Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– 1st / 2ndEXAMINATION (NEW SYLLABUS) – WINTER 2018

Subject Code:2110011 **Date: 04/01/2019**

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. Unit of absorption coefficient is
   a) Sabine
   b) Second
   c) O.W.U
   d) a & c both

2. Frequency of ultrasonic waves is
   a) f = 20 kHz
   b) f > 20 kHz
   c) f < 20 kHz
   d) f = 20 Hz

3. According to Snell's law
   a) $n_1/n_2 = \sin\emptyset_1/\sin\emptyset_2$
   b) $n_1/n_2 = \sin\emptyset_2/\sin\emptyset_1$
   c) $n_1/n_2 = \sin\emptyset_1 + \sin\emptyset_2$
   d) $n_1/n_2 = \sin^2\emptyset_1/\sin^2\emptyset_2$

4. 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?
   a) Absorption
   b) Emission
   c) Absorption and Emission
   d) None of the above

5. The current required to destroy the superconducting property is equal to
   a) $I_C = 2\pi r H_O$
   b) $I_C = 2\pi H_C$
   c) $I_C = 2\pi r H_C$
   d) $I_C = 4\pi r H_C$

6. The relation between permeability and susceptibility is
   a) $\mu_r = 1/\chi$
   b) $\mu_r = 1 - \chi$
   c) $\mu_r = \chi$
   d) $\mu_r = 1 + \chi$

7. The magnetic induction is equal to B =
   a) ØA
   b) Ø/A
   c) ØA/H
   d) ØH/A

(b) **07**

1. Super elasticity is observed by
   a) Biomaterials
   b) Shape Memory Alloys
   c) Metallic glasses
   d) None of the above

2. ____dB is the sound level for the threshold of pain
   a) 0 dB
   b) 110 dB
   c) 120 dB
   d) 10^{-12} dB

3. _____ is the process to synthesize metallic glasses
   a) Ball Milling
   b) Plasma Arching
   c) Melt Spinning
   d) CVD

4. The basic principle behind fiber optic communication is
   a) Reflection
   b) Refraction
   c) Diffraction
   d) Total Internal Reflection

5. Particle size of nano particle is
   a) 0.1 to 1 nm
   b) 1 to 100 nm
   c) 10 to 100 nm
   d) 1 to 10 nm

6. Weber Fechner law is
   a) $L = K / \log_{10} I$
   b) $I = K / \log_{10} L$
   c) $L = K \log_{10} I$
   d) $I = K \log_{10} L$

7. The superconducting state is perfectly ____ in nature
   a) Diamagnetic
   b) Paramagnetic
   c) Ferromagnetic
   d) All of the above

Q.2 **(a)** Discuss Meissner effect in superconductors. **03**

(b) Describe the following terms **04**
1) Sound absorption coefficient
2) Reverberation time

	(c)	Based on what factor superconductors are classified? Explain the types, which one has more applications? Give the reason for your answer.	**04**
	(d)	A hall has a volume of 2,265 m^3. Its total absorption is equivalent to 94.85 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 94.85 m^2?	**03**
Q.3	**(a)**	Given the equation $B = \mu H$, B = Magnetic flux density μ = Absolute permeability H = Magnetic field strength Derive the relation between relative permeability and magnetic susceptibility	**03**
	(b)	Discuss the disadvantages of nano-materials	**04**
	(c)	Explain Ball Milling technique for the production of nano particles with its merits and demerits.	**07**
Q.4	**(a)**	If we want to increase the intensity level by 1 dB, how many times should the intensity become? Explain the answers with necessary steps.	**03**
	(b)	Derive the Clausius Mossotti equation.	**04**
	(c)	What are Shape memory alloys? Discuss their two properties in detail.	**07**
Q.5	**(a)**	Calculate the refractive index of the core and cladding material of an optical fiber with numerical aperture 0.11 and relative refractive index difference is 0.011	**03**
	(b)	Describe the characteristics of LASER in detail.	**04**
	(c)	Define and derive the equations for Acceptance angle and Numerical aperture.	**07**
Q.6	**(a)**	The critical temperature for lead is 7.1 K. At 6 K the superconducting property disappears if it is subjected to magnetic field of 4.67×10^4 Am^{-1}. Determine the value of the magnetic field required to destroy superconducting property at 0 K.	**03**
	(b)	Explain the following terms in detail 1) Electric field 2) Dielectric constant	**04**
	(c)	What are ultrasonic waves? Describe the piezoelectric method for production of ultrasonic waves with its merits and demerits.	**07**
Q.7	**(a)**	Define the following terms. 1) Magnetic moment 2) Magnetic susceptibility 3) Intensity of magnetization	**03**
	(b)	What are Metallic glasses? Explain the melt spinning process for their preparation.	**04**
	(c)	Describe soft and hard magnetic materials in detail.	**07**

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