

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-I & II(NEW) EXAMINATION – SUMMER 2023****Subject Code:3110011****Date:01-08-2023****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.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) Define Ductility, Brittleness and Elasticity.	03
	(b) Define Spontaneous and Stimulated emission.	04
	(c) Derive an expression for Twisting couple in a wire.	07
Q.2	(a) Define simple harmonic motion (SHM). Give Any two examples of it.	03
	(b) Find the acceleration of particle performing simple harmonic motion when it is at 0.6 m from its mean position. The time period of S.H.M. is 0.05 sec. also calculate maximum velocity if the amplitude of S.H.M. is 2 m.	04
	(c) Derive an expression for depression of cantilever.	07
	OR	
	(c) Explain classification and properties of sound absorbing material.	07
Q.3	(a) Calculate Poisson's ratio and the rigidity modulus of copper using following data : Young's modulus $10.5 \times 10^{10} \text{ Nm}^{-2}$ and the bulk modulus of copper $14.3 \times 10^{10} \text{ Nm}^{-2}$.	03
	(b) Write a short note on I shaped girders.	04
	(c) Explain construction and working of He – Ne laser.	07
	OR	
Q.3	(a) An ultrasonic source of 0.09 MHz sends down a Pulse towards the seabed which returns after 0.55 sec. The velocity of sound in water is 1800 m/s. Calculate the depth of the sea and wavelength of pulse.	03
	(b) Compare Type –I and Type – II superconductors. (Any four points).	04
	(c) Explain in detail Magnetostriction method for production of ultrasonic waves.	07
Q.4	(a) Find the frequency of the first and second modes of vibration for a quartz crystal of piezoelectric oscillator. The velocity of longitudinal waves in quartz is $5.5 \times 10^3 \text{ m/s}$. thickness of quartz crystal is 0.05 m.	03
	(b) Explain Josephson junction.	04
	(c) Discuss Ultrasonic flaw detector method for NDT, with its advantages and limitations.	07
	OR	
Q.4	(a) The critical temperature of mercury with isotopic mass 199.5 is 4.185 K. calculate its critical temperature when its isotopic mass is 203.4.	03
	(b) Compare Non destructive test (NDT) with destructive test (DT). (any four points)	04

- (c) Explain basic components of laser generation with diagram. Also give types of laser. **07**
- Q.5** (a) Calculate the critical current for a wire of Pb having a diameter of 1 mm at 4.5 K. The critical temperature for Pb is 7.2 K and $H_c(0) = H(0) = 6.5 \times 10^4$ A/m. **03**
- (b) Define pumping with its types. **04**
- (c) Explain Meissner effect. Hence prove that superconductors are perfect diamagnetic materials. **07**
- OR**
- Q.5** (a) A hall has a volume of $1,20,000 \text{ m}^3$, it has reverberation time of 1.5 sec. what is average absorbing power of the surface if the total absorbing surface area is $25,000 \text{ m}^2$. **03**
- (b) Explain working of SONAR. **04**
- (c) Explain construction and working of Ruby laser with necessary diagrams. **07**
