

**Second Year B.Sc., Degree Examinations,  
December 2017**

*(Directorate of Distance Education)*

**PHYSICS**

**Paper- II: DSB – 210: Sound, Optics,  
Electricity and Electromagnetism**

*Time: 3 hrs]*

*[Max. Marks: 75/85*

*Instruction to the Candidates:*

- 1. Students who have attended 25 marks IA scheme will have to answer for total 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 the following in a word, a phrase or a sentence:** 10 x 1 = 10 Marks

1. State Stoke's theorem.
2. What are Lissajous figures?
3. What is displacement current?
4. What is average power dissipated in a pure inductor?
5. Give one example for forced vibration.
6. Write the output waveform of full wave rectifier.
7. How Q – factor related with bandwidth?
8. What is meant ballistic reduction factor?
9. Write any one application of CRO.
10. What is the significance of Poynting's vector?

**SECTION – B**

**II. Answer any FIVE of the following questions:** 5 x 3 = 15 Marks

11. When sound travels from one medium to another which physical quantity associated with the wave remain constant. Why?
12. Explain how the pressure and temperature affect the velocity of sound.
13. Explain one experimental proof for the validity of Huygen's wave theory?
14. Define mean value of alternating current (AC). Explain why only half cycle of AC is considered to calculate the mean value of AC?

*Contd.....2*

15. Is it possible to have a purely magnetic wave propagate through empty space? Explain.
16. Design R – C high pass filter for a cut – off frequency of 1KHz using a capacitor of  $0.2 \mu F$  .
17. State and explain Ampere’s circuital law.

### SECTION – C

**III. Answer any FIVE of the following questions:** 5 x 6 = 30 Marks

18. Define Intensity of a progressive wave. Derive an expression of a progressive wave propagating through the medium.
19. Give the theory of quarter wave plate. What are positive and negative crystals?
20. What are coherent sources? Describe the Biprism experiment to find the wave length of the monochromatic source.
21. Describe with necessary theory, the construction and working of ballistic galvanometer.
22. Derive an expression for the current in a series LCR circuit fed with AC voltage from ‘j’ operator method.
23. Prove that electromagnetic waves are transverse in nature.
24. Describe the working of full wave rectifier. Derive the expression for average value of output current.

### SECTION – D

**IV. Answer any TWO of the following questions:** 2 x 10 = 20 Marks

25. a) What is a zone plate? Describe the construction and theory of zone plate.  
 b) A particle of mass 5g executes SHM making 25 oscillations in 11S. If its maximum speed is 0.6 m/s. Calculate the maximum acceleration. (7 + 3)
26. a) Distinguish between Huygen’s eye piece and Ramsden’s eye piece with the help of diagrams.  
 b) A 1.2KW lamp is radiating uniformly. Calculate the average and peak electric and magnetic fields of radiation at a distance of 2m from the lamp. (5 + 5)
27. a) Explain the production of circularly and elliptically polarized light.  
 b) Show that,  $div(\text{Curl } \vec{F}) = 0$  (7 + 3)

28. a) Derive the Maxwell's i)  $\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$  and ii)  $\vec{\nabla} \times \vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t}$  equations. What are their physical significance?
- b) A personal computer draws 2.7A from a 220V 50Hz line. For this computer, what is the i) average current? ii) The average of the square of the Current. (8 + 2)

**SECTION – E**

V. *Answer any ONE of the following questions:* 1 x 10 = 10 Marks  
(Compulsory question for 85 marks scheme only)

29. a) Give the theory of interference at an air wedge. Explain briefly how would you use it to determine the thickness of a thin wire.
- b) A coil of self inductance 1H and having 1000 turns carries a current of 5A. What is the energy stored in it. (8 + 2)
30. a) State and illustrate the Thevenin's theorem for DC Circuit.
- b) Explain line integral, Surface inertial in vector analysis. (6 + 4)

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