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Reg. No. : .....

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Third Semester B.Sc. Degree Examination, January 2019
First Degree Programme under CBCSS
Complementary Course for Chemistry and Polymer Chemistry
PY 1331.2 : OPTICS, MAGNETISM AND ELECTRICITY
(2013 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

PART – A

Answer **all** questions, **each** carries **1** mark.

1. What is meant by interference ?
2. Can the light from two separate sources be coherent ?
3. What is dispersive power of a grating ?
4. What is Fraunhofer diffraction ?
5. What is meant by polarisation of light ?
6. Explain optical axis.
7. What is optical pumping in Laser ?
8. What is an optical fibre ?
9. What are paramagnetic materials ? Give one example.
10. Why the core of a transformer made of laminated sheets ?

(10×1=10 Marks)

PART – B

Answer **any 8** questions. **Each** should **not** exceed **one** small paragraph. **Each** question carries **2** marks.

11. Why a soap bubble in bright sunlight is beautiful coloured ?

12. How Newton's rings are formed ?

13. Distinguish between grating and prism spectra.

14. Distinguish between interference bands and diffraction bands.

15. Explain the double refraction in calcite crystal.

16. Explain how circularly polarized light can be produced.

17. List out the applications of Lasers.

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

19. What is a choke coil ? Give some of its uses.

20. What are the advantages of ac over dc ?

21. Why diamagnetism is independent of temperature ?

22. Explain the term relative permeability. **(8×2=16 Marks)**

PART – C

Answer **any 6** questions, **each** carries **4** marks.

23. In a Newton's rings system, the radius of curvature of the lower face of lens is 1 m. Calculate the diameter of the 10^{th} bright fringe, if the wavelength of light used is 59×10^{-8} m.

24. A parallel beam of sodium light ($\lambda = 589 \times10^{-9}$ m) is incident on a thin glass plate (n = 1) such that the angle of refraction into the plate is 60°. Calculate the thickness of the plate which will make it appear dark by reflection.

25. A plane transmission grating has 6000 lines per centimeter. Find the angular separation of 504 nm and 501.6 nm of helium in the second order spectrum.

26. In Fraunhoffer diffraction due to a narrow slit a screen is placed 2 m away from the lens to obtain the pattern. If the slit width is 0.2 mm and the first minima lie 5 mm on either side of the central maximum, find the wavelength of the light.

27. If μ_o = 1.658 and μ_E = 1.486 for calcite crystal plate of thickness 8×10^{-7} m when sodium light is used. Calculate the wavelength of light.

28. Calculate the specific rotation for sugar solution using the following data.
Length of the tube = 20 cm
Volume of the tube = 120 cm^3
Quantity of sugar dissolved = 6 g
Angle of rotation of the analyser for restoring equal intensity = 6.6°.

29. An ac voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in which L = 25.48 Mh, C = 796 μF and R = 3 Ω. Find the Impedance of the circuit.

30. A bar magnet place with its axis at 30° with a uniform magnetic field of 0.25 T experiences a torque of magnitude equal to 4.5×10^{-2} J. What is the magnitude of magnetic moment of the magnet ?

31. A solenoid of 2000 turns and area of cross section 1.6×10^{-4} m^2 carrying a current of 4 A is suspended through its centre allowing it to turn in a horizontal plane. What is the magnetic moment associated with the solenoid ? **(6×4=24 Marks)**

PART – D

Answer **any two** questions, **each** question carries **15** marks.

32. Discuss the analytical theory of Young's double slit experiment. Derive an expression for bandwidth.

33. Explain the theory of diffraction at a straight edge and draw the intensity distribution curve.

34. How can plane polarized light be produced by reflection ? State Brewster's law. Show that reflected and refracted rays are at right angles during polarization by reflection.

35. On the basis of modern electron theory, briefly explain diamagnetism and paramagnetism. **(2×15=30 Marks)**