

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2023****Subject Code:2161908****Date:20-12-2023****Subject Name:Refrigeration and Air Conditioning****Time:02:30 PM TO 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. Simple and non-programmable scientific calculators are allowed.
5. Use of Refrigerant Tables with refrigerant charts and Steam Table is permissible.

MARKS

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|------------|--|-----------|
| Q.1 | (a) Define ton of refrigeration and coefficient of performance of refrigeration. | 03 |
| | (b) Explain desirable properties of refrigerant. | 04 |
| | (c) Sketch bootstrap air refrigeration cycle and derive an expression for its expression for its COP. | 07 |
| Q.2 | (a) State the difference between refrigerator and heat pump, also state the way to measure effectiveness of refrigeration system. | 03 |
| | (b) Explain the effect of sub-cooling on the performance of vapour compression refrigeration system. | 04 |
| | (c) Explain cascade refrigeration system with neat sketch. | 07 |
| OR | | |
| | (c) Explain vapour compression refrigeration cycle with superheated refrigerant before compression with p-h and T-s diagram. | 07 |
| Q.3 | (a) Explain properties required for an ideal refrigerant-absorbent combination. | 03 |
| | (b) State the function of following components in vapor absorption refrigeration (i) Absorber (ii) Rectifier (iii) Analyzer and (iv) Heat exchanger | 04 |
| | (c) Describe the function of expansion device and Explain automatic expansion valve with neat sketch | 07 |
| OR | | |
| Q.3 | (a) Sketch multiple evaporator at different temperature with individual expansion valve along with its p-h diagram. | 03 |
| | (b) Explain construction and working of thermostatic expansion valve with neat sketch. | 04 |
| | (c) With a diagram explain Li-BR Vapor absorption refrigeration system and write its application. | 07 |
| Q.4 | (a) Explain use of sling psychrometer and hygrometer. | 03 |
| | (b) Explain the following terms: | 04 |
| | (i) Dry bulb temperature | |
| | (ii) Specific humidity | |
| | (iii) Relative humidity | |
| | (iv) Thermodynamic wet bulb temperature | |
| | (c) The sling- psychrometer reads 40°C DBT and 28°C WBT calculate following: | 07 |
| | (i) Specific humidity (ii) Relative humidity (iii) Vapour density in air (iv) Dew point temperature (v) Enthalpy of the mixture per kg of dry air. Assume atmospheric pressure to be 1.03 bar. | |

OR

- Q.4** (a) Define dehumidification and Explain chemical dehumidification. **03**
(b) Explain the factor affecting human comfort. **04**
(c) Explain desert air cooler show its process on psychrometric chart and write equation of its efficiency. **07**
- Q.5** (a) Explain the term cooling load. **03**
(b) Explain summer air conditioning system. **04**
(c) Explain various terms used in air distribution. **07**

OR

- Q.5** (a) Describe different methods of duct design. **03**
(b) Explain construction and working of any one type of humidifier with neat sketch. **04**
(c) Explain flywheel effect with neat labeled diagram **07**
