22101382

QP CODE: 22101382

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) IMPROVEMENT / REAPPEARANCE EXAMINATIONS, MAY 2022

Fourth Semester

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

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

2017 Admission Onwards

F71136A9

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. What do you mean by optical path?
2. State the conditions on which two waves can produce interference pattern.
3. What is diffraction?
4. Why the intensity of spectral lines with a grating are much less than those with a prism?
5. What is a Polaroid? Mention two uses of polaroids.
6. What is spontaneous emission?
7. Why optical fibre is preferred to metallic cables in communication system?
8. Write two examples of non-polar molecules.
9. What you mean by electric displacement vector D?
10. How Electric filed intensity E, Electric displacement vector D, and Polarisation vector P are related?
11. What is a Lattice point?
12. What is the Packing factor of FCC structure?

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. Green light of wavelength 5100Å from a narrow slit is incident on a double slit. If the overall separation of 10 fringes on a screen 200 cm away is 2 cm. Find the slit separation.

14. Given that angular width of a fringe formed is 0.1°. If the wavelength of light used is 4500 Å, then calculate the spacing between the slits.

15. In a plane diffraction grating the number of lines per centimeter is 5000. Find the angular separation between the wavelengths 5460 Å and 5480 Å in the second order.

16. A ray of light in air is incident on a glass plate at the polarizing angle. It suffers a deviation of 22^0 on entering the glass. Calculate the angle of polarization.

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) optical resonator and (b) optical pump.

19. Discuss the different polarisation mechanisms of dielectrics.

20. The lattice constant for a unit cell of aluminum is 4.031Å. Calculate the interplanar space of (2 1 1) plane.

21. Discuss the NaCl crystal structure.

(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 the formation of Newton's rings. How can these be used to determine the wavelength of monochromatic light?

24. Explain why population inversion is not possible in two level systems. With the help of energy level diagrams explain three level laser systems and four level laser systems. Why the laser beam in a three level system is spiking?

25. Derive Bragg's law for X-ray diffraction in crystals.

(2×10=20)