Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**B.E. Sem-I & II Remedial Examination Nov/ Dec. 2010**

**Subject code: 110011** **Subject Name: Physics**

**Date: 27 / 11 /2010** **Time: 10:30am- 01:00pm**

**Total Marks: 70**

**Instructions:**

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

**Q.1** **14**

1 Define absorption coefficient.
2 Expand the term: 'SONAR'.
3 What are crystalline materials? Give its example.
4 State the applications of Hall effect.
5 Expand the term: 'LASER'.
6 State the working principle of fiber optics.
7 Give the statement of Weiedmann-Franz law.
8 Define critical temperature.
9 What are metallic glasses?
10 List the methods for production of nanomaterials.
11 Name different types of biomaterials.
12 State the working principles of holography.
13 Mention the objectives of Non-Destructive Testing (NDT).
14 What is the frequency range of the audible sound?

**Q.2**

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

(b) What are ultrasonic waves? Explain with required circuit diagram the generation of ultrasonic waves with piezoelectric effect. **07**

**OR**

(b) Discuss the applications of ultrasonic waves **07**

**Q.3**

(a) Explain the construction, operation, merits and demerits of solar cell. **07**

(b) Derive the mathematical relation between inter planer distance and cube edge with required diagrams. **04**

(c) Calculate the inter planer spacing for a (3 1 1) plane in a simple cubic lattice whose lattice constant is 2.109 $A^0$. **03**

**OR**

**Q.3** (a) Give the construction,applications and merits & demerits of the Light Emiting Diode. **07**

(b) Mention the Properties of LASER. **04**

(c) Prove that the ratio of spontaneous emission and stimulated emission is proportional to the cube of frequency. **03**

**Q.4**

(a) Discuss in detail the advantages of fiber optics cable over metallic cable. **07**

(b) Compare type 1 and type 2 superconductors. **04**

(c) For InP laser diode, the wavelength of light emission is 1.55micrometer. What is its band gap in eV? **03**

**OR**

**Q. 4**

(a) What are super conductors? Explain few important properties of superconductors. **07**

(b) What is magnetic levitation? Explain in details with its applications. **04**

(c) Find the thermal conductivity of copper at $20^0$C with free electron density of $8.48 \times 10^{28}$ $m^{-3}$ . The thermal velocity of Cu at $20^0$ C is $1.1536 \times 10^5$ m/s with a mean free path of 2.8138 nm. **03**

**Q.5**

(a) Write the properties and applications of nanomaterials. **07**

(b) Give the difference between metallic and non-metallic glasses. **04**

(c) The critical temperature of Nb is 9.15 K. At zero kelvin the critical field is 0.196 tesla. Calculate the critical field at 6K. **03**

**OR**

**Q.5**

(a) Describe Shape Memory Alloy in detail. **07**

(b) Compare destructive testing with Non-destructive testing. **04**

(c) Calculate the frequency to which a piezo electric oscillator circuit should be tuned so that a piezo electric crystal of thickness 0.1 cm vibrates in fundamental mode to generate ultrasonic waves. (Young's Modulus and density of material of crystal are 80 Gpa and 2654 kg / $m^3$) **03**

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