2024/TDC (CBCS)/EVEN/SEM/
PHSDSC/GEC-401T/093

TDC (CBCS) Even Semester Exam., 2024

PHYSICS

(4th Semester)

COURSE NO. : PHSDSC/GEC-401T

(Waves and Optics)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

UNIT—I

1. Answer any *three* of the following questions : 1×3=3

(a) What is meant by principle of superposition?

(b) Define Lissajous figure.

(c) What is simple harmonic motion?

(d) What is meant by phase of a harmonic oscillator?

2. Answer any *one* of the following questions : 2

(a) Explain the differences between interference and beat phenomenon.

(b) Mention the uses of Lissajous figure.

3. Answer any *one* of the following questions : 5

(a) Define the phenomenon of beat. What is beat frequency? Find the expression for beat frequency. 1+1+3=5

(b) Find the equation of motion of two perpendicular harmonic motions analytically. What will happen if the phase difference between the two is 90°? 3+2=5

UNIT—II

4. Answer any *three* of the following questions : 1×3=3

(a) What is meant by acoustics?

(b) What is reverberation?

(c) What are musical notes?

(d) Define one 'decibel'.

5. Answer any *one* of the following questions : 2

(a) Distinguish between travelling and standing waves.

(b) What are the conditions for good acoustics in an auditorium?

6. Answer any *one* of the following questions : 5

(a) Define phase velocity and group velocity. Find the relation between them for a dispersive medium. 1+1+3=5

(b) What is forced vibration? Find the equation of motion of a particle under forced vibration. 1+4=5

UNIT—III

7. Answer any *three* of the following questions : 1×3=3

(a) State two properties of EM waves.

(b) State Stokes' treatment of phase change on reflection.

(c) What are Fizeau fringes?

(d) What is wavefront?

8. Answer any *one* of the following questions : 2

(a) Discuss Huygens principle.

(b) What are division of amplitude and division of wave front class of interference?

9. Answer any *one* of the following questions : 5

(a) Discuss Young's double-slit experiment to find the wavelength of a monochromatic light.

(b) Discuss Newton's ring method of measuring the wavelength of an unknown monochromatic light.

UNIT—IV

10. Answer any *three* of the following questions : 1×3=3

(a) What is an interferometer?

(b) What is diffraction grating?

(c) Define Fresnel class of diffraction.

(d) What is half-period zone?

11. Answer any *one* of the following questions : 2

(a) Distinguish between interference and diffraction pattern of light.

(b) State the comparison between the zone plate and a convex lens.

12. Answer any *one* of the following questions : 5

(a) Describe Michelson's interferometer and give an idea about the formation of fringes.

(b) Describe Fraunhofer diffraction due to a single slit and deduce the position of maxima and minima.

UNIT—V

13. Answer any *three* of the following questions : 1×3=3

(a) Define plane of vibration of a polarized light.

(b) State whether sunlight is polarized or unpolarized.

(c) Define plane of polarization.

(d) What is double refraction?

14. Answer any *one* of the following questions : 2

(a) Explain the transverse nature of light.

(b) What is half-wave plate?

15. Answer any *one* of the following questions : 5

(a) Describe the construction of Nicol's prism. Explain how it can be used as a polariser and as an analyser.

(b) Explain the construction and working of Babinet's compensator.

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