Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022

Subject Code:3171918 Date:18/06/2022

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.**

Q.1	**(a)**	**Define** Ton of refrigeration, Coefficient of performance, Heat pump.	**03**
	(b)	Explain about following properties of refrigerant. Viscosity, Dielectric strength, Specific volume, Miscibility with oil.	**04**
	(c)	Explain function and location of followings in refrigeration system Oil separator, Sight glass, Drier, Filter, Receiver, Accumulator and Thermostats.	**07**
Q.2	**(a)**	Give function of followings in Vapour absorption refrigeration system. Analyser , Rectifier and Generator	**03**
	(b)	Compare Vapour absorption system and Vapour compression system.	**04**
	(c)	Explain given system with diagram“ multi evaporator at different temperatures with single compressor, multiple expansion valves and back pressure valves”.	**07**
		OR	
	(c)	Explain with diagram “Cascade refrigeration system”.	**07**
Q.3	**(a)**	Explain with examples “Latent heat gain to the space”	**03**
	(b)	What is effective temperature ?What is its significance in design of air conditioning system.	**04**
	(c)	Give classification of loads and explain any three in detail.	**07**
		OR	
Q.3	**(a)**	Explain factors affecting effective temperature.	**03**
	(b)	Explain flywheel effect of building material.	**04**
	(c)	Explain in detail “Load calculations for automobiles”.	**07**

Q.4 **(a)** Give comparison between package air conditioning and central air conditioning. **03**

(b) Explain Domestic Electrolux refrigerator with neat sketch. **04**

(c) An air refrigeration open system operating between 100 kPa and 1MPa is required to produced a cooling effect of 2000 kJ/min.Temperature of the air entering the compressor is - 5^{o}C and leaving the cooler at 30^{o}C.Neglect losses and clearance in the compressor and expander.Determine **07**
(i) Mass of air circulated per minute.
(ii) Compressor work
(iii) Expander work
(iv) COP and power required in kW.

OR

Q.4 **(a)** Enlist the advantages of split air conditioner over window air conditioner. **03**

(b) Give advantages and disadvantages of Lithium bromide absorption refrigeration system. **04**

(c) An aircraft simple air refrigeration system having a load of 10 TR.The atmospheric pressure and temperature are 0.92 bar and 15^{o}C respectively.The pressure after ramming process is 1.015 bar.The air temperature at outlet of heat exchanger is 115 ^{o}C.The cabin pressure is 1 bar and temperature of air leaving the cabin is 24^{o}C.Calculate **07**
(i) The mass of air circulated per minute
(ii) Power required to take the load of cooling in the cabin
(iii) COP of the system
(iv) Heat rejected in heat exchanger
Assume that all the compression and expansions are isentropic and pressure ratio in main compressor is 4.

Q.5 **(a)** Explain following terms used in air distribution system **03**
Drop,Throw and Spread

(b) Explain “Summer air conditioning system” with neat sketch. **04**

(c) Find out equivalent diameter for a rectangular duct when **07**
(a) quantity of air passing through the rectangular and circular duct is same.

OR

Q.5 **(a)** Explain any three economic factor influencing duct layout **03**

(b) Explain “Winter air conditioning system” with neat sketch. **04**

(c) Explain in detail “Duct design methods”. **07**

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