QP CODE: 20100832

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Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) EXAMINATION, MARCH 2020

Fourth Semester

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

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

2017 Admission onwards

E7D1B9FE

Time: 3 Hours Marks: 60

Part A

*Answer any **ten** questions.*

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

1. State the super position principal of waves.
2. What is half period Element?
3. Distinguish between fresnel and fraunhofer diffraction.
4. What is meant by dispersive power of a grating?
5. What is mean by optic axis of a crystal?
6. What is population inversion?
7. Compare the refractive indices of core and cladding.
8. Differentiate between polar and non-polar molecules.
9. State the Gauss law for dielectric.
10. Explain the phenomenon ferroelectric effect.
11. Explain scheme used in finding Miller indices of a plane.
12. What is the Packing factor of HCP structure?

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. Two coherent sources are 0.18 mm apart and the fringes are observed on a screen 80 cm away. It is found that with a certain monochromatic source of light, the 4^{th} bright fringe is

situated at a distance of 10.8 mm from the central fringe. Calculate the wavelength of light.

14. Light of wavelength 5500 Å from a narrow slit is incident on a double slit. The overall separation of 5 fringes on a screen 200 centimeter away is 1 centimeter. Calculate the slit separation and fringe width.

15. What is the longest wavelength of light for which a spectrum can be observed for a plane diffraction grating with 5000 lines per centimetre used at normal incidence.

16. Determine the polarizing angle on the surface of water. Refractive index of water air interface is 1.33.

17. 25 gram of cane sugar is dissolved in water to make up 60 cc of solution. 20 cm length of this solution produces 53° optical rotation. Calculate the specific rotation.

18. Write a note on (a) two different pump sources and (b) active medium in laser.

19. The dielectric constant of a polymer is 8. The electric field in the dielectric is 10^6 v/m. Calculate the electric displacement vector and polarisation.

20. On a simple cubic lattice of spacing = 1, draw the [100], [010], [110], and [111] directions.

21. For an orthorhombic crystal what is the Bragg angle for the (222) reflection if a = 3Å, b= 3.5 Å and c = 8 Å.

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. Discuss the interference in thin films due to reflected light.

23. Explain how circular Newton's rings are formed by reflected light. With the necessary theory give the experiment to determine the wavelength of a monochromatic source of light by the Newton's rings method.

24. With the help of energy level diagrams explain three level laser systems and four level laser systems. Explain any five applications of laser.

25. Describe seven crystal systems in three dimensions.

(2×10=20)