Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3171919 Date:10-01-2023

Subject Name:Cryogenics Engineering

Time:10:30 AM TO 01:00 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.**

			MARKS
Q.1	**(a)**	Discuss variations of following properties of material at Cryogenic temperature. (a) Fatigue strength (b) Hardness (c) Ductility	**03**
	(b)	Explain the concept of otho-hydrogen and para-hydrogen	**04**
	(c)	Discuss the applications of cryogenics in space technology.	**07**
Q.2	**(a)**	Explain magnetic properties of superconductors.	**03**
	(b)	Explain different types of hazards and its prevention.	**04**
	(c)	Discuss the unusual properties of liquid Helium-II.	**07**
		OR	
	(c)	Discuss application of cryogenics in food preservation.	**07**
Q.3	**(a)**	Explain COP and FOM	**03**
	(b)	Explain the Claude cycle with suitable diagram.	**04**
	(c)	Enlist air separation and purification systems. Explain any one system with diagram.	**07**
		OR	
Q.3	**(a)**	Describe principle of liquefaction.	**03**
	(b)	Explain inversion temperature using Joule–Thomson inversion curve.	**04**
	(c)	With neat sketch explain mix refrigerant cascade cycle.	**07**
Q.4	**(a)**	Explain in brief vacuum insulated transfer lines.	**03**
	(b)	Explain the mechanism of insulation in (a) Opacified powder insulation (b) Evacuated powder and fibrous insulation.	**04**
	(c)	Give classification of cryogenics heat exchangers and explain plate fin type of heat exchanger in detail.	**07**
		OR	
Q.4	**(a)**	Explain in brief multi-layer insulation.	**03**
	(b)	Explain different process equipment used in air separation and liquefaction plants.	**04**
	(c)	Write a note on reciprocating expanders in details.	**07**
Q.5	**(a)**	Explain about dewar used in low-temperature research laboratories.	**03**
	(b)	Explain construction and working of turbine flow meter with figure.	**04**
	(c)	Explain working of capacitance liquid level probe with figure.	**07**
		OR	
Q.5	**(a)**	Explain about storage and transfer of cryogenic fluids in industry.	**03**
	(b)	Explain metallic resistance thermometer used for cryogenic temperature measurement.	**04**
	(c)	Write a brief note on cryogenic flow control devices and explain any one of them.	**07**

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