of a regenerative system used in aircraft refrigeration. Show the thermodynamic cycle also. 8

UNIT - III

- 3 (a) Derive an expression for an ideal COP in the case of vapour absorption system. 8
- (b) Describe with neat sketch any three types of expansion devices used in refrigeration. 8

OR

- 3 (a) What must be ideal characteristics of a refrigerant used in ice plant. Justify the use of ammonia as a refrigerant in an ice plant. 8
- (b) What are the important functions of an inter cooler used in multi stage compression. Derive an expression for ideal pressure in multistage compression intercooler. 8



UNIT - IV

- 4 (a) Define the terms, moist air, specific humidity, relative humidity and humidity ratio. 8
- (b) Atmospheric air at 760 mm of Hg pressure and dry bulb and wet bulb temperatures of 16°C and 10°C respectively enters the heating coil whose temperature is 42°C. The bypass factor of heating coil is 0.4. Calculate the dry bulb and wet bulb temperature, relative humidity of air leaving the heating coil and the sensible heat added per kg of dry air. 8

OR

- 4 (a) What are sensible heating and cooling processes ? Where these are used ? Explain with neat sketch and show on psychromatic chart. Define bypass factor also. 8
- (b) What is the mechanism of maintaining constant temperature of human body ? How it controls and adjusts to various weather conditions ? 8

UNIT - V

- 5 (a) What is internal heat gain ? Write short notes on loads due to occupancy, lighting and appliances. 8
- (b) A room measuring 5m × 6m is maintained at 27° DBT and 50 per cent RH. The ambient temperature are 40°C DBT and 27°C WBT. The space is a sensible heat gain of 14 kW Air is supplied to the space at 7°C saturated. Find the mass of moist air supplied to the space in Kg/h, latent heat gain in kW, and cooling load of the air washer in kW, if 30 per cent of the air supplied to the space is fresh, the remaining being recirculated. Cp of air = 1.0216 unit. 8

OR

- 5 (a) What is evaporative cooling ? What are its limitation ? Show the cooling process on psychrometric chart. 8
- (b) What are the factors considered for cooling load and heating load estimation ? 8

