

**Second Year B.Sc., Degree Examination August / September 2009**  
**Directorate of Correspondence Course**  
**Physics**  
**Paper - II (Freshers Scheme)**  
**Sound, Optics, Electricity and Electromagnetism**

Time : 3 Hours

Max. Marks : 80

**SECTION - A****I. Answer ALL the questions.****9x1=9 marks**

1. What are Lissajous figures?
2. What are Forced Vibrations?
3. What are Coherent sources?
4. What is a diffraction grating?
5. What is chromatic aberration?
6. What is Optical activity?
7. Define rms value of alternating current?
8. What is a Rectifier?
9. State Ampere's Law.

**SECTION - B****II. Answer any FIVE questions.****3x5=15 marks**

10. Derive differential equation of a one dimensional wave.
11. Write the Huygens' postulates of wave theory.
12. Distinguish between Fresnel's and Fraunhofer diffraction.
13. Compare Huygens' & Ramsden's eye pieces.
14. What is high pass filter ? Explain with graph.
15. Explain briefly with a neat diagram the de Sauty's bridge method of comparing the capacitances of two capacitors.
16. Write the characteristics of plane electromagnetic waves.

**SECTION - C****III. Answer any SIX questions.****6x6=36 marks**

17. Discuss Laplace's correction for Newton's formula for velocity of longitudinal waves in a gas. Discuss the effect of pressure, temperature and humidity on velocity of sound.

18. Set up the differential equation of damped simple harmonic oscillation and discuss the effect of damped vibrations.
19. Give the theory of Newton's rings and obtain expression for the diameters of bright and dark rings.
20. What is "Double refraction"? Give Huygens' theory of double refraction.
21. Obtain an expression for current in series LCR circuit fed with alternating voltage and find the condition for resonance.
22. Explain the construction and working of full wave bridge rectifier and what are its advantages.
23. What is the origin of electromagnetic waves? Describe Hetz's experiment to produce electromagnetic waves.
24. Define dispersive and resolving powers of grating. Derive expression for dispersive power & discuss its dependence.

#### SECTION - D

#### IV. Answer any TWO questions.

**10x2=20 marks**

25. a) Give the theory of interference by reflected light in thin films. **7 marks**  
 b) Calculate the thickness of a quarter wave plate for a light of wave length 550nm. If  $n_o = 1.540$  &  $n_e = 1.530$ . **3 marks**
26. a) Obtain expression for velocity of transverse waves in a stretched string. **6 marks**  
 b) A string of linear density  $1.5 \times 10^{-3}$  kg/m is stretched by a load of 2.5kg. Find the frequency of fundamental note and also second overtone. **4 marks**
27. a) Derive expression for charge flowing through a ballistic galvanometer. **6 marks**  
 b) A coil of self inductance 2mH and 15 ohm is connected in parallel to a capacitance of  $0.01 \mu\text{F}$ . Find the frequency at which the current from an a.c. source to this circuit is minimum. **4 marks**
28. a) Starting from Maxwell's equations, set up electromagnetic wave equations in free space. **6 marks**  
 b) If  $\phi = 2x^2 + 5x^2y - 3x^2z^3$  is a scalar function, calculate gradient  $\phi$  at a point (2, -1, 1) **4 marks**

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