(Pages : 4)

P – 3853

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

(2018 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Each question carries **1** mark.

1. What is a coherent source how can they be realized?
2. What are Newtons rings?
3. What is Huygens principle?
4. Distinguish between Fresnel and Fraunhofer diffraction.
5. What is Polarization, what do you mean by piane-polarized light?
6. Explain Brewster's law.
7. A plane wave is characterized by $\vec{E} = \left(0.5\hat{x} + \hat{y}e^{j\frac{\pi}{2}} \right) e^{j\omega t - jkz}$ the wave exhibits what type of polarization?
8. Explain the term optical activity.
9. Explain the principle of optic fiber.
10. Explain the term magnetic susceptibility.

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

Answer any **eight** questions. Each question carries **2** marks.

11. What you mean by the term power factor? What is its importance?

12. What is interference? Distinguish between constructive and destructive interference.

13. Explain the formation of colors in thin films, with real life examples.

14. What is double refraction, what do you mean by negative crystals?

15. Distinguish between linear polarization and circular polarization.

16. What do you mean by LASER? What are the main properties of LASER beam?

17. Explain the term population inversion in laser.

18. What do you mean by total internal reflection? Explain about the light propagation in optical fibers.

19. Explain step-index fiber and graded index fibers. What is the advantage of GRIN?

20. Explain the Applications of Fiber optics.

21. Differentiate between the magnetic vectors $\vec{B}$, $\vec{H}$ *and* $\vec{M}$. What is the relation connecting these three magnetic vectors?

22. Discuss the current through the LCR series circuit and explain its resonance.

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions. Each question carries **4** marks.

23. Green light of wavelength 5100 Å 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.

24. Two coherent sources whose intensity ratio is 100:1 produce interference fringes. Deduce the ratio of maximum intensity to minimum intensity in fringe system.

25. Newtons rings are observed in reflected light from an air film formed between a plane surface and a spherical surface of radius of curvature 2 *m*. If diameter of m^{th} and $(m+8)^{th}$ rings are 4.2 mm and 7 mm respectively Find the wavelength of light.

26. Calculate the possible order of spectra with a plane transmission grating having 18000 lines per inch when light of wavelength 4500 Å is used.

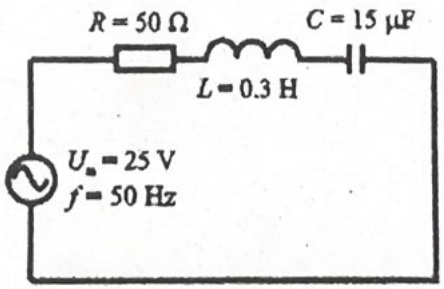
27. What is the radius of the first zone in a zone plate of focal length 40 cm for a light of wavelength 5000 Å.

28. Calculate the ratio of spontaneous emission to stimulated emission if λ of radiation is *600 nm* at *2500 K*. $h = 6.6 \times 10^{-34}$ *j*. S. $K_B = 1.38 \times 10^{-23}$ SI units. Whether laser production is possible.

29. Two layers of glass are placed on top of each other. The light ray travels from the glass of refractive index 1.5 to the glass of refractive index 1.45. Find the critical angle for total internal reflection.

30. The magnetic susceptibility of silicon is -0.4×10^{-5}. Calculate the flux density and magnetic moment per unit volume when magnetic field of intensity 5×10^5 *A/m* is applied.

31. An AC circuit is composed of a serial connection of a resistor with resistance 50Ω, a coil with inductance 0.3*H* and a capacitor with capacitance 15 μF. The circuit is connected to an AC voltage source with amplitude *25V* and frequency *50Hz*. Determine the amplitude of electric current in the circuit and a phase difference between the voltage and the current.



(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. Each carries **15** marks.

32. Explain Young's double slit experiment.

33. What is the principle behind a laser, Explain the Ruby laser.

34. What is Magnetism? Explain different types of magnetic materials with examples.

35. What do you mean by electromotive force, briefly explain the emf induced in coil rotating in uniform magnetic field.

(2 × 15 = 30 Marks)
