Reg. No. : ....
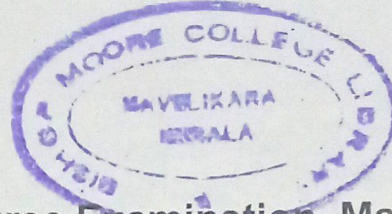
Name : ....

Third Semester B.Sc. Degree Examination, March 2022

First Degree Programme under CBCSS

Physics

Complementary Course for Chemistry and Polymer Chemistry

PY 1331.2 : OPTICS, MAGNETISM AND ELECTRICITY

(2013-2017 Admission)

Time : 3 Hours　　　　　　　　　　　　　　　　　　　　　Max. Marks : 80

SECTION – A

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

1. What are coherent sources?

2. Write the conditions for constructive interference.

3. What is diffraction?

4. Define the resolving power of a grating.

5. What is population inversion?

6. What are uniaxial and biaxial crystals?

7. Define ferromagnetism.

8. What is hysteresis?

9. Define impedance of a circuit.

10. Define power factor in an ac circuit.

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight**, each question carries **2** marks.

11. Two independent sources could not produce interference. Why?

12. Distinguish between Fresnel and Fraunhoffer diffractions.

13. Explain how colours are appearing in thin oil films when illuminated with light?

14. Draw the diagram of polarimeter.

15. Explain the Fraunhofer diffraction pattern due to a single slit.

16. Distinguish between parallel and series LCR resonant circuits?

17. Explain the principle and working of a choke coil.

18. Give four applications of LASER.

19. Explain Brewster's law of polarisation.

20. Distinguish between positive and negative crystals.

21. What are Fresnels half period zones. Why are they called so?

22. How can paramagnetic and diamagnetic material rods be distinguished in a magnetic field?

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six**, each question carries **4** marks.

23. A soap film is illuminated by white light incident at an angle of 30°. The reflected light is examined by a spectroscope in which dark band corresponding to The wavelength 6×10^{-7} m is found. Calculate the smallest thickness of the film. $\mu = 1.33$.

24. If the grating element is 2×10^{-6} m. How many order of spectrum are possible for a Light of wavelength 650 nm.

2

25. Two lines in a second order spectrum of a plane transmission grating are resolved. If the lines are due to lights of wavelengths 5890A° and 5896 A°, find the number of lines in the grating.

26. Calculate the thickness of ice capable of inverting a circularly polarised light. $\mu_0 = 1.309$, $\mu_E = 1.313$, wavelength of light 590 nm.

27. When sunlight is incident on water surface at a glancing angle of 37°, the reflected light is found to be completely plane polarised. Determine the refractive index of water and angle of refraction.

28. The energy level difference between two laser level is 0.21 eV. Determine the wavelength of radiation.

29. An optic fibre has a core of refractive index 1.52 and cladding of refractive index 1.42. Calculate the numerical aperture and acceptance angle.

30. A circuit consists of a non inductive resistance of 52 Ω, an inductance of 0.3 H and a capacitance of 40 μF in series and is supplied with 200 volts at 50Hz. Find the impedance and the current in the circuit.

31. Show that the current leads the applied emf by $\pi/2$ when ac is passed in a circuit containing a capacitance.

<div align="right">(6 × 4 = 24 Marks)</div>

SECTION – D

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

32. Explain the formation of Newton's rings. How can these be used to determine the wavelength of monochromatic light.

33. Give the theory of plane diffraction grating and how it is used to measure the wavelength of given source of light.

34. Explain with theory the production of circularly and elliptically polarised light waves.

35. Describe the principle, construction and working of a ruby laser.

<div align="right">(2 × 15 = 30 Marks)</div>

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