Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– 1st / 2nd (OLD SYLLABUS) EXAMINATION – SUMMER 2015

Subject Code:110011 **Date: 17/06/2015**

Subject Name: Physics

Time: 10.30am-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] **04**

1. Give two conditions for TIR.
2. What is piezoelectric effect?
3. 1 bel = _____ dB
4. What is atomic packing factor?

(b) 1. Explain the procedure for finding Miller indices of a plane. **04**

2. Explain factors affecting acoustics of the building and their remedies. **03**

3. A hall has volume of 13000 m^3. What should be the total absorption in the hall if the reverberation time of 1.6 seconds is to be maintained? **03**

Q.2 **(a)** Answer the following questions. [One mark each] **04**

1. The solid in which atoms or molecules are arranged in some regular fashion, is known as _____ solid.
2. What is population inversion?
3. Give any two applications of biomaterials.
4. A semiconductor behaves as a perfect insulator at _____.

(b) 1. Explain the principle, construction and working of magnetostriction method of producing ultrasonic waves. **04**

2. Write a short note on ultrasonic cleaning. **03**

3. An ultrasonic source of 1 MHz sends down a pulse towards the seabed which returns after 0.55 second. The velocity of sound in water is 1800 m/s. Calculate the depth of the sea and wavelength of the ultrasonic sound. **03**

Q.3 **(a)** Answer the following questions. [One mark each] **04**

1. Give full form of LASER.
2. Define superconductivity.
3. Mention names of various NDT methods.
4. 1 nm = _____ cm

(b) 1. Explain Classification of solids based on band theory. **04**

2. Explain working of PN junction diode in forward bias with necessary circuit. **03**

3. A silicon plate of thickness 1mm, breadth 10mm and length 10cm is placed in a magnetic field of 0.5 Wb/m^2 acting perpendicular to its thickness. If 10 mA current flows along its length, calculate the Hall voltage developed if the Hall coefficient is 3.66×10^{-4} m^3/C. **03**

Q.4 **(a)** Answer the following questions. [One mark each] **04**

1. Classify sound waves based on frequency.
2. Give statement of Hall effect.
3. Give full form of SONAR.
4. What is MAGLEV?

(b) 1. Explain the construction and working of Nd:YAG laser. **04**

2. In carbondioxide laser, the energy difference between two levels is 2.1 eV. Calculate the wavelength of radiation. [$h=6.625\times 10^{-34}$ J, $C=3\times10^{8}$ m/s]. **03**

3. Discuss applications of the LASER in various fields. **03**

Q.5 **(a)** Answer the following questions. [One mark each] **04**

1. Give full form of LED.
2. List characteristics of LASER.
3. What is Josephson junction?
4. Define Miller indices.

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

2. Derive the expression of the numerical aperture of step index optical fiber. **03**

3. Calculate the critical angle, NA and the acceptance angle of the fiber having $n_1 = 1.52$ and $n_2 = 1.45$. **03**

Q.6 **(a)** 1. Compare type-I and type-II superconductors**.** **04**

2. Calculate the critical current for a superconducting wire of lead having a diameter of 1mm placed at 4.2 K. Critical temperature for lead is 7.18K and $H_c(0) = 6.5 \times 10^4$ A/m. **03**

(b) 1. Derive Wiedemann-Franz law. Discuss about Lorentz number. **04**

2. Calculate the mean free path between collisions of the free electrons in copper at 20 $\mathring{C}$. The resistivity of copper at 20 $\mathring{C}$ is 1.27×10^{-3} Ω m and density of free electrons is 8.48×10^{28} m^{-3}. [Given: $e = 1.6 \times 10^{-19}$, $m = 9.11 \times 10^{-31}$ kg and $K_B = 1.38 \times 10^{-23}$ JK^{-1}] **03**

Q.7	**(a)**	List different NDT methods and discuss the liquid penetrant method in detail.	**05**
	(b)	Explain the types, properties of metallic glasses and melt spinning technique to prepare the metallic glasses.	**05**
	(c)	What is nano technology? List the applications of Nano technology.	**04**

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