

This question paper contains 2 printed pages]

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S. No. of Question Paper : 74

Unique Paper Code : 222363

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

Name of the Course : B.Sc. Physical Science/App. Physical Science Part-II

Semester : III

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any *five* questions.

All questions carry equal marks.

1. (a) What is a compound pendulum ? How does it differ from a simple pendulum and what are its advantages over a simple pendulum ?
(b) Give the theory of compound pendulum. Show that there are four points on the pendulum having same time period. 5,10
2. (a) Obtain the equation of motion of a damped harmonic oscillator having one degree of freedom. Also derive its general solution.
(b) Define logarithmic decrement, relaxation time and quality factor. Obtain a relation between them. 10,5
3. (a) Define degrees of freedom and normal co-ordinates.
(b) Two identical simple pendulums of same mass ' m ' and length ' l ' are coupled by a linear spring of force constant ' k '. Obtain normal co-ordinates and normal modes of their motion. 3,12

P.T.O.

4. (a) Derive the one-dimensional classical wave equation.
- (b) What is the difference between division of wavefront and division of amplitude experiments in interference ? Explain by giving examples. 7,8
5. (a) What are Newton's rings and how are they formed ? Give the necessary theory. How would you use Newton's rings to measure wavelength of light ?
- (b) In a Newton's rings experiment the diameter of the 15th dark ring is found to be 0.590 cm and that of the 5th ring is 0.336 cm. If the radius of the plano-convex lens is 100 cm, calculate the wavelength of light used. 10,5
6. (a) Deduce the expressions for intensity distribution in the diffraction pattern due to a plane transmission grating and hence obtain the grating equation.
- (b) Calculate the minimum number of lines in a grating which will just resolve the two wavelengths 5890 Å and 5896 Å in its first order. 10,5
7. (a) Distinguish between Fresnel and Fraunhofer classes of diffraction.
- (b) Explain Fresnel's division of a plane wavefront into half period zones. Show that the amplitude at a point due to the entire wavefront is approximately half of that due to the first zone alone. 5,10
8. (a) What are the conditions required to obtain a sustained interference pattern ?
- (b) What is double refraction ? Define ordinary ray and extraordinary ray.
- (c) What is Nicol prism and how is it used to produce polarised light ? 5,5,5