QP CODE: 21102812

21102812

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) EXAMINATIONS, OCTOBER 2021

Fourth Semester

Complementary Course - PH4CMT02 - PHYSICS - OPTICS AND SOLID STATE PHYSICS

(Common for B.Sc Chemistry Model I, B.Sc Geology Model I)

2019 Admission only

0A9EBB3D

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. What are coherent sources?
2. What is interference?
3. How would you obtain plane polarised light by reflection?
4. Mention some methods for producing plane polarised light.
5. What are polaroids ? Give their uses.
6. What is stimulated emission?
7. What do you mean by graded index fibre?
8. Write two examples of non-polar molecules.
9. Explain the term permittivity of the medium.
10. How ferroelectric domains are related to ferroelectricity?
11. Define crystalline solids.
12. Define a unit cell.

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. A light source emits light of two wavelengths 4300 Å and 5100 Å. The source is used in a

double slit experiment. The distance between source and screen is 1.5 m and the distance between the slits is 0.025 mm. Calculate the separation between the 3rd order bright fringes due to these two wavelengths.

14. In a Newton's ring experiment the diameter of 10^{th} ring changes from 1.40 to 1.27 cm when a drop of liquid is introduced between the lens and the glass plate. Calculate the refractive index of the liquid.

15. Light of wavelength 589.6 nm is incident normally on a plane transmission grating with 6000 lines per centimetre. Find the difference in angle of deviation in the first and second order spectra.

16. Obtain an expression for the dispersive power of a grating.

17. A 20 cm long tube containing 50 cm^3 sugar solution producers and optical rotation of 10^0. Calculate the quantity of sugar solution contained in the solution. Specific rotation of sugar is 65^0.

18. Explain any five applications of laser.

19. A dielectric material having dielectric constant 3 is placed in an electric field of intensity 10^5 v/m. Find the polarisation in the dielectric material.

20. Lead is fcc structure and its atomic radius is 0.175 nm. What is its volume, its diagonal and its body diagonals in the unit cell?

21. X-rays of wavelength 1.5418 Å are diffracted by (1 1 1) planes of a cubic crystals at an angle 30^0 in the first order. Calculate the interatomic spacing.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Discuss the formation of interference fringes on a screen due to the monochromatic light passing through two parallel slits on an opaque screen. Also arrive at the expression for Fringe width.

23. On the basis of fresnel theory discuss the rectilinear propagation of light.

24. With the help of geometry of optical fibre explain how light is propagated through and optical fibre. Derive the equation of numerical aperture of an optical fibre.

25. The Miller indices of a plane in a simple cubic crystal are (123). Get the coordinate of the plane and sketch it.

(2×10=20)