K21U 0893

IV Semester B.Sc. Degree (CBCSS – Sup./Imp.) Examination, April 2021
(2014-'18 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. Newton's rings illustrate the phenomenon of _____

2. In grating, if the number of lines per inch (N) increases, then width of the slit _____

3. The distance between two consecutive bright and dark fringes is called _____

4. If the light is made incident on any transparent medium at the polarizing angle, the transmitted light is _____

(4×1=4)

SECTION – B

(Short answer type – **Each** carries **2** marks – Answer **7** questions out of 10.)

5. What is system matrix ?

6. Define unit planes and nodal planes.

7. On what factors does the diameter of Newton's ring depend ?

8. How the interference fringes are formed ?

9. What is Fresnel half period zone ?

10. What is the difference between interference and diffraction ?

11. What is Fraunhofer diffraction pattern ?

12. State Brewster's law.

13. How can you produce an elliptically polarised light ?

14. What is a grating ? How is a grating produced ?

(7×2=14)

P.T.O.

SECTION – C

(Short essay/problem type – **Each** carries **3** marks – Answer **4** questions out of 6.)

15. Determine the formula for the focal length of a thin lens using matrix method.

16. Between two glass plates of length 3 cm a piece of paper of thickness 0.05 mm is introduced at one end. Light of wavelength 500 nm is made to fall on the glass plates normally. Find the bandwidth of the interference pattern formed.

17. Fraunhofer diffraction pattern is obtained by a double slit. The width of slits is 0.16 mm and they are 0.8 mm apart. Find the missing order in the diffraction spectra.

18. What is a zone plate ? Explain how focusing of light is achieved by a zone plate.

19. A polariser and analyser are oriented so that the amount of light received from the analyzer is maximum. What fraction of this amount will be the intensity of light transmitted when the analyzer is rotated through

    a) 30

    b) 40 degrees.

20. Draw a neat sketch of Michelson interferometer. Explain how circular fringes are formed.

$$(4\times3=12)$$

SECTION – D

(Long essay type – **Each** carries **5** marks – Answer **2** questions out of 4.)

21. With a neat diagram explain the formation of Newton's rings in reflected light. How can you determine the wavelength of light ?

22. Give the theory of a plane transmission grating. Deduce the relation for resolving power of a grating.

23. Describe the Fresnel's diffraction from a straight edge and obtain an expression for positions of maxima and minima.

24. What is meant by double refraction ? Explain how you can make a quarter and half wave plate from a uniaxial doubly refracting crystal.

$$(2\times5=10)$$