

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-I & II EXAMINATION (NEW) – Winter 2017**

**Subject Code: 2110011**

**Date:01/01/2018**

**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.

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

**(a) 07**

1. In which materials magnetic dipoles are align anti-parallel with unequal magnitude
  - (a) Anti ferromagnetic.
  - (b) Diamagnetic.
  - (c) Paramagnetic.
  - (d) Ferry magnetic.
2. The characteristic temperature associated with the phase transformation are
  - (a)  $M_s, M_f, A_s, M_d$
  - (b)  $M_s, M_f, A_s, A_f$
  - (c)  $M_s, M_d, A_s, A_f$
  - (d)  $M_s, M_d, A_s, M_f$
3. For water which type of polarization will be prominent?
  - (a) Electronic polarization.
  - (b) Ionic polarization.
  - (c) Orientation polarization.
  - (d) Space charge polarization.
4. The current require to destroy the superconductivity is equal to
  - (a)  $I_c = 2\pi r H_0$
  - (b)  $I_c = 2\pi H_c$
  - (c)  $I_c = 2\pi r H_c$
  - (d)  $I_c = 4\pi r^2 H_c$
5. By introducing dielectric materials between two plates of the charge capacitor, the intensity of the electric field will
  - (a) Increases.
  - (b) Decreases.
  - (c) Remains same.
  - (d) None of the above
6. Pen drive stores the data in the form of
  - (a) Only magnetic field
  - (b) Only electric field.
  - (c) Both Electric and magnetic field
  - (d) Electromagnetic
7. For which type materials area of Hysteresis curve is zero
  - (a) Anti-ferromagnetic materials
  - (b) Diamagnetic materials
  - (c) Paramagnetic materials
  - (d) None of the above

- (b)
- Which of the following represents the correct formula for intensity of sound?
    - $2\pi^2 f a^2 \rho v$
    - $2\pi^2 f^2 a \rho v$
    - $2\pi^2 f^2 a^2 \rho v$
    - $2\pi f^2 a^2 \rho v$
  - To reduce eddy current loss in transformer core materials will be
    - Soft magnetic material.
    - Hard magnetic material.
    - Metalloid glass.
    - Dielectric material.
  - The polarization of a solid which contains N number of particles per unit volume is equal to
    - $P_e = N\alpha E$
    - $P_e = 2N\alpha E$
    - $P_e = N\alpha^2 E$
    - $P_e = N\alpha^2 E^2$
  - Which of the following represents the Bohr Magneton
    - $\frac{e\hbar}{2\pi m}$
    - $\frac{eh}{4\pi m}$
    - $\frac{e\hbar}{4\pi m}$
    - $\frac{eh}{2\pi m}$
  - Which event is likely to take place when a photon of energy equal to the difference in energy between two levels is incident in a system?
    - Absorption
    - Emission
    - Absorption and emission
    - Prominently Scattering
  - In Josephson junction made by
    - superconductor sandwich between two conductors.
    - insulator sandwich between two superconductors.
    - semiconductor sandwich between two superconductors.
    - superconductor sandwich between two insulators.
  - The value of threshold intensity  $10^{-12} \text{w/m}^2$  is set at frequency
    - 20Hz
    - 20kHz
    - 50Hz
    - 1kHz

<a href="http://www.gujaratstudy.com">http://www.gujaratstudy.com</a>	(b) A parallel plate capacitor has a capacitance of 2mF. The dielectric has permittivity, $\epsilon_r=80$ . For the applied voltage of 1kV, find the energy stored in the capacitor as well as the energy stored in the polarizing the dielectric.	04
	(c) Explain with neat diagram recording and reading of data is carried out in magnetic storage.	07
<b>Q.3</b>	(a) Calculate the intensity level of a turbine whose sound intensity is $100\text{w/m}^2$ when it is under operation. ( Standard intensity level is $10^{-12}\text{w/m}^2$ )	03
	(b) Explain the two functional properties of SMAs.	04
	(c) What is acceptance angle and numerical aperture? Derive the expression for them.	07
<b>Q.4</b>	(a) A nickel of 10cm length with a density of $8.1 \times 10^3\text{kg/m}^3$ and young modulus of $8.2 \times 10^{11}\text{N/m}^2$ is used in a Magnetostriction oscillator. Determine the fundamental frequency of the ultrasound generator.	03
	(b) What is the importance of electron confinement in nanomaterial?	04
	(c) Define superconductivity. What are different types of superconductors? Explain them in detail.	07
<b>Q.5</b>	(a) Calculate the critical current for a wire of lead having a diameter of 1mm at 4.2K. Critical temperature for leads is 7.18K and $H_c(0) = 6.5 \times 10^4\text{A/m}$ .	03
	(b) List the important properties and applications of CNTs.	04
	(c) What are the factors affecting the acoustics of the buildings and its remedies?	07
<b>Q.6</b>	(a) Calculate the refractive index of the core and cladding of a fibre from the following data. The NA is 0.027 and relative refractive index is 0.015	03
	(b) Explain why metallic glasses are used for core in transformer in power lines.	04
	(c) List various polarization mechanisms in dielectric materials. Derive an expression for atomic polarisability $\alpha_e$ .	07
<b>Q.7</b>	(a) What is photovoltaic effect? List the different materials uses for solar cell.	03
	(b) What is an acoustic grating? Explain the acoustic grating method to determine the velocity of ultrasound in liquids.	04
	(c) Describe the construction and working of Nd:YAG laser with a suitable energy level diagram.	07

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