Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–III • EXAMINATION – SUMMER • 2014

Subject Code: 731002 Date: 05-06-2014

Subject Name: Advanced Cryo Coolers

Time: 02:30 pm - 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.**

Q.1	**(a)**	What is a Cryo Cooler ? Give brief Classification of Cryorefrigerators. Write down the assumptions to be made while designing Cryorefrigerator.	**07**
	(b)	Discuss three different geometries for pulse tube Cryo Cooler s with their merits and demerits.	**07**
Q.2	**(a)**	Explain in brief Construction and working of Striling Cryo Cooler. Discuss the novel research work on Stirling Cryo Cooler .	**07**
	(b)	Write short note on: (1) Crycooler Applications (2) Cryo Cooler reliability	**07**
		OR	
	(b)	Describe the Cool-down characteristic of J-T Cryorefrigerator with different supply pressure, temperature and mass flow rate of working fluid.	**07**
Q.3	**(a)**	Write note on ‘Brief Overview of Advanced Cryo Cooler s’.	**08**
	(b)	Write Short note on: (1) Sorption Compressor (2) Electrochemical compressor	**06**
		OR	
Q.3	**(a)**	Explain working of He^3-He^4 dilution Cryo Cooler to attain the temperature of 0.040 K in mixing chamber with schematic figure.	**07**
	(b)	What is G-M Cryo Cooler ? Explain in brief ‘Design of two stage G-M Cryo Cooler ’.	**07**
Q.4	**(a)**	Write down Advantages and disadvantages of pulse tube Cryo Cooler. Also discuss recent progress in pulse tube Cryo Coolers.	**08**
	(b)	Explain in brief “Thermo acoustically driven pulse tube Cryo Cooler ”.	**06**
		OR	
Q.4	**(a)**	Differentiate clearly between Recuperative and Regenerative Cryo Coolers with suitable examples.	**06**
	(b)	Write short note on (1) Working of a typical Magnetic Refrigerator (2) Heat exchangers in Cryo Cooler s	**08**
Q.5	**(a)**	Explain pressure- volume variations phenomenon for Stirling Cryo Cooler .	**07**
	(b)	Explain characteristics of miniature Cryo Cooler s for space craft applications.	**07**
		OR	
Q.5	**(a)**	What is Regenerator? Explain desirable characteristics for a regenerative matrix.	**06**
	(b)	Discuss the effects of valve timing on performance of the pulse tube Cryogenerator.	**08**

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