

Second Year B.Sc., Degree Examination

Directorate of correspondence course

July / August 2011

PHYSICS

Paper II : Sound, Optics, Electricity and Electromagnetism

Time: 3 hrs.]

[Max.Marks: 75/85

Instructions to candidates:-

1. Students who have attended 25 Marks IA Scheme will have to answer for total of 75 Marks.
2. Students who have attended 15 Marks IA Scheme will have to answer for total of 85 Marks.
3. Section E is compulsory for 85 marks scheme only.

SECTION - A

I. Answer All questions.

10 x 1 = 10 Marks

1. What are beats?
2. Mention one characteristic of simple harmonic motion.
3. State principle of super position of waves.
4. What is Fresnel diffraction?
5. Write the mathematical formula for the resolving power of plane diffraction grating.
6. Why Newton's rings are circular?
7. On what principle Ballistic galvanometer works?
8. What is the efficiency of a full wave rectifier?
9. Define impedance of an A.C. circuit.
10. State Ampere's circuital law.

Contd....2

SECTION – B**II. Answer any FIVE questions.**

5 x 3 = 15 Marks

11. Explain the uses of beats.
12. What are the differences between grating spectra and prism spectra.
13. Explain longitudinal chromatic aberration.
14. Explain the principle of working of quarter wave plate.
15. Derive an expression for the R.M.S value of an alternating current and emf.
16. Write the expression of cut off frequency of an R-C filter circuit. If R is 2K –ohm and C is 0.1 microfarad. Calculate the cut off frequency.
17. If “B” is a magnetic induction, explain why $\text{Div B} = 0$

SECTION – C**III. Answer any FIVE questions.**

5 x 6 = 30 Marks

18. Give the theory of interference of light.
19. Give the theory of Lissafous figures.
20. Explain the construction and working of Ramsdon’s eye piece.
21. Explain the Huygen’s theory of double refraction.
22. Derive an expression for the impedance of an LR circuit fed with A.C using j – notation and write vector diagram.
23. Explain the theory of low pass and high pass filters.
24. Explain and show that the current loop is acting as a magnetic dipole.

SECTION – D**IV. Answer any TWO questions.**

2 x 10 = 20 Marks

25. (a) Give the theory of diffraction grating for an oblique incidence.
- (b) Calculate the angle of deviation of a green coloured light of wave length 546.1nm, obtained from a first order diffraction using grating of constant 1.7×10^{-6} m. (7 + 3 Marks)
26. (a) Give the theory of forced vibrations.
- (b) What is the tension required for a wire of length 0.39 metre vibrating with a fundamental frequency of 100 Hertz, if its linear density is $1.8 \times 10^{-3} \text{ kgm}^{-1}$? (7 + 3 Marks)

Contd....3

27. (a) Give the mathematical analysis of full wave rectifier.
(b) Calculate the value of inductance required to construct a series LC R resonance circuit of frequency 360 Hertz, if R is 2 kilo ohm and C is 0.47 micro farad.
(7 + 3 Marks)
28. (a) Using Maxwell's field equations, derive electro magnetic wave equations.
(b) Calculate the velocity of light in free space using the values of μ_0 and ϵ_0 .
(7 + 3 Marks)

SECTION – E

V. Answer any one of the following questions.

1 x 10 = 10 Marks

(Compulsory question for 85 marks scheme only)

29. (a) Derive an expression for self inductance of a coil using Anderson's method using \hat{j} operator.
(b) A straight solenoid of length 4m is wound uniformly on a glass tube of diameter 0.02m. If there are 1000 turns, Calculate the strength of the field at the centre of the Solenoid when a current of one ampere flows through of.
(7 + 3 Marks)
30. (a) Write a note on Gradient, divergence and curl of a vector with examples.
(b) State the theorems of Gauss and Stoke.
(7 + 3 Marks)

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