Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–IV • EXAMINATION– WINTER • 2014

Subject Code: 741001 **Date: 26-11-2014**

Subject Name: Advanced Cryogenics and Applied Super Conductivity

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)**	Explain briefly about magnetic behaviour of a perfect conductor and a superconductor with figure.	**07**
	(b)	Describe briefly Josephson effects with figure. Give its applications.	**07**
Q.2	**(a)**	Describe possible applications of superconductivity at present in different scientific domains.	**07**
	(b)	Describe briefly the method of preparation of Cuprate materials.	**07**
		OR	
	(b)	Describe general features of Cuprate Superconductors.	**07**
Q.3	**(a)**	Write about Superconductivity and Nuclear Magnetic Resonance (NMR).	**07**
	(b)	Explain magnetic phase diagram in context to H_c and T_c with necessary plots. Also discuss about the magnetic phase diagram of Type-II superconductor.	**07**
		OR	
Q.3	**(a)**	Explain briefly about following terms related to superconductors. (i) Supercurrents (ii) Perfect Diamagnetism	**07**
	(b)	Describe with figure the construction and working of High Pressure Oxygen sputtering system.	**07**
Q.4	**(a)**	Write short note on Superconducting Fullerides.	**07**
	(b)	Draw the structure diagram of $YBa_2Cu_3O_7$ cuprate. Explain its superconducting transition phenomenon with necessary plot.	**07**
		OR	
Q.4	**(a)**	Write short note on BCS Theory.	**07**
	(b)	Explain about Meissner Effect with figure in context to superconductivity.	**07**
Q.5	**(a)**	Describe about the Hall Effect in context to single crystal $YBa_2Cu_3O_7$ cuprate.	**07**
	(b)	Differentiate between low temperature superconductors and high temperature superconductors.	**07**
		OR	
Q.5		Write about ANY FOUR of the followings according to Ginzburg-Landau Theory applied to superconducting phenomenon. (i) Order Parameter Idea (ii) Free Energy Functional for a superconductor. (iii) Coherence Length (iv) Flux Quantization (v) Meissner Effect and Zero electric Resistance (vi) Superconducting Phase Transition.	**14**