Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEMESTER 1st / 2nd (NEW) EXAMINATION WINTER 2016

Subject Code: 2110011 Date:21/01/2017

Subject Name: PHYSICS

Time:10:30 AM TO 1:00 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. The high temperature stable phase of Shape Memory Alloys (SMA) is called
(a) Austenite (b) Martensite (c) Nitiosite (d) None of these

2. _____ exhibit super plasticity.
(a) Bio-materials (b) Metallic materials (c) Nanomaterials (d) SMA

3. We prefer _____ fiber for short distance communication.
(a) Single mode (b) Multi mode (c) Dual mode (d) None of these

4. Nd-YAG LASER emittes _____ μm wavelenghth.
(a) 1.063 (b) 1.062 (c) 1.064 (d) 1.406

5. Material used for the production of ultrasonic waves in magnetostriction effect is
(a) Paramagnetic (b) Diamagnetic (c) Ferromagnetic (d) Can't say

6. Magnetic susceptibility (χ_m) equals
(a) dipole moment per unit volume (b) torque per unit area (c) magnetization per unit magnetic field intensity (d) none of these

7. The metallic glasses are obtained by cooling a molten material rapidly at a rate of
(a)$20x10^{60}$c/s (b)$2x10^{60}$c/s (c)$2x10^{40}$c/s(d) None of these

(b) **07**

1. The polarization **P** in a solid dielectric is related to the electric field **E** and the electric flux density **D** by the relation
(a) $\mathbf{E}=\varepsilon_0\mathbf{D}+\mathbf{P}$ (b) $\mathbf{D}=\mathbf{E}+\varepsilon_0\mathbf{P}$ (c) $\mathbf{D}=\varepsilon_0\mathbf{E}+\mathbf{P}$ (d) $\mathbf{D}=\varepsilon_0(\mathbf{E}+\mathbf{P})$

2. Threshold of feeling is
(a) 100dB (b)110dB (c)130dB (d)120dB

3. Which of the following waves does not belong to the electromagnetic spectrum
(a) X-rays (b) Microwave (c) Infrared (d) Ultrasonic wave

4. Cooper pairs are formed between electrons
(a) of same spin (b) of opposite spin (c) of same velocity (d) of different velocity

5. Laser beam is highly coherent so it can be used in
(a) Polarization (b) Interference (c) Diffraction (d) Scattering

6. Which of the following is the transmission frequency in optical fibre
(a) 10^{14}(b)10^{13}(c)10^{12}(d)10^{11}

7. The first commercial shape memory alloy is
(a) NiTi (b) NiCd (c) NiC (d) Cryofit

Q.2	**(a)**	A magnetic field strength of $2x10^5$ A/m is applied to a paramagnetic material with a relative permeability of 1.01, calculate the values of Intensity of magnetic field(B) and Magnetisation(M).	**03**
	(b)	Write a short note on: Sound absorbing materials.	**04**
	(c)	Explain Josephson effect and its application.	**07**
Q.3	**(a)**	What is the resultant sound level when 70dB sound is added to a 80dB sound.	**03**
	(b)	Draw the circuit diagram for Magnetostriction and Piezoelectric oscillator method	**04**
	(c)	Describe the construction & working of Ndyag laser.	**07**
Q.4	**(a)**	Discuss the general objectives of Non-destructive testing.	**03**
	(b)	Discuss the characteristics of LASER.	**04**
	(c)	What do you mean by acceptance angle. Derive expression for them.	**07**
Q.5	**(a)**	An optical fiber core and cladding have refractive index of 1.545 and 1.495 respectively. Calculate critical angle, acceptance angle and numerical aperture.	**03**
	(b)	Discuss the general properties of Paramagnetic and Diamagnetic materials.	**04**
	(c)	List out the techniques used in synthesis of Nanomaterials. Discuss any two of them in detail.	**07**
Q.6	**(a)**	What is relative refractive index. Derive relation between numerical aperture and relative refractive index.	**03**
	(b)	Explain: (a) Relative intensity (b) absorption coefficient	**04**
	(c)	What are Shape Memory Alloys? Explain temperature-induced and stress-induced transformations in detail.	**07**
Q.7	**(a)**	Define: Pumping, Life time, Metastable state	**03**
	(b)	Explain: Meissner effect. Prove that a superconductor exhibits perfect diamagnetism.	**04**
	(c)	What is an acoustic grating. Explain the acoustic grating method of determining the velocity of ultrasonic waves in liquids.	**07**

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