Reg. No. : ....

Name : ....

IV Semester B.Sc. Degree (CBCSS – Reg./Sup./Imp.) Examination, April 2020
(2014 Admn. Onwards)
CORE COURSE IN PHYSICS
4B04 PHY : Optics

Max. Marks : 40

Time : 3 Hours

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

SECTION – A

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

1. The value of the determinant of translation matrix is _____

2. The colours of thin films are due to _____

3. In diffraction pattern, fringes have _____ width.

4. Nicol prism is based on the action of _____

(4×1=4)

SECTION – B

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

5. What is the advantage of using matrix method in paraxial optics ?

6. What is meant by nodal plane ?

7. What is the importance of using white light in Michelson interferometer experiments ?

8. Explain how giving a thin film coating enhances the reflectivity of a transparent surface.

9. What is meant by Fresnel diffraction ?

10. Compare the action of zone plate with a convex lens.

11. Why does a diffraction grating separate Colours ?

12. Give the equation for intensity variation of diffraction pattern produced by a single slit.

13. What is meant by polarization of light ?

14. State and explain Malus law.

(7×2=14

SECTION – C

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

15. The refractive index of a thin lens placed in air, made of glass is 1.5. If the radii of curvature of the surfaces are 50 cm each. Obtain the system matrix for the lens.

16. With a neat diagram, explain the formation of Newton's rings in reflected light.

17. In double slit Fraunhofer diffraction calculate the fringe spacing on a screen 60 cm away from the slit if they are illuminated by sodium light of wavelength 589 nm. The distance between the upper edge of the first slit to the upper edge of the other slit is 0.12 mm.

18. The diameter of the central zone of a zone plate is 2.3 mm. If a point light source of wavelength 589 nm is placed at a distance of 6m from it, find the position of the brightest image.

19. What is meant by double refraction ? Explain how you can make a quarter wave plates from a uniaxial doubly refracting crystal.

20. Explain how non-reflecting and highly reflecting surfaces can be prepared.

$$(4\times3=12)$$

SECTION – D

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

21. Bring out translation and refraction matrices for a medium of refractive index μ.

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

23. Discuss the Fraunhofer diffraction of light on a single slit and deduce a relation for the intensity variation of the diffraction pattern produced on a screen.

24. Constructing half periods on a plane wave front, show that the rectilinear propagation of light is only an approximation.

$$(2\times5=10)$$

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