

[This question paper contains 2 printed pages.]

Sr. No. of Question Paper : 6858

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Your Roll No.....

Unique Paper Code : 222363

Name of the Course : B.Sc. (Prog.) Physical Science

Name of the Paper : Physics III – Waves and Optics (PHPT-303)

Semester : III

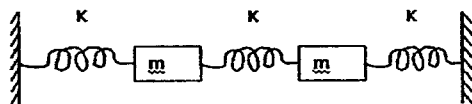
Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any five questions.
3. All questions carry equal marks.

1. (a) What are Lissajous figures ? Trace graphically the motion of a particle that is subjected to two perpendicular simple harmonic motions of equal frequencies, different amplitudes and phases differing by (i) zero and (ii) $\pi/4$. (10)
(b) A tuning fork A of frequency 384 Hz gives 6 beats per second when sounded with another tuning fork B. On loading B with a little wax, the number of beats per second becomes 4. What is the frequency of B ? (5)
2. (a) Establish the equation of motion of a forced harmonic oscillator. Solve this equation to obtain the amplitude of steady state oscillations. (10)
(b) What is the amplitude resonance ? (5)
3. (a) What are normal co-ordinates, normal modes and normal mode frequencies ? (5)
(b) Find the normal mode frequencies and normal mode shapes of the following system having two equal masses connected by three identical massless springs executing longitudinal vibrations. (10)



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4. (a) Explain the formation of standing waves on a stretched string by giving necessary theory. (10)
- (b) A string of length L is fixed on its two ends. Discuss and obtain the different harmonics. (5)
5. (a) Explain the formation of Newton's rings and derive an expression for the diameter of dark rings formed by reflected light. (10)
- (b) Newton's rings are observed in reflected light of $\lambda = 5.9 \times 10^{-5}$ cm. The diameter of the 10th dark ring is 0.5 cm. Find the radius of curvature of the lens. (5)
6. (a) A parallel beam of monochromatic light is incident normally on a plane diffraction grating. Obtain an expression for the intensity distribution and discuss it. (10)
- (b) How many orders will be visible if the wavelength of light used in a plane diffraction grating experiment is 5000\AA and the number of lines per inch on the grating is 2620 ? (5)
7. (a) What are Fresnel half period zones ? How can half period zones be used to prove that rectilinear propagation of light is approximate ? (7)
- (b) Give the theory of a zone plate explaining multi-image formation by it. (8)
8. (a) State the essential conditions for obtaining a sustained interference pattern. (4)
- (b) Differentiate between Fraunhofer and Fresnel classes of diffraction. (4)
- (c) What is double refraction ? How is it used to obtain polarised light ? (7)