Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–I & II(NEW) EXAMINATION – SUMMER 2023

Subject Code:2110011 Date:10-08-2023

Subject Name:Physics

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Question No. 1 is compulsory. Attempt any four out of remaining Six questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1 **Objective Question (MCQ)** **Marks**

(a) **07**

1. LASER is Light Amplification by ..... Emission of radiation.
   (a) Spontaneous (c) Successive
   (b) Stimulated (d) Simultaneous
2. Audible range of frequency is...
   (a) $f > 20$ Hz (c) $f > 20$ kHz
   (b) 20 Hz $< f >$ 20 kHz (d) $f < 20$ Hz
3. ..... substances do not possess magnetic dipole moment.
   (a) Diamagnetic (c) Ferromagnetic
   (b) Paramagnetic (d) none of these
4. $L = k \log I$ is known as...
   (a) Weber-Fechner's law (c) Faraday's law
   (b) Einstein's law (d) Newton's law
5. Unit of electric dipole moment is .....
   (a) coulomb • volt (c) farad • ampere
   (b) coulomb • ampere (d) coulomb • meter
6. Hysteresis loop for hard ferromagnetic substances is .....
   (a) narrow (c) cannot say
   (b) broad (d) None of these
7. Solar cell converts ..... energy into ..... energy.
   (a) electric, solar (c) solar, electrical
   (b) chemical, solar (d) solar, chemical

(b) **07**

1. Full form of SONAR is .....
   (a) Sound Negative and Radiation
   (b) Solar Navigation and Radiation
   (c) Sound Navigation and Ranging
   (d) Solar Negative and Ranging
2. A junction formed by two superconductors with a very thin strip of an insulator is called .....
   (a) P-N Junction (b) Transistor Junction
   (c) Josephson Junction (d) Bipolar Junction
3. Pitch of the sound is related to the .....
   (a) Frequency (b) loudness

(c) Timber (d) None of these

4. The population densities of lower and upper energy levels E_1 and E_2 are N_1 and N_2 respectively. Condition for population inversion between these two levels is given by.....
   (a) $N_1 = N_2$ (b) $N_1 > N_2$
   (c) $N_1 < N_2$ (d) None of these

5. CO_2 is .....
   (a) Polar molecule (b) Non-polar molecule
   (c) Bi-polar molecule (d) none of these

6. A hall has a volume of 5600 m^3 is found to have a reverberation time of 2 s. If the area of sound absorbing surface is 700 m^2, calculate the absorption coefficient.
   (a) 1.28 (b) 0.32
   (c) 0.84 (d) 0.64

7. The intensity level of conversation is given as 60 dB. Find the intensity of the wave generated.
   (a) 10^6 W/m^2 (b) 60 W/m^2
   (c) 10^{-6} W/m^2 (d) 10^{60} W/m^2

Q.2 **(a)** Define following terms: **03**
(*i*) Magnetic dipole moment (*ii*) Magnetization (*iii*) Bohr magneton
(b) Derive Calussius-Mossotti equation. **04**
(c) Write general properties of diamagnetic, paramagnetic and ferromagnetic materials. **07**

Q.3 **(a)** A silica optical fibre has a core of refractive index 1.6 and cladding of refractive index of 1.5. Calculate the critical angle at the core-cladding interface. **03**
(b) Differentiate step index and graded index fibre. **04**
(c) Describe with neat diagram construction and working of *Nd-YAG* LASER. **07**

Q.4 **(a)** State points of difference between intensity and loudness. **03**
(b) Derive formula for acceptance angle and numerical aperture for the light transmission in optical fiber. **04**
(c) Describe with neat diagram principle, construction and working of Piezoelectric Generator. **07**

Q.5 **(a)** What is Meissener effect? Prove that for a superconductor $\chi_m = -1$. **03**
(b) The critical magnetic field at 2.2×10^3 A/m in a superconductor ring of radius 0.01 m. Find the value of critical current. **04**
(c) What is reverberation time? Write and discuss any three factors affecting Acoustic of a building and their remedies. **07**

Q.6 **(a)** Mention the names of the various NDT methods **03**
(b) Write brief note on Shape Memory Alloy (SMA). **04**
(c) What is biomaterial? Discuss the types of biomaterials and their applications in the medical field. **07**

Q.7 **(a)** State the types of polarization. **03**
(b) Write any four properties of metallic glasses. **04**
(c) What are nano materials? Discuss in detail any two methods of producing nanomaterials. **07**

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