(Pages : 3) D – 3085

Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree Examination, December 2017
First Degree Programme under CBCSS
PY 1331.2 : OPTICS, MAGNETISM AND ELECTRICITY
Complementary for Chemistry and Polymer Chemistry
(2013 Admission Onwards)

Time : 3 Hours Max. Marks : 80

PART – A

Answer **all** the questions. Answer should **not** exceed **two** sentences. **Each** question carries **1** mark.

1. State the essential conditions for observing the phenomenon of interference of light.
2. Define diffraction.
3. What is Fresnel diffraction ?
4. What is quarter wave plate ?
5. Define optic axis.
6. What is step index fibre ?
7. What is stimulated absorption ?
8. Define hysteresis.
9. Define form factor of an AC.
10. What is step down transformers ?

All Saints' College Trivandrum

PART – B

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

11. What will happen to Newton's rings if monochromatic light is replaced by white light ?
12. Explain why an excessively thin film appears black and excessively thick film shows no colour in reflected light.

13. What is meant by double refraction ? Explain.

14. Distinguish between positive and negative uniaxial crystal.

15. How can elliptically polarised light be produced and analysed ?

16. The Ruby laser gives a pulsed output. Why ?

17. What are the conditions that must be satisfied to achieve laser action ?

18. What are the applications of optical fibres ?

19. What are the properties of ferromagnetic materials ?

20. Explain diamagnetic substances on the basis of electron theory.

21. Explain the theory of choke coil.

22. Why are choke type fan regulators superior ?

PART – C

Answer **any 6** questions. **Each** question carries **4** marks.

23. Two slits 0.3 mm apart are illuminated by light of wavelength 4500 Å. The screen is placed at 1 m distance from the slits. Find the separation between the second bright fringe on both sides of the central maximum.

24. In a Newton's ring's experiment the diameter of the 20^{th} ring and the 10^{th} ring were found to be 5.82 mm and 3.36 mm respectively. If the radius of the plano-convex lens is 1 m, calculate the wavelength of light used.

25. The number of lines per millimetre of a grating is 600, how many orders of spectra are maximum possible for light of wavelength 5.89×10^{-7} meter ?

26. What is the highest order spectrum, which may be seen with monochromatic light of wavelength 6000 Å by means of a diffraction grating with 5000 lines/cm ?

27. Find the thickness of a quarter wave plate of quartz for sodium light of wavelength 589.3 nm. Given $n_O = 1.5442$ and $n_E = 1.5533$.

All Saints' College Trivandrum

28. A rod of magnetic material, 0.5 m in length has a coil of 200 turns wound over it uniformly. If a current of 2 ampere is sent through it, calculate (i) magnetising field H and (ii) the magnetic induction B of the material. Given $\chi_m = 6 \times 10^{-3}$.

29. Establish the relation $\mu = \mu_0 + \chi$.

30. A coil has an inductance of 0.1 H and a resistance of 12 ohm. It is connected to a 220 V; 50 Hz mains. Determine the (i) reactance of the coil and (ii) impedance of the coil.

31. Describe the construction and working of transformer.

PART – D

Answer **any 2** questions. **Each** question carries **15** marks.

32. Explain how Newton's rings are formed. With necessary theory give the experiment to determine the wavelength of the monochromatic light by Newton's ring arrangement.

33. Explain the principle, construction and working of Ruby laser.

34. Describe the construction, working and uses of nicol prism.

35. Give the theory of the series resonance (L, C, R in series) circuit. Obtain an expression for the resonance frequency and for the impedance at resonance.

All Saints' College Trivandrum