

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013****Subject code: 711107N****Date: 06-01-2014****Subject Name: Automobile Refrigeration & A/C****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) State & explain the factors affecting the performance of a simple vapour compression system. **07**

(b) Define and explain the following with fig. (1) Adiabatic dew point temp. (2) Relative humidity (3) Wet bulb temp **07**

Q.2 (a) Explain air conditioning system for isolated vehicle with figure. **07**

(b) Explain automobile air distribution system for air conditioning with fig. **07**

OR

(b) In a simple vapour compression cycle following are the properties of the refrigerant R-12 at various points: **07**

Compressor inlet : $h_2 = 183.2 \text{ kJ/kg}$; $v_2 = 0.0767 \text{ m}^3/\text{kg}$

Compressor discharge : $h_3 = 222.6 \text{ kJ/kg}$; $v_3 = 0.00164 \text{ m}^3/\text{kg}$

Condenser exit : $h_{f4} = 84.9 \text{ kJ/kg}$; $v_4 = 0.00083 \text{ m}^3/\text{kg}$

The piston displacement volume for compressor is 1.5 litres per stroke and its volumetric efficiency is 80%. The speed of the compressor is 1600 rpm

Find (i) Power rating of the compressor (kW)

(ii) Refrigerating effect

Q.3 (a) Give important properties of any two automobile A/C refrigerants used now a days. **07**

(b) 40 m^3 of air at 35°C DBT and 50% RH is cooled to 25°C DBT maintaining its specific humidity constant. Determine (i) Relative humidity of cooled air and (ii) Heat removed from air. **07**

OR

Q.3 (a) What is the need of ‘eco-friendly refrigerants’. State and explain various eco-friendly refrigerants. **07**

(b) Enlist different types of cooling loads. Explain how to calculate cooling load for designing A/C system. **07**

Q.4 (a) Explain designation system for refrigerants. **07**

(b) Explain the effect of air conditioning load on engine performance **07**

OR

Q.4 (a) Explain comfort chart with figure. **07**

(b) State and explain factors affecting the selection of air conditioning system **07**

Q.5 (a) Explain various safety devices for refrigeration system. **07**

(b) Derive equation of equivalent diameter of a circular duct for a rectangular duct for same quantity of air. **07**

OR

Q.5 (a) Explain trouble shooting of air conditioning system **07**

(b) Explain the method of charging refrigerant in refrigeration system. **07**
