Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M.E –I$^{st}$ SEMESTER–EXAMINATION – JULY- 2012**

**Subject code: 711107N** **Date: 11/07/2012**

**Subject Name: Automobile Refrigeration & A/C**

**Time: 2:30 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.**

| | | | |
|---|---|---|---|
| **Q.1** | **(a)** | Explain designation system for refrigerants. | **07** |
| | **(b)** | Give the important properties of following refrigerants (i) R-134a (ii) R-152a | **07** |
| **Q.2** | **(a)** | Explain winter air conditioning on psychrometric process chart. | **07** |
| | **(b)** | In an auditorium which is to be maintained at a temperature not exceeding $24^0$ C and a relative humidity not more than 60%, a sensible heat load of 132 kW and 54 kg/h of moisture has to be removed. Air is supplied to the auditorium at $15^0$ C. (a) How many kg of air per hour must be supplied? (b) What is the dew point temp. of supply air and what is its relative humidity? | **07** |
| | | **OR** | |
| | **(b)** | Write short note on alternative refrigerants. | **07** |
| **Q.3** | **(a)** | Draw and explain human comfort chart. | **07** |
| | **(b)** | Atmospheric air at a dry bulb temperature of $16^0$ C and 25% relative humidity passes through a furnace and then through a humidifier, in such a way that the final dry bulb temperature is $30^0$ C and 50% relative humidity. Find the heat and moisture added to the air. Also determine the sensible heat factor of the process. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Give various sources of heat load that contribute to the vehicle cooling load. | **07** |
| | **(b)** | A rectangular duct 0.15m X 0.12m is 20m long and carries standard air at the rate of 0.3 $m^3$/s. Calculate the total pressure required at the inlet to the duct in order to maintain this flow and the air power. Assume that for the duct, the friction factor f = 0.005. | **07** |
| **Q.4** | **(a)** | Explain various methods of duct design in nutshell. | **07** |
| | **(b)** | Explain construction and working of any unitary air conditioning system. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Draw layout of automatic car air conditioning system and give functions of each component. | **07** |
| | **(b)** | Explain step by step refrigerant gas leak detecting method using halide torch. | **07** |
| **Q.5** | **(a)** | Explain with figure the refrigerant charging method for a refrigeration system. | **07** |
| | **(b)** | Explain servicing of air conditioning compressor. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Write short note on refrigerated trucks. | **07** |
| | **(b)** | Explain briefly the trouble shooting method of automobile air conditioning system. | **07** |

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