

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- I & II (NEW) EXAMINATION – WINTER 2019

Subject Code: 3110011

Date: 02/01/2020

Subject Name: Physics

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		Marks
Q.1	(a) Define: coefficient of viscosity.	03
	(b) Define Reverberation time and write down the Sabine's formula of it by explaining the parameters in it.	04
	(c) What is damping motion? Derive the differential equation and general solution of damped harmonic motion.	07
Q.2	(a) Define resonance in an oscillating system.	03
	(b) Draw stress- strain diagram. Explain the main points of it.	04
	(c) Write down the factors affecting the acoustics of an auditorium. Give remedies.	07
	OR	
	(c) Explain Young's Modulus, shear modulus, bulk modulus and Poisson's ratio.	07
Q.3	(a) Write down various applications of ultrasonic waves.	03
	(b) Calculate the natural frequency of 50 mm length of a pure iron rod. Given that Young's modulus of iron = $11.5 \times 10^{10} \text{ N/m}^2$ and density of pure iron = $7.25 \times 10^3 \text{ kg/m}^3$. Can you use it in a magnetostriction oscillator to produce ultrasonic waves?	04
	(c) Describe production of ultrasonic waves by magnetostriction method. Give its advantages and limitations.	07
	OR	
Q.3	(a) What do you understand by NDT. Give names of few NDT methods.	03
	(b) A Nickel rod having 5 cm length is vibrating at resonance. Calculate the fundamental frequency of vibration for which ultrasonic waves are generated. Given that Young's modulus of Nickel = $2.14 \times 10^{11} \text{ N/m}^2$, density of Nickel = $8.908 \times 10^3 \text{ kg/m}^3$.	04
	(c) Describe acoustic diffraction method to determine the speed of sound in liquid with suitable diagram.	07
Q.4	(a) Explain the phenomenon of superconductivity.	03
	(b) The critical magnetic field of Niobium is $1 \times 10^5 \text{ Tesla}$ at 8 K and $2 \times 10^5 \text{ Tesla}$ at 0 K. Calculate the transition temperature of the element.	04
	(c) Write down the applications of superconductors.	07
	OR	
Q.4	(a) Describe BCS theory of superconductivity.	03
	(b) Derive the formula for time period of a torsional pendulum.	04
	(c) (i) Josephson Junction and its applications 04	07
	(ii) What force is required to stretch a steel wire to double the length when its area of cross section is 1 cm^2 . Given that Young's modulus of wire is $7 \times 10^{10} \text{ N/m}^2$.	03

- Q.5 (a) Write down the properties of LASER light. **03**
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- (b) What is the wavelength of light of Ruby Laser if the separation between metastable state and lower energy state is 1.79 eV. Given that Planck's constant = 6.64×10^{-34} Js. **04**
- (c) Describe the construction and working principle of He-Ne LASER with suitable diagrams. **07**

OR

- Q.5 (a) Classify sound on the basis of frequency with suitable examples. **03**
- (b) Derive the relationship between Einstein Coefficients. **04**
- (c) Write down the various applications of LASER. **07**

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