

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII(NEW) EXAMINATION – SUMMER 2019

Subject Code: 2181917

Date: 09/05/2019

Subject Name: Cryogenic 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.

MARKS

Q.1	(a)	Explain the concept of ortho-hydrogen and para-hydrogen.	03
	(b)	Discuss variations of following properties of material at Cryogenic temperature. (a) Fatigue strength (b) Hardness (c) Ductility (d) Ultimate strength	04
	(c)	Discuss the unusual properties of liquid Helium-II.	07
Q.2	(a)	Explain Joule Thompson expansion.	03
	(b)	Explain the mechanism of insulation in (a) Opacified powder insulation (b) Evacuated powder and fibrous insulation	04
	(c)	Explain role of heat exchanger in cryogenic systems. List various configuration of heat exchangers used in cryogenics.	07
		OR	
	(c)	Write comparison between G-M and Philips refrigerator. Also write desirable features of regenerative heat exchanger of Philips refrigerator.	07
Q.3	(a)	Explain in brief vacuum insulated transfer lines.	03
	(b)	Write a note on Applications of cryogenics in biology.	04
	(c)	Write short note on Magnetic refrigerator.	07
		OR	
Q.3	(a)	Explain in brief Multi layer insulation.	03
	(b)	Explain general characteristics of mixtures and draw typical Temperature-composition diagram for binary mixture.	04
	(c)	Enlist Air separation and purification systems. Explain any one system with diagram.	07
Q.4	(a)	Discuss payoff functions and performance parameters for gas liquefaction systems.	03
	(b)	Explain Metallic resistance thermometer used for cryogenic temperature measurement.	04
	(c)	Explain Linde-Bronn system for hydrogen separation.	07
		OR	
Q.4	(a)	Draw a neat diagram of dewar vessel showing its elements.	03
	(b)	Explain construction and working of Turbine flow meter with figure.	04
	(c)	Explain working of capacitance liquid level probe with figure.	07
Q.5	(a)	What is superconductivity? Briefly explain Type-I and Type-II superconductors.	03
	(b)	Discuss in brief hazard due to (a) flammability (b) high pressure gas (c) material of construction (d) personal exposure hazard.	04
	(c)	Discuss the Applications of cryogenics in superconducting devices.	07
		OR	
Q.5	(a)	Briefly describe space simulation chamber.	03
	(b)	Discuss safety criteria to be considered while handling cryogenics.	04
	(c)	Discuss application of cryogenics in food preservation.	07
