22/02/23
AN

BISHOP MOORE COLLEGE LIBRARY
MAVELIKARA
PIN: 690110
KERALA

(Pages : 4) **P – 3820**

Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree Examination, January 2023

First Degree Programme Under CBCSS

Physics

Complementary Course for Mathematics

PY 1331.1 – OPTICS, MAGNETISM AND ELECTRICITY

(2018 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions in one or two sentences. **Each** question carries **1** mark.

1. Give the relation connecting optical path length and geometrical path length.
2. What is meant by a zero order fringe in Young's double slit experiment?
3. What is meant by grating element?
4. Do the centre spot of the Fresnel diffraction due a circular aperture be bright always? Explain.
5. How does electrical isolation be achieved in optical fibers?
6. What are the essential parts of a laser?
7. Which are the components of magnetic dipole moment of an atom?
8. What is the purpose of a choke coil in a circuit?

P.T.O.

9. The unit of magnetic induction is _____ and the unit of magnetic flux is _____

10. Draw the amplitude and phase relation for voltage and current in an a.c. circuit containing inductance only.

(10 × 1 = 10 Marks)

SECTION – B

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

11. Compare constructive and destructive interference.

12. How do circular fringes be formed in Newton's ring experiment?

13. How can you generate Haidinger fringes?

14. What do you observe for diffraction at a straight edge using white light? Give the reason.

15. How does overlapping of spectral lines occur in diffraction gratings? How do you avoid this?

16. Distinguish between Fresnel and Fraunhofer diffractions.

17. Compare multi-mode and single mode fibers.

18. What is the significance of metastable state in lasers?

19. Plot the variations of susceptibility with respect to temperature for paramagnetic, ferromagnetic and antiferromagnetic materials.

20. Define true power, apparent power and power factor.

21. Plot resonance curves for at least R values and explain it.

22. Write notes on ferromagnetic domains.

(8 × 2 = 16 Marks)

SECTION – C

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

23. In Newton's ring experiment, a lens of 100 cm radius of curvature is used. The diameter of the biggest ring formed is 2 cm. How many rings will be formed if light of wavelength 500 nm is used? If the system is immersed in water (n = 1.33), will there be any change in the number of rings formed.

24. Find the refractive index of the soap film of thickness 0.57 μm, which gives constructive interference of order 2 for a light of 600 nm incident normally on it.

25. A narrow slit is illuminated with 600 nm light and casts a shadow of a wire of diameter 2 mm on a screen kept 3 m away from the wire. The distance between the slit and the wire is 1 m. Calculate the distance apart of the bands inside the shadow and the total number of bands which can be seen.

26. Calculate the angle between the central image of a lamp filament and its first diffracted image produced by a fabric with 160 threads per cm. The wavelength of the monochromatic light used is 600 nm.

27. How much will be the change in the ratio of population for a monochromatic light source operated at ice point and steam point?

28. Determine the form factor by finding out the rms and mean value of current in an a.c circuit.

29. Determine the impedance and lead in phase in a CR circuit connected to 50 Hz and 220 V a.c. with the following parameters. C = 50 μF, R = 50 Ω

30. A paramagnetic material has a magnetic field intensity of 2×10^4A/m. If the susceptibility of the material at room temperature is 2×10^3, calculate the magnetisation, magnetic field and relative permeability.

31. An optical fibre with core refractive index 1.50 is constructed without any cladding. What will be the critical angle when it is placed in air? When it is put in water of refractive index 1.33, will there be any change in critical angle?

(6 × 4 = 24 Marks)

SECTION – D

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

32. Discuss the theory of interference. Give the detailed analysis of intensity distribution. Compare superposition of coherent as well as incoherent waves.

33. Describe Fresnel's explanation to diffraction. Show that the amplitude due a complete wavefront at any point is half of the amplitude due to the first half period zone at that point. Hence explain the rectilinear propagation of light.

34. Explain the construction, working, losses and uses of transformer.

35. Analyse the features of various types of magnetisms.

(2 × 15 = 30 Marks)
