Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2017

Subject Code: 2161908 Date:28/11/2017

Subject Name:Refrigeration and Air Conditioning

Time:02:30 PM TO 05:00PM 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)** Define refrigeration, air conditioning and COP. **03**

(b) Explain the method of designation of refrigerant with example. **04**

(c) Explain standard VCR cycle with T-S and P-H diagrams. **07**

Q.2 **(a)** Why aircrafts require cooling? **03**

(b) Differentiate dry and wet compression. **04**

(c) Discuss the effect of suction pressure and sub-cooling on the performance of a vapour compression system. **07**

OR

(c) Explain Boot strap air refrigeration system with neat diagram. **07**

Q.3 **(a)** Explain working of Electrolux VAR system with neat sketch. **03**

(b) Explain hermetically sealed compressor. **04**

(c) An NH_3 refrigerator produces 30 tonnes of ice from and at 0^0 C. The temperature range in the compressor is from 26^0 C to -14^0 C. the vapour is dry saturated at the end of the compression. Actual C.O.P. is 60 % of the theoretical. Calculate the power required for the compressor. The latent heat of ice = 335 kJ/kg. Use following table. **07**

Temp.,^{0} C	Enthalpy kJ/kg, Vapour	Enthalpy kJ/kg, Liquid	Entropy kJ/kg K, S_L	Entropy kJ/kg K, S_v
26	1483.72	322.73	1.4257	5.3066
-14	1445.47	135.82	0.7599	4.8137

OR

Q.3 **(a)** Enlist properties required for an ideal refrigerant-absorbent combination. **03**

(b) Explain construction and working of Thermostatic Expansion valve with neat sketch. **04**

(c) Briefly explain the working of Two stage vapour compression system with water intercooler and liquid sub-cooler. **07**

Q.4 **(a)** Explain human comfort. **03**

(b) Explain Adiabatic saturation process with neat sketch. **04**

(c) Explain equal friction loss (pressure loss) method for duct design. **07**

OR

Q.4 **(a)** Explain cooling and dehumidification process. **03**

(b) Explain flywheel effect as applied to cooling load calculation with neat labeled diagram. **04**

(c) 50 m^3/min of air at 27^0 c DBT and 20^0 C WBT flows through a cooing coil and leaves the coil at 12^0 C DBT and 8 gm/kg of moisture content. Determine: (i) Apparatus dew point (ii) Contact factor (iii) Cooling load. **07**

Q.5 **(a)** Differentiate instantaneous heat gain (IHG) and instantaneous cooling load (ICL). **03**

(b) Explain central air conditioning system **04**

(c) Explain all air system. **07**

OR

Q.5 **(a)** Explain air washer. **03**

(b) Explain construction and working of any one type humidifier with neat sketch. **04**

(c) Define effective temperature. Explain briefly various factors governing it. **07**

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