Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 110011 **Date: 02-01-2015**

Subject Name: Physics

Time: 10:30 am - 01:00 pm **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Answer the following questions [One mark each] **07**

1. Define: Loudness
2. What is acoustical grating?
3. Define: Unit cell
4. What are metallic glasses?
5. How is an energy band formed?
6. What is a depletion layer?
7. Name the main components of LASER system.

(b) Answer the following questions [One mark each] **07**

1. Define: Acceptance angle
2. Define mobility of a charge carrier. Give its unit.
3. State Wiedemann – Franz law.
4. What is a SQUID?
5. Define: Motif
6. What are shape memory alloys?
7. What is meant by NDT?

Q.2 **(a)** Discuss various factors affecting the acoustics of buildings and their remedies. **07**

(b) 1. Discuss photovoltaic effect. **04**

2. Calculate the refractive index of the core and cladding material of an optical fibre with numerical aperture 0.11 and relative refractive index difference 0.015. **03**

Q.3 **(a)** Explain inverse-piezoelectric effect to produce ultrasonic waves with proper diagram. What are the advantages and disadvantages of this method? **07**

(b) 1. What is biomaterial? Write the types of biomaterials. **02**

2. Write the advantages of ultrasonic inspection method. **02**

3. Calculate the Lorentz number when the thermal and electrical conductivity of copper at 26ºC are 420 $Wm^{-1}K^{-1}$ and 5.60×10^{7} $\Omega^{-1}m^{-1}$ respectively. **03**

Q.4 **(a)** What is Hall effect? Derive equations for Hall voltage, Hall coefficient and mobility for n-type semiconductor material. **07**

(b) 1. List any four properties of superconducting materials and explain in detail. **04**

2. Draw the following planes: (101), (020) and (112). **03**

Q.5 **(a)** Establish the relation between Einstein's coefficients A and B. **07**

(b) 1. Discuss the advantages of optical fibre communication system over the conventional coaxial communication system. **04**

2. The critical temperature of mercury with isotopic mass 202 is 4.2 K. Calculate its critical temperature when its isotopic mass is 200. **03**

Q.6	**(a)**	Explain the principle of X-ray radiography and describe the technique to detect the location of the flaws by X-rays.	**07**
	(b)	1. What are the success and drawbacks of classical free electron theory?	**04**
		2. Write short note on SONAR.	**03**
Q.7	**(a)**	What are nanomaterials? Explain the methods of preparing nanomaterials.	**07**
	(b)	1. Derive the relation between the interplanar distance and cube edge.	**04**
		2. Show that a change in intensity level of 1 dB alters the intensity by 26%.	**03**

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