Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–IV • EXAMINATION – SUMMER 2015

Subject Code: 741001 **Date: 01/05/2015**

Subject Name: Advanced Cryogenics & Applied Super Conductivity

Time: 2:30 pm to 5:00 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)	Describe construction and working of a typical SQUID system for sensing external magnetic field.	**07**
	(b)	Explain the general features of Cuprates superconductors.	**07**
Q.2	(a)	With the help of M-H curves compare Type-I and Type-II superconductors.	**07**
	(b)	Describe the important issues to design a good superconductiong magnet.	**07**
		OR	
	(b)	Describe with q -T plot the phenomenon of superconductivity termed by Kamerlingh Onnes. Also give reasons for selecting Mercury as metal by Onnes for the same.	**07**
Q.3	(a)	Explain with figure the magnetic behaviour of a superconductor inferred by Meissner and Ochsenfeld.	**07**
	(b)	Explain working of a magnetic seperator using superconducting magnets.	**07**
		OR	
Q.3	(a)	Describe with figure the working of Laser Ablation System for preparation of superconducting films.	**07**
	(b)	Draw the detailed schematic structure of the following cuprates. i). $Ca_{0.85}Sr_{0.15}CuO_2$ ii). $LaSrCaCu_2O_6$	**07**
Q.4	(a)	Describe the properties of Oxycarbonates and Oxyhalides cuprates along with their stoichiometry.	**07**
	(b)	Expalin following terms with relevant theories. i). BCS gap ii). BCS ground state	**07**
		OR	
Q. 4	(a)	Write Hamiltonian with usual notations to describe the electronic states of CuO_2 lattice of the cuprates. Also explain one-band and two band	**07**

electronic models from it.

	(b)	Write the function of Bolometer. Describe basic principal and operation of the Bolometer.	**07**
Q.5	(a)	Explain construction of Optoisolator with figure and give its applications.	**07**
	(b)	Explain theory of Flux Quantization with suitable applications.	**07**

OR

Q.5	(a)	Explain the principle and operation of a typical magnetic fusion system with figure.	**07**
	(b)	Describe Josephson effect and Tunneling with neat figures.	**07**

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