

Total No. of Questions : 9]

SEAT No. :

P2230

[Total No. of Pages : 3

[5254]-561

B.E. (Automobile) (Semester -I)

**AUTOMOTIVE REFRIGERATION & AIR CONDITIONING
(2012 Pattern)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Figures to the right side indicate full marks.*
- 2) *Use of steam tables, slide rule, electronic calculator, and psychrometric chart is allowed.*
- 3) *Assume suitable data, if necessary.*
- 4) *Solve 5 question 1 or 2, 3 or 4, 5 or 6, 7 or 8,9 is compulsory.*

SECTION - I

- Q1)** a) The capacity of refrigerator of 450 TR when working between -15°C and 30°C find mass of ice produced at 0°C with 24 hrs when water is supplied at 20°C also find out the minimum power required and heat in condenser in kw assume the machine to be working on reversed carnot cycle take $C_{p_w} = 4.18 \text{ kJ/kg}^{\circ}\text{C}$ and latent heat of ice as 335 kJ/kg . [6]
- b) Explain vapour compression system. [4]

OR

- Q2)** a) Domestic refrigerator of 1/8 ton refrigeration (TR) capacity has cop half that of carnot cop, outside air temperature difference is required on both sides determine power consumption also outside air temp is 40°C while freezer is maintained at -10°C also assume 5°C temp difference. [6]
- b) Define one tonn of refrigeration & compare cop of heat pump & refrigerator. [4]

P.T.O

Q3) Write note on- **[10]**

- a) Future refrigerant
- b) Air conditioning components

OR

Q4) Explain various modes in details. **[10]**

Q5) Explain following properties. **[8]**

- a)
 - i) Saturated air
 - ii) Relative humidity
 - iii) Adiabatic saturation temp
 - iv) DBT & WBT
- b) Calculate without using psychrometric chart. **[8]**
 - i) Partial pressure
 - ii) Sp-humidity
 - iii) Abs-humidity
 - iv) Relative humidity
 - v) Sp-enthalpy

For moist air DBT of 24°C & DPT of 15°C under total pressure of 740 mm of Hg.

OR

- Q6) a) Explain in detail sensible heating & sensible cooling.** **[8]**
- b) Calculate properties of moist air at 36°C DBT & 20 WBT without psychrometric chart. **[8]**

Q7) Air with 60% RH at 25°C is supplied AC unit, it is condition to this state first by cooling & dehumidification and then by reheating it cooling coil surface temp is 13°C and ambient conditions are 32°C DBT & RH 65% if the air supply rate is 15000 m³/hr

Calculate-

[16]

- i) Cooling coil capacity in TR.
- ii) Bypass factor of cooling coil
- iii) Heating capacity in Kw
- iv) Mass of water vapour removed per hr.
- v) Heating coil s/f temp if bypass factor 0.3

OR

Q8) In an Ambulance air conditioning system all outside air is supplied as per medical requirement following data is noted [16]

Inside design for 24°C DBT & 50% RH

Outside condition 38°C DBT & 27%RH

Room sensible load = 25kw, Room LH load = 31U

by pass factor of coil = 0.01, ventilation requirement = 30cmm find

- i) App dew point
- ii) Dehumidified air quantity
- iii) Condition of air entering and leaving coil
- iv) Capacity of cooling coil

Q9) Write any three:

[18]

- a) Leak detection test and detectors
- b) Types of compressor, it used as per AC applications
- c) Refrigerant recovery & recycling
- d) Initial vehicle inspection points
- e) Measure refrigerant in automotives

