(Pages : 3) B – 3701

Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree Examination, December 2016
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. Define interference.
2. Define band width.
3. What is meant by Fraunhofer diffraction ?
4. Define stimulated emission.
5. What is a half wave plate ?
6. Define polarising angle.
7. What is graded index fiber ?
8. What do you understand by population inversion ?
9. Define magnetic permeability.
10. What is wattless current ?

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 a drop of water is introduced between the glass plate and lens ?

12. Why is interference pattern not detected, when the two coherent sources are far apart ?
13. Explain the formation of spectra by a grating.
14. Explain Brewster's law.
15. How can circularly polarised light be produced and analysed ?
16. Explain path difference and phase difference.
17. What is meant by optical pumping ?
18. Differentiate between laser beam and ordinary light beam.
19. Why optical fibre cable is preferred to metallic cables in communication systems ?
20. How are the value of relative permeability for dia, para and ferro magnetic materials different ?
21. Explain antiferromagnetism.
22. Explain rms value and peak value of an AC.

PART – C

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

23. Find the radius of curvature of the lens surface in contact with the glass plate with produces Newton's rings. With a light of wavelength 5890 Å, the diameter of the third dark ring is 3.2 mm.
24. Obtain the expression for resolving power of a plane diffraction grating.
25. The faces of a quartz plate are parallel to the optic axis of the crystal. Calculate the minimum thickness of such a plate that would introduce a path difference of $\lambda/2$ between the ordinary and extraordinary rays. Given $\lambda = 5890$ Å, $n_o = 1.544$ and $n_E = 1.553$.
26. Explain the working of a nicol prism.
27. Derive the relation between the magnetic vectors M,B and H.

All Saints' College Trivandrum

28. An iron rod 0.2 m long, 10 mm in diameter and of relative permeability 1000 is placed inside a long solenoid wound with 300 turns/meter. If a current of 0.5 ampere is passed through the rod, find the magnetisation of the rod.

29. Find the expression for the power in AC circuit containing resistance, inductance and capacitance.

30. An alternating voltage of 10 volt at 100 Hz is applied to a choke of inductance 5 henry of resistance 200 ohm. Find the power factor of the coil.

31. i) Describe the various losses occurring in a transformer

    ii) Explain the uses of transformer.

PART – D

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

32. Explain the formation of Newton's rings and derive the expression for the radius of the n^{th} dark ring ?

33. Discuss the theory of plane diffraction grating and describe an experiment to determine the wavelength of light using a plane transmission grating ?

34. State the properties of ferromagnetic materials. Explain with the help of the electron theory and also explain Curie temperature.

35. Describe the principle, construction and working of a choke coil.

Al Sana' College Trivandrum