K24U 0936

Reg. No. : .....

Name : .....

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 n^{th} bright band due to a straight edge diffraction.

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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 λ = 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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