



QP CODE: 24021046



24021046

Reg No :

Name :

B.Sc DEGREE (CBCS) REGULAR EXAMINATIONS, APRIL 2024

Fourth Semester

Complementary Course - PH4CMT01 - PHYSICS-OPTICS & ELECTRICITY

(Common for B.Sc Mathematics Model I, B.Sc Statistics Model I)

2017 Admission Onwards

522ABD75

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. State the conditions on which two waves can produce interference pattern.
2. Thick films illuminated by white light do not exhibit any color in white light. Explain why.
3. What is half period Element?
4. What is fraunhofer diffraction?
5. In nicol prism though double refraction take place we could get a single beam of plane polarised light. How?
6. How can you show that both the ordinary and extraordinary rays are plane polarized with their planes of vibration mutually perpendicular ?
7. What is optical activity?
8. What is population inversion?
9. What are the important characteristics of laser beam?
10. Write down the relation between dielectric constant and temperature for ferroelectric crystals.
11. What is the energy supplied when a current of i units flows through an inductor of self inductance L units?
12. Show that L/R and RC both have the units of time.

(10×1=10)

Part B

*Answer any **six** questions.*

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





13. A two slit young's experiment is done with monochromatic light of wavelength 600 nm. Slits are 2 mm apart and fringes are observed on a screen placed 10 cm away from the slits. If a transparent plate of thickness 0.5 mm is placed in front of one of the slit interference pattern shifts by 5mm. Find the refractive index of the transparent plate.
14. Two straight and narrow parallel slits one millimeter apart are illuminated by a monochromatic light. Fringes formed on the screen held at distance of 100cm are 0.5 mm apart. What is the wavelength of the light used?
15. Newton's rings are observed in reflected light of $\lambda = 5.9 \times 10^{-5}$ cm. The diameter of 10th dark ring is 0.5 cm. Find the radius of curvature of the lens and thickness of the air film.
16. Obtain an expression for the dispersive power of a grating.
17. Describe Polarization by scattering.
18. Write a note on (a) two different pump sources and (b) active medium in laser.
19. A dielectric material having dielectric constant 3 is placed in an electric field of intensity 105 v/m. Find the polarisation in the dielectric material.
20. A 15 micro Farad capacitor is connected to a 220 V, 50 Hz source. Find the capacitive reactance and the current(rms and peak) in the circuit. If the frequency is doubled, what happens to the capacitive reactance and the current?
21. With necessary mathematical equations, Explain the dissipation of power when an ac is applied to an LCR circuit.

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. Derive an expression for conditions of brightness and darkness on a plane thin film.
23. Give the theory of a plane transmission grating and describe how it is used to determine the wavelength of light using grating at normal incidence.
24. With the help of geometry of optical fibre explain how light is propagated through and optical fibre. Derive the equation of numerical aperture of an optical fibre.
25. Discuss the current and voltage variations through a series LCR circuit when an AC is applied to it. Discuss the conditions for resonance in that circuit. Also discuss the band width and sharpness of the circuit.

(2×10=20)

