Second Year B.Sc., Degree Examination

August/Semptember 2010

DIRECTORATE OF CORRESPONDENCE COURSE

PHYSICS *(Freshers)*

Paper - II: SOUND, OPTICS, ELECTRICITY AND ELECTROMAGNETISM

Time: 3 hrs] [Max.Marks: 85

Instruction:

1. *Answer all questions in Section – A.*
2. *Answer any* **FIVE** *questions from Section – B, any* **SEVEN** *questions from Section – C and any* **TWO** *questions from Section – D.*
3. *Draw neat labeled diagrams wherever necessary.*
4. *Take the necessary data from the tables.*
5. *Symbols used have their usual meaning.*

SECTION – A

I. Answer ALL the questions: 8 X 1 = 8 Marks

1. What is resovling power of an optical instrument?

2. Write the relation between wave velocity and group velocity.

3. Give the expression for the vector differential operator $\vec{\nabla}$.

4. Can Maxwell's e.m.w. equations explain dispersion of light?

5. What is achromatism?

6. The centre of the ring system in Newton's rings experiment is dark why?

7. What is the value of maximum theoretical efficiency of full wave rectifier?

8. State Faraday's effect of polarization of light.

SECTION – B

II. Answer any FIVE questions: 5 X 3 = 15 Marks

9. Distinguish between interference & diffraction.

10. What is low pass filter? Explain the role of capacitor in law pass RC filter.

11. What are Lissajous figures? Write the shape of Lissajous figures when two S.H.Ms of same period overlap with a phase of (a) $\pi/2$ (b) π

12. Give the difference between prism and grating spectra.

13. Write a note on poynting vector.

14. What are free, damped and forced vibrations?

15. Explain the method of measuring unknown frequency using CRO.

SECTION – C

III. Answer any SEVEN questions: 7 X 6 = 42 Marks

16. Give the theory of B.G.

17. Giver the theory of damped simple harmonic Oscillation.

18. Explain the construction and working of full wave semiconductor diode rectifier and also obtain the expressions for efficiency and ripple factor.

19. Derive an expression for the torque acting on a current loop kept in a magnetic field and hence arrive at the equivalence between the current loop and magnetic dipole.

20. How would you produce and detect circularly and elliptically polarized light?

21. Derive an expression for the velocity of longitudinal waves set up in a rod.

22. Give the theory of Zone Plate.

23. Describe Fresnel's biprism method for the determination of wavelength of light.

24. Explain the construction and working of Huygen's eye piece.

SECTION – D

IV. Answer any TWO questions: 2 X 10 = 20 Marks

25. a) Obtain the expression for intensily of a progressive wave in terms of amplitude.

6 Marks

  b) A tuning fork A produces 4 beats per second with a tuning fork B of frequency 256. A is filed and the beats occur at shorter intervals. What was its original frequency.

4 Marks

26. a) Explain the construction and working of Michelson interferometer and also discuss the conditions for obtaining the types of fringes.   **7 Marks**

  b) Calculate the rotation of the plane of polarisation of light in degrees produced by a plate of thickness 0.5 mm. Given $\mu_L = 1.5392$, $\mu_R = 1.53914$, $\lambda = 7620$ Å°. **3 Marks**.

27. a) Using the solutions for plane e.m. wave equations, show that e.m waves are
     transverse in nature.   6 Marks
     b) If $\Phi (x, y) = x^2 - 2xy + y^2$, find grad Φ at (2, 3).   4 Marks

28. a) Obtain the expression for quality factor in terms of band width and resonant frequency
     of a.c.   7 Marks
     b) An alternating voltage of 110 volts and 50 cycles is applied to a circuit which contains
     an inductance of 0.02 henry and resistance of 10 ohm in series. Determine the current.
                                                             3 Marks

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