Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–I & II EXAMINATION – WINTER 2024

Subject Code:BE01000021 Date:02-01-2025

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: (1) Stress (2) Strain and (3) Young's modulus.	**03**
	(b)	The critical temperature for a metal with isotopic mass 199.5 is 4.185 K. Calculate the isotopic mass if the critical temperature falls to 4.133 K.	**04**
	(c)	What is Cantilever? Obtain the expression for depression at free end of thin beam clamped horizontally at one end and loaded at other end.	**07**
Q.2	**(a)**	Define:(1) Reverberation (2) Nano-materials (3) Absorption co-efficient	**03**
	(b)	The volume of a hall is 475 m^3. The area of wall is 200 m^2, area of floor and ceiling each is 100 m^2. If the absorption co-efficient of wall, ceiling and floor are 0.025, 0.02 and 0.55, respectively. Calculate the reverberation time for the hall.	**04**
	(c)	Describe production of ultrasonic waves by Piezo-electric method. Give its advantages and limitations.	**07**
		OR	
	(c)	What is simple harmonic motion? Obtain equation for kinetic energy and potential energy of simple harmonic oscillator. Show that at any time the sum of kinetic energy and potential energy remains constant.	**07**
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)	Differentiate: Spontaneous and Stimulated emission.	**04**
	(c)	What are Einstein's coefficients? Give relation between them and discuss the result.	**07**
		OR	
Q.3	**(a)**	Define:(1) Meta stable state (2) Population inversion (3) Pumping	**03**
	(b)	Write a short note on Scanning Tunneling Microscope (STM).	**04**
	(c)	What is full form of LASER? Write the characteristics and applications of LASER.	**07**
Q.4	**(a)**	State any three differences between interference and diffraction.	**03**
	(b)	Calculate the minimum number of lines in a grating which will just resolve the lines of wavelength 5890 Å and 5896 Å in the second order.	**04**
	(c)	Derive the time independent Schrödinger's wave equation.	**07**
		OR	
Q.4	**(a)**	An unknown weight is attached to the lower end of wire of length 4 m, radius 0.7 mm, extends it by 0.8 mm. If Y= 2×10^{11} $N/m^{2.}$ Find the unknown weight.	**03**
	(b)	Write a short note on black body radiation.	**04**
	(c)	Explain Heisenberg's uncertainty principle and derive it.	**07**
Q.5	**(a)**	Define: (1) Critical Temperature (2) Critical Magnetic field (3) Critical Current density.	**03**
	(b)	Write the applications of nano materials.	**04**
	(c)	Describe the principle, construction and working of Michelson interferometer.	**07**

OR

Q.5	**(a)**	State and explain principle of superposition of waves.	**03**
	(b)	What is interference? Differentiate Constructive and destructive interference.	**04**
	(c)	Explain working of the p-n junction diode and state its applications.	**07**

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