Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER B.TECH DEGREE EXAMINATION (R,S), MAY 2024
CHEMICAL ENGINEERING
(2020 SCHEME)

Course Code : 20PHT110

Course Name: Engineering Physics B

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Define sharpness of resonance with the help of suitable graph.
2. Differentiate transverse and longitudinal waves with examples.
3. Explain the use of antireflection coating in optical devices?
4. Distinguish interference and diffraction.
5. Write any three characteristics of wavefunction.
6. How nanomaterials differs from their bulk counterpart.
7. Define threshold hearing intensity and threshold pain intensity.
8. Explain the pulse echo method for flaw detection.
9. Why metastable state is important in laser action?
10. Explain how a hologram is recorded?

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Derive the differential equation of a damped harmonic oscillator. Obtain the equations for the three different cases of oscillation and compare the nature of oscillations with displacement- time graph. (10)

    b) Define quality factor and derive the expression for quality factor of a damped harmonic oscillator and forced harmonic oscillator. (4)

OR

12. a) Derive the expression for fundamental frequency of a transverse wave in a stretched string. (10)

b) A wave of wavelength 0.5 m is travelling down a 200 m long wire whose total mass is 13 Kg. If the wire is under tension of 1200 N, what is the velocity and frequency of the wave. (4)

MODULE II

13. a) Considering interference in thin films, derive cosine law and deduce the conditions for constructive and destructive interference in thin films. (10)

b) The radius of curvature of the convex surface of a plano convex lens is 100 cm. The lens is placed convex side down on a plane glass plate, and illuminated from above with light of wavelength 650 nm. Find the diameter of the third dark ring in the interference pattern. (4)

OR

14. a) Define grating element. Derive grating equation for a plane transmission grating. (10)

b) What is the highest order spectrum which may be seen with light of wavelength 5890 Å by means of a diffraction grating having 6000 lines per cm. (4)

MODULE III

15. a) Define a matter wave. Derive the Schrodinger time dependent equation for matter waves having momentum p, de- Broglie wavelength λ and potential energy V. (10)

b) State Heisenberg's Uncertainty principle. Write the three Uncertainty relations. (4)

OR

16. a) Define quantum confinement. Classify and explain nanomaterials on the basis of quantum confinement. (10)

b) Explain the electrical properties of nanomaterials. (4)

MODULE IV

17. a) Explain any six factors affecting the acoustics of a building and give their remedies. (10)

b) The reverberation time of a hall of volume 10000 m^3 is 1.5 sec. calculate the total absorption in the hall. (4)

OR

18. a) Define magnetostriction effect. Explain how ultrasonic waves are generated by magnetostriction oscillator. (10)
    b) Write any 4 medical applications of ultrasonic waves. (4)

MODULE V

19. a) Mention the characteristics of laser light. Describe the working of a Ruby laser with essential diagrams. (10)
    b) Explain the working of an intensity modulated sensor with suitable diagram. (4)

OR

20. a) Explain how light is propagated through a step index fiber. Derive the expression for numerical aperture of a step index fiber. (10)
    b) Why fiber optic communication system is superior over the other conventional methods. (4)

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