BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: IMSC **SEMESTER : III**
BRANCH: PHYSICS **SESSION : MO/2025**

SUBJECT: PH24207 - WAVES AND OPTICS

TIME:02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	State the principle of superposition.	[2]	01	01
Q.1(b)	Explain the superposition of N harmonic oscillations with equal frequency differences.	[3]	01	02
Q.2(a)	Define Lissajous figures.	[2]	01	01
Q.2(b)	Find the resultant of two mutually perpendicular harmonic waves having different amplitudes and phases and having frequencies in the ratio 1 : 2.	[3]	01	03
Q.3(a)	Define phase velocity and particle velocity for waves on a stretched string. What is the relation between them?	[2]	02	02
Q.3(b)	Obtain the equation for waves on a stretched string, clearly stating the assumptions.	[3]	02	02
Q.4(a)	Write Newton's formula for speed of sound in air. Explain why this formula does not give the correct value for speed of sound.	[2]	02	02
Q.4(b)	Find the speed of sound in air at normal temperature and pressure using the Newton's formula.	[3]	02	03
Q.5(a)	Define interference. State the condition for bright and dark fringes in terms of phase and path difference.	[3]	03	02
Q.5(b)	In a Fresnel's biprism experiment, the eyepiece is at a distance of 100 cm from the slit. A convex lens inserted between the biprism and the eyepiece gives two images of the slit at two positions. In one case, the two images of the slit are 4.05 mm apart, and in the other case 2.10 mm apart. If sodium light of wavelength 5893 Å is used, calculate the thickness of the fringes.	[2]	03	03

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