

GUJARAT TECHNOLOGICAL UNIVERSITY
ME – SEMESTER –I • EXAMINATION – WINTER 2014

Subject Code: 2711107**Date: 12/01/2015****Subject Name: Automobile Refrigeration & A/C****Time: 14:30 to 17:00****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Psychrometry charts are allowed.

- Q.1** (a) Differentiate air-conditioning of automobile vehicles from room air conditioning. **07**
- (b) Describe air conditioning system used in modern automobile vehicle with neat sketch. Show location of main components of A/C system in vehicle. **07**
- Q.2** (a) Discuss important properties of R-134a and HFE-143a. Give chemical name and formula for R-143a. **07**
- (b) Elaborate requirements of comfort air conditioning in detail. **07**
- OR**
- (b) Explain different air filter purification system with necessary details. **07**
- Q.3** (a) Discuss effect of air conditioning load on engine performance with various driving conditions. **07**
- (b) A rectangular duct of 50cm x 40 cm size carries 75 m³/min of air having a density of 1.16 kg/m³. Determine the equivalent diameter of circular duct if (1) The quantity of air carried in both the case is same (2) The velocity of air in both the case is same. Find the pressure loss per 100 m length of the duct if $f=0.01$ for sheet metal when velocity of air is same in both duct. **07**
- OR**
- Q.3** (a) Describe how cooling load is calculated for an automobile vehicle. **07**
- (b) Air flowing at the rate of 100 m³/min at 40 °C DBT and 50% RH is mixed with another stream flowing at the rate of 20 m³/min at 26 °C DBT and 50% RH. The mixture flows over a cooling coil whose ADP is 10 °C and bypass factor is 0.2. Find DBT and RH of air leaving the coil. If this air is supplied to an air conditioned room where DBT of 26 °C and RH 50% are maintained, calculate (1) Room sensible heat factor (2) Cooling coil capacity in tons of refrigeration. **07**
- Q.4** (a) Discuss layout of duct systems for automobile and their impact on load calculations. **07**
- (b) Explain Capacity control of (1) Reciprocating compressor and (2) Centrifugal compressor **07**
- OR**
- Q.4** (a) Explain, with neat sketch, constant volume variable temperature systems with (1) the help of Air reheat control (2) the help of Bypass control. **07**
- (b) Enlist different expansion devices used in automobile vehicles and explain any one device with neat sketch. **07**
- Q.5** (a) Describe different troubles occur in automobile air conditioning system, give probable cause and remedies for each in tabulated form. **07**

- (b) What are the common controls used in air-conditioning systems? How do they control the system? 07

OR

- Q.5** (a) Enlist different gas charging method for automobile air conditioning system. Explain any one gas charging system with neat sketch. 07
- (b) Enlist various tools needed for air conditioning system service. Explain working of compound gauge manifold with neat sketch. 07
