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QP CODE: 20100832



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# 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.

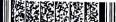
- 1. State the super position principal of waves.
- 2. What is half period Element?
- 3. Distinguish between fresnel and fraunhofer diffraction.
- 4. What is meant by dispersive power of a grating?
- 5. What is mean by optic axis of a crystal?
- 6. What is population inversion?
- 7. Compare the refractive 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?

 $(10 \times 1 = 10)$ 

### 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<sup>th</sup> bright times 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.
- The dielectric constant of a polymer is 3. The electric field in the dielectric is 10<sup>6</sup> 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.

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25. Describe seven crystal systems in three dimensions.

(2×10=20)