Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–I & II (NEW) EXAMINATION – SUMMER 2024

Subject Code:3110011 Date:10-07-2024

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.**

Q.1	**(a)**	What is Meissner effect? For superconductor show that $\chi_m = -1$.	**03**
	(b)	Draw Stress versus Strain diagram with necessary notation and discuss it.	**04**
	(c)	(i) Write principle of Piezoelectric Generator. (ii) With proper circuit diagram describe construction and working of Piezoelectric Generator. (iii) List merits and demerits of Piezoelectric Generator.	**07**
Q.2	**(a)**	What is reverberation and reverberation time? Write Sabin's formula for reverberation time and explain each term.	**03**
	(b)	State any four points of differences between spontaneous emission and stimulated emission.	**04**
	(c)	What is torsional pendulum? Derive expression of time period for vibration of torsional pendulum.	**07**
		OR	
	(c)	Derive the expression for depression of Cantilever loaded at free end.	**07**
Q.3	**(a)**	Write any three properties of ultrasonic waves.	**03**
	(b)	Calculate the length of iron rod which can be used to produce ultrasonic waves of 75 kHz. Given that the density of iron is 7230 kg/m^3 and its Young's modulus is 6×10^9 N/m^2.	**04**
	(c)	What is called Acoustic Grating? Discuss the method to determine velocity of ultrasonic waves with the help of acoustic grating.	**07**
		OR	
Q.3	**(a)**	Give classification of sound waves based on frequency of wave.	**03**
	(b)	Write any four points of differences between Destructive test and Non-destructive test.	**04**
	(c)	(i) Discuss the method to determine depth of the sea with the help of SONAR. (ii) An ultrasonic wave of 7.2 MHz sends down a pulse towards the seabed, which returns after 1.2 s. The velocity of sound in seawater is 1800 m/s. Calculate the depth of sea and wavelength of pulse.	**07**

Q.4	**(a)**	Write any three applications of LASER.	**03**
	(b)	Write any four factors affecting acoustic of building and their remedies.	**04**
	(c)	Write detailed note on Ruby laser with proper diagram.	**07**

OR

Q.4	**(a)**	Write full for of LASER and discuss in brief characteristics of laser light.	**03**
	(b)	The volume of a room is 1500 m^3. The wall area of the room is 240 m^2, the floor area is 125 m^2, and the ceiling area is 125 m^2. The average sound absorption coefficient (i) for wall is 0.025; (ii) for the ceiling is 0.85; and (iii) the floor is 0.09. Calculate the average sound absorption coefficient and reverberation time.	**04**
	(c)	Write detailed note on He-Ne laser with proper diagram.	**07**

Q.5	**(a)**	For a superconducting material isotopic mass is 195 amu and critical temperature is 4.5 K. Calculate isotopic mass at 5.7 K.	**03**
	(b)	Write any four points of comparison of type-I and type-II superconductor.	**04**
	(c)	What is superconductivity? Discuss any six properties of superconductor.	**07**

OR

Q.5	**(a)**	The critical current passing through a superconducting wire of radius 5 mm is 21 A. Calculate critical magnetic field.	**03**
	(b)	Explain in detail BCS theory of superconductivity.	**04**
	(c)	(i) Write a short note on SQUID. (ii) Write short note on London Penetration Depth.	**07**

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