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Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree Examination, October 2019

First Degree Programme under CBCSS

Complementary Course for Chemistry

PY 1331.2 : OPTICS, MAGNETISM AND ELECTRICITY

(2018 Admission)

Time : 3 Hours

Max. Marks : 80

PART – A

Answer **all** questions. Answer should not exceed two sentences. Each question carry **1** mark :

1. What property of light cause the colours of thin film?
2. Define the phenomenon of diffraction of waves.
3. Distinguish between step index fiber and graded index fiber.
4. What is meant by polarization of light?
5. Define magnetic permeability.
6. Distinguish between rms and mean value of ac.
7. Write any property of ferromagnetic material.
8. Give any two applications of Laser.
9. What are the circuit elements of an electrical resonance circuits?
10. Distinguish between ordinary ray and extra ordinary ray.

(10 × 1 = 10 Marks)

P.T.O.

PART – B

Answer **any eight** questions not exceeding a paragraph. Each question carries **2** marks.

11. What property of light is responsible for the production of newton's rings? How they are produced in the experimental setup?

12. Write the expression for the area of the half period zone and justify that all the half period zones have equal area.

13. What do you understand by population inversion?

14. In double slit diffraction patterns all fringes are of equal width. Examine this statement by writing the expression for fringe width.

15. Explain the constructional details of optical fiber. What is critical angle?

16. What is resonance? Obtain the condition for resonance in series LC circuit.

17. What is Curie temperature?

18. What is optical activity? Mention any application of it.

19. Distinguish between diamagnetic and paramagnetic material.

20. What is magnetic susceptibility? How it is related to magnetic permeability?

21. How do you produce circularly polarized light?

22. What are birefringent materials? Give one example.

($8 \times 2 = 16$ Marks)

PART – C

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

23. Calculate the fringe width of the interference pattern formed on a screen arranged at a distance of 10 cm from a double slit arrangement of slit width is 10^{-4}m, if illuminated by light of wavelength 500 nm.

24. A transformer has 500 turns in the primary winding and 20 turns in the secondary winding. If the primary voltage is 220. Find the secondary voltage.

25. An air wedge is made by placing a thin foil between two glass plates at a distance of 5 cm from their point of contact. When light of 600 nm is used to illuminate the air wedge, fringes are formed 1 mm apart. What is the thickness of the foil?

26. A beam of un-polarised light of intensity 50 candela is passed through a polaroid A. then through another polaroid B which is oriented so that its principal plane makes an angle 45 degree with respect to A. What shall be the intensity of the emergent light?

27. Calculate the thickness of a quarter wave plate made from a quartz crystal for which the refractive index of ordinary light is 1.544 and that of extra ordinary light is 1.553 for a wavelength of 6000 A°.

28. 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 $5 \times 10^{5} A/m$ is applied.

29. An ac circuit consists of a resistance 1000 ohms and a capacitance 0.1 microfarad Calculate power factor for a frequency of 10 kHz.

30. What is the self-inductance of the coil which produce 5 V when current in it changes from 3A to 2A in 1 ms.?

31. An ac circuit contain 4Ω resistance in series with an inductive load of reactance 3Ω Calculate the impedance of the circuit.

(6 × 4 = 24 Marks)

PART – D

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

32. Explain theory of interference. Describe Young's double slit experiment and obtain expression for bandwidth.

33. Write a note on the electron theory of magnetism and explain ferromagnetism.

34. Describe Fraunhoffer diffraction at a single slit. Obtain central maxima, secondary maxima and secondary minima.

35. Explain the principle of laser. Describe the application of these principle in the construction of Ruby laser.

(2 × 15 = 30 Marks)
