Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–I & II EXAMINATION – WINTER 2025

Subject Code:3110011 Date:16-01-2026

Subject Name:Physics

Time:02:30 PM TO 05:00 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)**	The critical temperature for lead is 7.1 K. At 6 K the superconducting property disappears if it is subjected to a magnetic field of $4.67 * 10^4$ A/m. Find H_0.	**03**
	(b)	Explain properties Meissner Effect and Effect of magnetic field for Superconductors.	**04**
	(c)	Define superconductivity. Describe its use in Maglev and Josephson Junction.	**07**
Q.2	**(a)**	A hall of volume 1000 m^3 is found to have a reverberation time of 2.5 s. If the area of the sound absorbing surface is 5000 cm^2, calculate the average absorption coefficient.	**03**
	(b)	What is a wave? Describe Longitudinal and Transverse wave.	**04**
	(c)	What is simple harmonic motion? Obtain its differential equation with graphical representation. Write equation for its potential energy and kinetic energy in terms of amplitude of a wave.	**07**
		OR	
	(c)	What is damped harmonic motion. Solving its differential equation, obtain equation for its overdamped and underdamped conditions.	**07**
Q.3	**(a)**	Write equation of bending of beam and explain I shaped girders with advantages.	**03**
	(b)	A rectangular solid has dimensions 6 x 6 x 2 cm. A force of 0.2 N, applied tangentially to the upper surface, causes a displacement of 5 mm relative to the lower surface. Calculate the shearing strain, stress and rigidity modulus.	**04**
	(c)	State types of moduli of elasticity. Derive relation of Young's modulus and modulus of rigidity.	**07**
		OR	
Q.3	**(a)**	Define stress and strain. Give their equation and unit.	**03**
	(b)	Calculate the Young's modulus in the cantilever depression method used. The length of the cantilever is 1 m which is suspended with a load of 150 gm. The depression is found to be 4 cm. The thickness of the beam is 5 mm and breadth of the beam is 3 cm.	**04**
	(c)	What is twisting moment? Derive equation for twisting couple on a wire or shaft.	**07**
Q.4	**(a)**	What is the ratio of the stimulated emission to spontaneous emission at a temperature of 250 °C for the sodium D line?	**03**
	(b)	Discuss properties of laser.	**04**
	(c)	Obtain relation between Einstein's coefficients.	**07**

OR

Q.4	**(a)**	Write applications of Ultrasonic waves in various fields	**03**
	(b)	List the properties of ultrasound.	**04**
	(c)	Discuss with suitable diagram the piezoelectric method for ultrasonic wave generation. State its advantages and disadvantages.	**07**
Q.5	**(a)**	Find the maximum velocity and acceleration of a particle performing SHM of period 20 π s and amplitude 10 cm.	**03**
	(b)	Discuss acoustic grating method for finding velocity of ultrasonic waves in medium.	**04**
	(c)	What is destructive and non-destructive testing. Give difference between them.	**07**

OR

Q.5	**(a)**	An Ultrasonic source of 0.07 MHz sends down a pulse towards the seabed which returns after 0.35 sec. The velocity of sound in water is 1800 m/s. Calculate the depth of sea and wavelength of pulse.	**03**
	(b)	Write note on applications of laser in engineering and medicine.	**04**
	(c)	Discuss Ruby laser for laser beam production with suitable diagram.	**07**

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