

**DCPH301**

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III Semester B.Sc. Degree Examination, April - 2023**PHYSICS****Wave Motion And Optics****(NEP Scheme Freshers 2021-22 and Onwards)****Paper : PHY.DSCT3****Time : 2½ Hours****Maximum Marks : 60****Instructions to Candidates:**

1. Answer the number of questions as cited in each part.
2. Non - programmable scientific calculators are allowed.

Part - AAnswer any **Four** questions. Each question carries Two marks.**(4×2=8)**

1. Arrive at the relation between wave velocity and particle velocity.
2. Why are strings of different cross sections and materials used in string instruments?
3. What are the nodes and antinodes in a stationary wave?
4. Write any two failures of Newton's corpuscular theory of light.
5. What will be the intensities of maxima and minima when two light waves each of amplitude 'a' interfere with each other?
6. Distinguish between positive and negative birefringent crystals.

Part - BAnswer any **four** questions. Each question carries five marks.**(4×5=20)**

7. A progressive harmonic wave travelling in a string is given by $y = 10^{-4} \sin 2\pi(300t - x)$ where x and y are in meter and t is in second. Find the intensity of the wave. Given : density of the material of the string is $1.25 \times 10^3 \text{ kg m}^{-3}$.
8. The equation of a stationary wave is $y = 0.12 \cos\left(\frac{\pi}{0.05}x\right) \sin 20\pi t$. Find the wave velocity and amplitude of the progressive waves.

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(2)

DCPH301

9. A wire of mass 6.5 g and length 1.5 m is stretched by a force of 44N. Calculate its fundamental frequency of vibration.
10. In young's double slit experiment, the two parallel slits separated by 0.56 mm are held at a distance of 2.8 m from the screen. If the distance of the 5th bright fringe from the central bright fringe is 1.5 cm, find the wave length of the light used.
11. In a single slit diffraction experiment, first minimum for red light of wave length 660 nm coincides with first maximum of some other wave length. Find the unknown wave length.
12. Two polaroids are held parallel such that their transmission lines are mutually perpendicular to each other. When one of them is rotated through an angle of 60°, what percentage of incident light is transmitted by the system?

Part - C

Answer **four** questions. Each question carries **Eight** marks.

(4×8=32)

13. a. Arrive at the equation for a simple harmonic progressive wave.
b. Arrive at Newton - Laplace formula for velocity of sound. (5+3)
14. Show that the resultant motion of a particle subjected to two mutually perpendicular harmonic oscillations having same time period is an ellipse inclined at an angle to coordinate axes. Show that the resultant motion represents a straight line and an ellipse whose axes coincide with the coordinate axes for angle of inclination (i) zero and (ii) $\frac{\pi}{2}$. (8)
15. a. Discuss the modes of vibration of an air column in a closed pipe.
b. What is meant by (i) reverberation (ii) reverberation time (iii) absorption co-efficient and (iv) echelon effect? (4+4)
16. a. Arrive at the relation between phase velocity and group velocity.
b. Discuss the theory of interference of light in a thin film by reflected light. (3+5)
17. a. Mention any two differences between zone plate with a convex lens.
b. In Fresnel diffraction at a straight edge, obtain the conditions for the positions of maximum and minimum intensity. (2+6)
18. a. What are quarter and half wave plates?
b. Describe the construction and working of a Lorentz half shade polarimeter. (2+6)