K24U 0936

IV Semester B.Sc. Degree (C.B.C.S.S. – Supplementary/One Time Mercy Chance) Examination, April 2024
(2014 to 2018 Admissions)
CORE COURSE IN PHYSICS
4B04 PHY – Optics

Time : 3 Hours

Max. Marks : 40

Instruction : *Write answers in* ***English*** *only.*

SECTION – A

Answer **all** questions. Very short answer type. **Each** carries **1** mark.

1. The refraction matrix is given by

2. The central point in Newton's rings seen in reflected light appears

3. Resolving power of a grating _____, when the total number of lines on the grating increases.

4. Halfwave plate introduces a path difference of

(4×1=4)

SECTION – B

Answer **any seven** questions. Short answer type. **Each** carries **2** marks.

5. What are nodal planes ?

6. What are the conditions to be satisfied for a non reflecting film ?

7. Why a thick film cannot produce interference when illuminated with white light ?

8. Explain why the centre of Newton's ring is dark for reflected light.

9. What is a phase reversal zone plate ?

10. Give the expression for the position of the nth bright band due to a straight edge diffraction.

P.T.O.

11. How are gratings prepared ?

12. Define polarisation of light.

13. Distinguish between e rays and o rays.

14. What is a positive crystal ? Give two examples. **(7×2=14)**

SECTION – C

Answer **any four** questions. Short essay/problem. **Each** carries **3** marks.

15. Derive the system matrix for two thin lenses having focal length f_1 and f_2 separated by a distance d.

16. In a Newton's ring experiment, the radius of curvature of a lens is 5 m and its diameter is 2 cm. Calculate the total number of rings formed. Wavelength of the incident light is 5500 Å.

17. A single slit illuminated by red light of 6500 Å wavelength gives first order Fraunhofer diffraction minima that subtends an angle of 4.2° with the axis. How wide is the slit ?

18. Calculate the size of the circular opening in an opaque screen which will transmit 10 Fresnel zones to a point 1 m away. Given $\lambda = 6000$ Å.

19. Show the graphical variation intensity of the Fresnel diffraction pattern of a straight edge.

20. Show that the reflected and refracted rays are at right angles to each other when rays are incident at polarising angle. **(4×3=12)**

SECTION – D

Answer **any two** questions. Long essay type. **Each** carries **5** marks.

21. Describe Michelson's interferometer. How will you determine the wavelength of monochromatic light with the help of Michelson's interferometer ?

22. Discuss the Fraunhofer diffraction due to a double slit in detail.

23. Explain with theory the production of circularly polarized and elliptically polarized light waves.

24. Set up the translation, refraction and system matrices for a thin lens and hence obtain lens makers formula and lens formula. **(2×5=10)**

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