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SAINTGITS COLLEGE OF ENGINEERING
KOTTAYAM, KERALA

(AN AUTONOMOUS COLLEGE AFFILIATED TO
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER B.TECH DEGREE EXAMINATION(S), JULY 2021

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. What is amplitude resonance in forced oscillation? Give one example
2. State laws of Transverse vibrations of a stretched string?
3. Describe briefly how optically plane surfaces can be tested.
4. Distinguish between Fresnel and Fraunhofer diffraction?
5. Explain quantum mechanical tunnelling.
6. Write a short note on Quantum wires.
7. Define reverberation time. What is its significance?
8. Write the principle of piezoelectric ultrasonic generator.
9. What are the three requisites for laser action to take place?
10. Give any three applications of optical fibre.

PART B

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

MODULE I

11. a) Write out the forces acting on a damped harmonic oscillator. Derive the differential equation of a damped harmonic oscillator and obtain the solution for under damped case. (10)

    b) In case of a forced harmonic oscillator, the amplitude of vibrations increases from 0.01 mm at very low frequencies to a value 4 mm at the frequency 100 Hz. Find the Quality factor (Q-factor) of the system and damping constant. (4)

OR

12. a) Distinguish between transverse and longitudinal waves. Derive an expression for velocity of transverse waves in a stretched uniform string. (10)

    b) A wave of wavelength 0.40 m is travelling down a 200 m long wire whose total mass is 10 kg. If the wire is under tension of 1000 N, what is the velocity and frequency of the wave? (4)

MODULE II

13. a) Describe the Newton's rings experimental arrangement and derive the expression to find the wavelength of a monochromatic light. (10)

b) Interference fringes are formed in a thin air wedge using sodium light of wavelength 5890 Å. When observed normally, 10 fringes are found in a distance of 1cm. Calculate the angle of the Wedge. (4)

OR

14. a) What is a plane transmission grating? Derive the grating equation. (10)

b) A diffraction grating has 4000 lines/cm. What is the angular separation between the 4358 Å and 5461 Å lines in the first and the second orders. (4)

MODULE III

15. a) What is the normalization condition of a wave function? Obtain Schrodinger's time dependent equation from a plane wave equation by using de-Broglie's formula and Einstein's relation for photon energy. (10)

b) Write Uncertainty principle and give its two applications (4)

OR

16. a) Write a note on quantum dots. Explain the electrical, optical and mechanical properties of nano materials. (10)

b) Write any four applications of nanotechnology. (4)

MODULE IV

17. a) Describe the factors affecting architectural acoustics and their remedies. (10)

b) The area of interior surface of an auditorium is 3340m^2. Its reverberation time is 1s. If average absorption coefficient of interior surface is 0.4 Sabine, find the volume of the auditorium. (4)

OR

18. a) What is magnetostriction effect? With the help of a neat diagram explain the working of a magnetostriction oscillator. (10)

b) Describe the method of non- destructive testing using ultrasonic waves (4)

MODULE V

19. a) What is the principle of working of laser? Describe the working of He-Ne laser with the help of energy level diagram. (10)

b) What is a hologram? What are the differences between holography and photography? (4)

OR

20. a) Define Numerical aperture of an optical fibre? Derive an expression for numerical aperture with the help of a neat ray diagram. (10)

b) Calculate the numerical aperture, acceptance angle of a fibre having core refractive index 1.48 and cladding refractive index 1.45. (4)

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