Reg. No. : ....

Name : ....

K16U 0568

IV Semester B.Sc. Degree (CBCSS – 2014 Admn. – Regular) Examination, May 2016
Core Course in Physics
4B04 PHY : OPTICS

Time : 3 Hours

Max. Marks : 40

SECTION – A

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

1. Phase difference between two successive Fresnel's half period zones is _____

2. Transverse nature of light was established by the phenomenon _____

3. The ratio of intensities of two waves is given by 4:1. The ratio of amplitudes of two waves is _____

4. Compact Disc shows colour in white light due to _____

(4×1=4)

SECTION – B

Answer **any seven** questions. **Each** carries **2** marks.

5. Obtain the expression for translation matrix. Find its determinant.

6. Define unit planes and nodal planes.

7. What are Newton's rings ? Give two uses.

8. Show that the areas of half period zones are equal.

9. State and explain grating law.

10. Explain polarization by reflection.

11. What is a Nicol prism ?

12. Distinguish between Fresnel and Fraunhoffer diffraction.

13. Derive cosine law.

14. Can you analyse an elliptically polarized light ? How ?

(7×2=14)

P.T.O.

SECTION – C

Answer **any four** questions. **Each** carries **3** marks.

15. Find the expression for the focal length of two thin lenses.

16. Light of wavelength 5880 Å is incident on a thin film of glass of refractive index 1.5 such that the angle of refraction in the plate is 60°. Calculate the smallest thickness of the plate which will make it dark by reflection.

17. In the Newtons rings arrangement the radius of the curvature of the curved side of the plano convex lens is 1 m, for $\lambda = 6 \times 10^{-7}$ m. What will be the radii of the 10th and 20th bright rings ?

18. Light of wavelength 6000 Å is incident normally on a grating 5 cm wide. The first order spectrum is formed at 30° from the normal to the grating. Find the total number of lines on the grating.

19. What will be the Brewster angle for a glass slab (n = 1.5) immersed in water ? Refractive index of water, $n = \frac{4}{3}$.

20. Calculate the thickness of

    i) a quarter wave plate and

    ii) a half wave plate. Given that refractive index of ordinary ray is 1.973 and that of extra ordinary ray is 2.656 and $\lambda = 590$ nm. **(4×3=12)**

SECTION – D

Answer **any two** questions. **Each** carries **5** marks.

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

22. Describe in detail the diffraction of a cylindrical wavefront at a straight edge.

23. Derive an expression for the intensity distribution in case of double slit and discuss the results.

24. Through matrix method explain the image process by a co-axial optical system. **(2×5=10)**