	Utech
Name:	
Roll No.:	As dignost (5' Knowledge Steel Explained
Invigilator's Signature :	

# CS/B.Tech (AUE)/SEM-8/AUE-818/2011 2011 AUTOMOTIVE AIR CONDITIONING

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

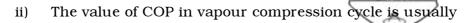
Candidates are required to give their answers in their own words as far as practicable.

## GROUP - A ( Multiple Choice Type Questions )

- 1. Choose the correct alternatives for the following:  $10 \times 1 = 10$ 
  - i) In vapour compression cycle, the condition of refrigerant
     is high pressure saturated liquid
    - a) after passing through the condenser
    - b) before passing through the condenser
    - c) after passing through the expansion or throttle valve
    - d) before entering the expansion valve
    - e) before entering the compressor.

8146 [ Turn over

#### CS/B.Tech (AUE)/SEM-8/AUE-818/2011



- a) always less than unity
- b) always more than unity
- c) equal to unity
- d) any one of the above
- e) none of these.

#### iii) Relative humidity is equal to

- a) pv/ps
- b) ps/ph
- c) 1 pv/ps
- d) 1 ps/pv
- e) ps pv,

pv = partial pressure of water vapour in air

ps = saturation pressure of water vapour at same temperature.

#### iv) Wet bulb temperature is

- a) indication of amount of moisture in air
- b) measured by wetting the bulb of the thermometer
- c) less than dry bulb temperature
- d) dependent on the dryness and temperature of air
- e) none of these.



- v) Dew point temperature is constant as long as there i
  - a) no change in moisture content of the air
  - b) no change in the volume of air
  - c) no change in wet bulb and dry bulb temperatures
  - d) no change in relative and specific humidity of air
  - e) continuous increase in moisture content of air.
- vi) Psychrometric chart
  - a) is seldom used for air conditioning design
  - b) provides plots for moist air conditions
  - c) enables to determine wet bulb and dew point temperature
  - d) is a chart for conversion of British system into metric system
  - e) is used to determine properties of refrigerants.

#### CS/B.Tech (AUE)/SEM-8/AUE-818/2011



- vii) The refrigerant should have
  - a) high sensible heat
  - b) high total heat
  - c) high latent heat
  - d) low latent heat
  - e) low sensible heat.
- viii) The leaks in a refrigeration system using feron are detected by
  - a) halide torch which on detection flame lighting
  - b) sulphur sticks which on detection gives white smoke
  - c) using reagents
  - d) smelling
  - e) sensing reduction in pressure.
- ix) If S is the sensible heat and L the latent heat, then sensible heat factor is given by
  - a)  $\frac{S}{S+L}$
  - b)  $\frac{L}{S+L}$
  - c)  $S + \frac{S}{L}$
  - d)  $\frac{S+L}{L}$
  - e)  $\frac{S}{S-L}$



- x) In humidification process
  - a) relative humidity increases
  - b) relative humidity decreases
  - c) specific humidity increases
  - d) specific humidity decreases
  - e) specific humidity and relative humidity remains same.

### GROUP – B ( Short Answer Type Questions )

Answer any three of the following.

 $3 \times 5 = 15$ 

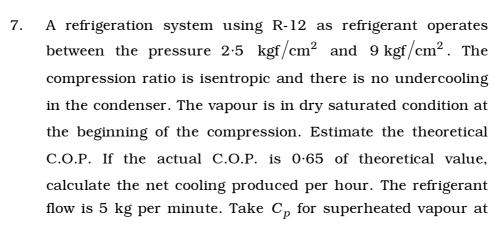
- 2. Discuss the human comfort factor in air conditioning system.
- 3. Describe the refrigeration cycle with diagram used in Automobile.
- 4. What are the different types of leak detection methods used in refrigerant system?
- 5. When is dehumidification of air necessary and how is it achieved?
- 6. Why is moisture harmful to the air conditioning system?

#### CS/B.Tech (AUE)/SEM-8/AUE-818/2011

#### **GROUP - C**

#### (Long Answer Type Questions)

Answer any three of the following.



 $9 \text{ kgf/cm}^2$  as 0.16 kcal/kg °C. Properties of refrigerant are –

Pressure kgf/cm <sup>2</sup>	Saturation temp. °C	Enthalpy kcal/kg		Entropy of saturated vapour kcal/kg/°C
		Liquid	Vapour	
9	36	109	139.8	1.132
2.5	<b>-</b> 7	98.5	136.2	1.137

- 8. a) For the sample of air having 22° C DBT, relative humidity 30% at barometric pressure of 760 mm Hg.
  - i) Vapour pressure
  - ii) Humidity ratio
  - iii) Vapoure density
  - iv) Enthalpy.
  - b) Find the above value by psychrometric chart and compare with calculating value. 9 + 6

8146 6

CS/B.Tech (AUE)/SEM-8/AUE 818/2011

9. A car of 25 person capacity is provided air conditioning of a system with following data:

Outdoor conditions 34°C DBT and 28°C WBT, required comfort conditions 24°C DBT and 50% R. H., outdoor air supplied  $0.4~\text{m}^3/\text{min/person}$ , sensible heat load 125600 kJ/hr, Latent heat load 42000 kJ/hr. Find the sensible heat factor of the system.

- 10. a) What do you mean by air conditioning of passenger car? Explain with a diagram the automobile A.C system used on passenger car.
  - b) What are the factors responsible for automobile compartment heating and heat absorption? 9+6
- 11. a) Explain the function of the three-section of the duct system.
  - b) What are the preliminary checks that must be made when checking the refrigerant system? 10 + 5

8146