



DCPH – 301

III Semester B.Sc. Degree Examination, February/March 2024

(NEP) (Freshers and Repeaters)

PHYSICS

Wave Motion and Optics

Time : 2½ Hours

Max. Marks : 60

Instruction : Answer **all** Parts.

PART – A

Answer **any four** of the following. **Each** question carries **two** marks. (4×2=8)

1. Mention any two characteristics of wave motion.
2. What are beats ? How are beats formed ?
3. What is the condition for stationary wave ?
4. Mention any two failures of Newton's corpuscular theory.
5. Distinguish between resolving power and dispersive power.
6. Define the specific rotation of a solution.



PART – B

Answer **any four** of the following. **Each** question carries **five** marks. (4×5=20)

7. Write down the equation for a wave traveling along the negative Z direction and having an amplitude of 0.01 m, frequency 550 Hz and speed 330 ms⁻¹. How would the equation change if a wave with the same parameters was traveling along the positive Z direction ?
8. Two tuning forks of approximately equal frequency produce Lissajous' figures that go through a cycle of changes in 15 second. When one fork is loaded with wax the cycle of changes of Lissajous figures takes 10 second tuning fork has a frequency of 400 Hz, find the frequency of the first fork before and after loading.
9. A uniform cord has a mass of 0.3 kg and a length of 6 m. The cord passes over the pulley and supports a 2 kg object. Calculate the speed of the wave and the time taken for the wave to travel the distance of 6 m.

P.T.O.



10. In a biprism experiment with sodium light, fringes of width 0.02 cm are observed at 1m from the slit. On introducing a convex lens 0.3m away from the slit, two images of the slit are seen 0.7 m apart at 1m from the slit. Calculate the wavelength of sodium light.
11. A narrow slit illuminated with monochromatic light of wavelength 5893×10^{-10} m is placed at a distance of 0.1 m from a straight edge. If the distance between the straight edge and the screen is 1.9 m, calculate the distance between the first and the fourth dark band.
12. Plane-polarized light is incident on a piece of quartz cut parallel to the axis. Find the least thickness for which the ordinary and extraordinary rays combine to produce plane polarized light. Given $n_e = 1.5442$, $n_o = 1.5533$ and $\lambda = 5000 \text{ \AA}$.

PART – C

Answer **any four** of the following. **Each** question carries **eight** marks. **(4×8=32)**

13. Define the intensity of a progressive wave. Derive an expression for the intensity of a progressive wave.
14. Deduce an expression for the velocity of longitudinal waves in gases.
15. Mention any four factors affecting the acoustics of buildings and any four requisites for the good acoustics of an auditorium.
16. Give the theory of interference by reflected light in thin films.
17. What is an air wedge ? Give the theory of interference at an Air wedge.
18. What is diffraction grating ? Give the theory of diffraction grating at normal incidence.

