

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-I Regular Examination January / February 2011****Subject code: 711107N****Subject Name: Automobile Refrigeration and A/C****Date: 03 /02 /2011****Time: 02.30 pm – 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Students are allowed to use their own tables and charts.

- Q.1** (a) Draw schematic & p-h diagram of a simple vapour compression cycle. Also derive an expression for COP for the same. **07**
- (b) Define: (i) Relative humidity (ii) COP of refrigeration (iii) ADP (iv) GSHF (v) By-pass factor (vi) Adsorbent (vii) Adiabatic saturation temperature **07**

- Q.2** (a) Draw the schematic diagram with all basic components for the air-conditioning system of an automobile and explain function of each component. Differentiate the a/c system of automobile as compared to conventional air-conditioning. **07**
- (b) Discuss location of outlets in air distribution systems for specific applications like banks, restaurants and apartments, hotels etc. **07**

OR

- (b) Classify the air conditioning systems and explain typical conventional constant volume variable temperature system with neat line diagram. **07**
- Q.3** (a) The following data is available for a room to be air conditioned: **10**
Outside design condition: 28°C DBT, 20°C WBT
Inside design condition : 21°C DBT, 50% RH
RSH : 11.63 kW, Coil ADP = 7°C
Room ADP = 7.8°C, Coil BF = 0.26
Calculate (1) Condition of air entering the coil (2) RSHF (3) Condition of air entering the room (4) Mass of air supplied kg/s. (5) Coil Capacity (6) Room latent heat load.
- (b) List out different controls used in air conditioning system and explain any two in detail. **04**

OR

- Q.3** (a) Enlist the different type of cooling loads. Also explain how to calculate cooling loads for designing the air conditioning system. **07**
- (b) Explain the term effective temperature. State the factors influencing human comfort and explain how the comfort chart is prepared. **07**
- Q.4** (a) Enlist the types of refrigeration. Explain working of simple vapour absorption cycle with neat sketch. **07**
- (b) An R-12 vapour compression system has saturated suction temperature of -5°C and saturated discharge temperature of 40°C. Calculate (1) mass flow rate/ton of refrigeration (2) C.O.P. (3) system performance when capacity is 15 TR. Assume dry compression. **07**

OR

- Q.4 (a)** Enlist types of Expansion devices and explain working of thermostatic expansion valve. With neat sketch. **07**
- (b)** List the tools needed for air conditioner service. With the help of neat sketch explain flaring and swaging. What is the difference between them? **07**
- Q.5 (a)** Explain how refrigerants are classified. Compare primary refrigerants and secondary refrigerants. **07**
- (b)** Enlist the type of fans used in A/C systems. Describe in brief construction and salient features of forward curve, backward curve and propeller fans. **07**
- OR**
- Q.5 (a)** What is 'eco-friendly refrigerant'? Why conventional refrigerants are to be replaced? State the optional refrigerants available as eco-friendly. **07**
- (b)** Explain the desirable properties of ideal refrigerant. Write chemical formulae for following: R-13, R-717, R-21, and R-131. **07**
