P – 3852

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, January 2023.

First Degree Programme under CBCSS

Physics

Complementary Course for Chemistry and Polymer Chemistry

PY 1331.2 – OPTICS, MAGNETISM AND ELECTRICITY

(2013 – 2017 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Each carries **1** marks.

1. Give two examples for coherent sources.

2. What is interference?

3. What is double refraction?

4. What is meant by grating element?

5. What nature of light can be demonstrated by the polarisation of light?

6. What happens to the energy during interference?

7. Explain paramagnetism.

8. What is total internal reflection?

P.T.O.

9. Why the shock from ac is more severe than dc?

10. Define power factor in an ac circuit.

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight**, each question carries **2** marks.

11. State the conditions for constructive interference and destructive interference.

12. Explain the diffraction pattern due to a straight edge.

13. What is a grating? How it can be constructed?

14. Define the terms impedance and reactance of an ac circuit.

15. Give the advantages of optical fibre communication system?

16. Obtain the relation between relative permeability and susceptibility.

17. Distinguish between paramagnetic and diamagnetic substances.

18. What is a quarter wave plate? What is its use?

19. Distinguish between step index fibre and graded index fibre.

20. Explain the principle of LASER.

21. Distinguish between ordinary and extra ordinary rays.

22. Define specific rotation. Give its expression.

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six**, each question carries **4** marks.

23. In the Newtons ring arrangement, the radius of the curvature of the curved surface is 50cm, the radii of the 9th and the 16th dark rings are 0.18 cm and 0.2235 cm respectively. Calculate the wavelength.

24. A soap film 5×10^{-5} cm thick is viewed at an angle of 35° to the normal. Find the wavelength of light in the visible spectrum, which will be absent from the reflected light, $\mu = 1.33$.

P – 3852

25. A plane transmission grating which has 5500 lines/cm is used to produce a spectrum from a mercury lamp. What will be the angular separation of the two yellow mercury lines of wavelength 577 nm and 579.1nm when viewed in the second order.

26. A parallel beam of monochromatic line is allowed to be incident normally on a plane transmission grating having 5000 lines/cm, and the third order spectral line is found to be diffracted through 45°. Calculate the wavelength of light.

27. A ray of light in air is incident on a glass plate at the polarizing angle. It suffers a deviation of 26° on entering the glass. Calculate the refractive index of glass.

28. An optical fibre has an acceptance angle of 26.80° Calculate its numerical aperture.

29. Calculate the thickness of (a) a quarter waveplate, and (b) a half waveplate. Given $\mu_0 = 1.973$, $\mu_e = 2.656$ and wavelength is 590 nm.

30. A coil has an inductance of 0.1 H and a resistance of 12Ω. It is connected to a 220V, 50Hz mains, determine the reactance of the coil and impedance of the coil.

31. Show that $I rms = 0.707 I_0$, where $I rms$ is the root mean square value of alternating current.

(6 × 4 = 24 Marks)

SECTION – D

Answer any two; each question carries 15 marks

32. Describe the phenomenon of fraunhoffer diffraction at a single slit.

33. Explain para and diamagnetic substances on the basis of electron theory.

34. Explain the construction and working of Laurent's half shade polarimeter to measure specific rotation.

35. Derive an expression for the instantaneous current in a series LCR circuit when an ac is passed through it. Obtain the condition for resonance.

(2 × 15 = 30 Marks)