Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. Sem-I/II Examination June-July 2011

Subject code: 110011   **Subject Name: PHYSICS**
Date:06/07/11   **Total Marks: 70**   **Time:10:30 am to 1:00pm**

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Differentiate loudness and intensity of sound. Explain Weber-Fechner law. **06**
     (b) Compare Hard and Soft superconductors. **04**
     (c) State the properties of LASER. **04**

Q.2 **(a)** A hall has volume of 13000 m^3 and reverberation time 1.6 sec. If 300 chairs **05**
are additionally placed in the hall, what will be the new reverberation time of
the hall? (Absorption of each chair is 1.0 OWU)
     (b) What is acoustical grating? **02**
     (c) Explain the principle, construction and working of magnetostriction method **07**
of producing ultrasonic waves.
<div align="center">OR</div>
     (c) Derive the expression for rate of absorption of sound energy inside a hall in **07**
terms of energy density.

Q.3 **(a)** Define lattice and basis. Derive the expression for the interplanner distance **06**
'd' for a cubic lattice.
     (b) Explain the construction, working and application of LED. **05**
     (c) Calculate the interplanner distance for (321) plane in simple cubic lattice **03**
with interatomic spacing equal to 4.12 Å.
<div align="center">OR</div>
Q.3 **(a)** Define Miller indices. Explain the procedure for finding Miller indices of a **07**
plane.
     (b) Describe the Quantum Mechanical treatment of free electron theory to **07**
explain electrical conductivity.

Q.4 **(a)** A silica optical fiber has a core of refractive index 1.55 and a cladding of **06**
refractive index 1.47. Determine (i) the critical angle at the core-cladding
interface (ii) the numerical aperture for the fiber and (iii) the acceptance
angle in the air for the fiber.
     (b) Establish the relation between Einstein's coefficients A and B **04**
     (c) Define (i) superconductivity and (ii) total internal reflection **04**
<div align="center">OR</div>
Q.4 **(a)** Explain the High Tc superconductor by giving one example. **07**
     (b) Explain Hall effect. Derive the expression for Hall coefficient R_H in **07**
semiconductors.

Q.5 **(a)** Explain the method of x-ray radiography to detect the exact location of the **07**
flaws.
     (b) What are shape memory alloys? Explain shape memory effect and pseudo- **07**
elasticity.

Q.5 **(a)** What are nanomaterials? Mention the methods of producing nanomaterials and explain any one of them. **07**

(b) Describe the pulse echo system to detect flaws in the materials by giving advantages and limitations. **07**

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