Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–I & II EXAMINATION – WINTER 2015

Subject Code: 110011 **Date:22/12/2015**

Subject Name: Physics

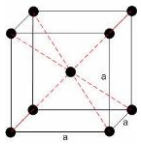
Time: 10:30am to 01:00pm **Total Marks: 70**

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**

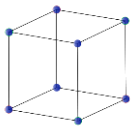
1. State the Weber-Fechner law.
2. Sound having frequency higher than 20 KHz is called_____.[Fill in the bank]
3. Identify and give name of the following crystal structure.



4. The range of energies possessed by an electron in a solid is called the energy band. State True or False?
5. Write Full Form of LASER.
6. What is kelvar?
7. What are Shape Memory Alloys?

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

1. Define Superconductivity.
2. What are important components in a fiber optic communication system?
3. What is popular inversion?
4. Define the term forbidden band or energy gap.
5. What is the total share of all the corner atoms/unit cell for simple cubic structure?



6. Metallic glasses are metal alloys that are crystalline. State True or False?
7. What is meant by NDT?

Q.2 **(a)** Discuss Reverberation Time, Echo, Echelon Effect and Noise that affect the acoustics in hall and the remedies for them? **07**

(b)

1. Define Co-ordination number and calculate it for SC, BCC, and FCC structures. **04**
2. A hall has a length of 57 m, breadth 43 m and height to be 4.08 m. Its total absorption is equivalent to 83.5 m^2 of open window. What will be the effect on reverberation time if the audience fill the hall and thereby increase the absorption by another 83.5 m^2 of open window? **03**

Q.3 **(a)** Explain Magnetostriction effect. Describe how ultrasonics can be produced using Magnetostriction effect with proper diagram. Give its merits and demerits. **07**

(b)

1. Define packing factor of a unit cell. Obtain the expression for packing factor of face centered cubic unit cell. **04**

2. List out the difference between single mode fiber and multi-mode fiber. **03**

Q.4 **(a)** What is Hall effect? Show that for a p-type semiconductor the Hall coefficient R_H is given by 1/pe. Describe an experimental set up to measure the Hall voltage, **07**

(b) 1. What is Photo-voltaic effect? List few applications of a photovoltaic cell. **04**

2. List out the difference between step index fiber and graded index fiber. **03**

Q.5 **(a)** Describe the construction and working of Nd:YAG laser with a suitable energy-level diagram. **07**

(b) 1. State and explain the characteristics of laser. **04**

2. Compare Type-I and Type-II superconductors. **03**

Q.6 **(a)** Describe and Give important applications of superconductors in Maglev and Josephson effect.. **07**

(b) 1. Describe any four applications of ultrasonics. **04**

2. The refractive index of the core and cladding materials of an optical fibre are v1.54 and 1.5 respectively. Calculate the numerical aperture of the optical fiber. **03**

Q.7 **(a)** Describe Non-destructive methods with its objectives. Explain in detail Liquid Penetrant Method with suitable diagram. Also, mention the areas where this method is applicable. **07**

(b) 1. What are metallic glasses? Mention some important properties of metallic glasses. **04**

2. A step index fiber has a numerical aperture of 0.26, a core of refractive index 1.5 and diameter of 100µm. Calculate (i) the refractive index of the cladding, (ii) the acceptance angle, and (iii) the maximum number of modes with a wavelength of 1µm that the fiber can carry. **03**

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