TDC (CBCS) Even Semester Exam., 2023

PHYSICS

(4th Semester)

Course No. : PHSDSC/GE-401T

(Waves and Optics)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

SECTION—A

Answer any *fifteen* questions from the following : 1×15=15

1. Define harmonic oscillation.

2. What do you mean by the frequency of a harmonic oscillation?

3. Define time period of a harmonic oscillation.

4. How are acceleration and displacement related in harmonic oscillation?

5. Define phase velocity in wave motion.

6. Is sound a longitudinal wave?

7. Define resonance in forced vibration.

8. What do you mean by intensity of sound?

9. Is light a transverse wave?

10. What is an electromagnetic wave?

11. What do you mean by wave front?

12. Define interference of light.

13. Can we use Michelson's interferometer for the determination of wavelength difference?

14. What is Fraunhofer diffraction?

15. Define diffraction of light.

16. Write the conditions to be fulfilled for observing Fresnel diffraction.

17. What do you mean by a transverse wave?

18. Define polarization of light.

19. Can Nicol prism produce plane polarized light?

20. What is unpolarized light?

SECTION—B

Answer any *five* questions from the following : 2×5=10

21. State the superposition principle for two collinear harmonic oscillations having equal frequencies.

22. What are beats in harmonic oscillations?

23. What are plane waves and spherical waves?

24. Define simple harmonic motion.

25. State the working principle of a Lloyd's mirror.

26. What are fringes of equal inclination?

27. What do you mean by a zone plate?

28. Distinguish between Fraunhofer diffraction and Fresnel diffraction.

29. Distinguish between plane polarized and unpolarized light.

30. Define quarter-wave plate and half-wave plate.

SECTION—C

Answer any *five* questions from the following : 5×5=25

31. Discuss the superposition principle of two collinear harmonic oscillations having different frequencies to show the formation of beats.

32. Discuss the formation of Lissajous figures in case of superposition of two perpendicular harmonic oscillations with equal frequencies.

33. Obtain an expression for the velocity of transverse waves on a string.

34. Define the time of reverberation and absorption coefficient. Obtain the Sabine's formula. 2+3=5

35. Discuss the interference in parallel thin films due to reflected light.

36. Describe the determination of an unknown wavelength by using Fresnel's biprism.

37. Discuss the use of Michelson's interferometer in the determination of an unknown wavelength.

38. Obtain the Fresnel diffraction pattern due to a straight edge.

39. Discuss the production and analysis of plane polarized light by using Nicol prism.

40. Obtain the expressions for thickness of quarter-wave plate and half-wave plate. 2½+2½=5

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