

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 26°C are $420 \text{ Wm}^{-1}\text{K}^{-1}$ and $5.60 \times 10^7 \Omega^{-1}\text{m}^{-1}$ 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**
