Seat No.: _____ Enrolment No._____

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 x 10^{10} Nm^{-2} and the bulk modulus of copper 14.3 x 10^{10} 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 x 10^3 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 Hc(0) = H(0) = 6.5 x 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 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 m^2.	**03**
	(b)	Explain working of SONAR.	**04**
	(c)	Explain construction and working of Ruby laser with necessary diagrams.	**07**

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