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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER B.TECH DEGREE EXAMINATION (Supplementary), December 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)

		CO
1.	With the help of a neat diagram explain sharpness of resonance.	[1]
2.	Distinguish between transverse and longitudinal waves.	[1]
3.	Why Newton's Rings are circular? What will happen if we use planoconvex lens of smaller radius of curvature?	[2]
4.	A parallel beam of light is made incident on a plane transmission diffraction grating of 15000 lines per inch and angle of second order diffraction is found to be 45°. Calculate the wavelength of light used. (1 inch = 2.5c.m)	[2]
5.	What is meant by Quantum Mechanical Tunneling?	[3]
6.	Why nanomaterial is different from ordinary solids?	[3]
7.	What are the characteristics of a musical sound?	[4]
8.	What is SONAR? Give the equation to find the depth of ocean.	[4]
9.	Why helium is used in a He-Ne LASER? Why is it necessary to use a narrow tube in a He-Ne laser?	[5]
10.	What is the basic principle of propagation of light through an optical fiber? What is meant by critical angle?	[5]

PART B

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

MODULE I

			CO	Marks
11.	a)	Set up a differential equation for a forced oscillation. Derive expression for amplitude and phase of a forced oscillation.	[1]	(10)
	b)	Find the natural frequency of a circuit containing inductance of 144 µH and a capacity of 0.0025 µF. To which wavelength its response will be maximum?	[1]	(4)

OR

			CO	Marks
12.	a)	By considering a uniformly stretched string derive an expression for the velocity of transverse vibration in a stretched string.	[1]	(10)
	b)	The equation of transverse vibration of a stretched string is given by $y = 3 \sin 3\pi(\frac{x}{30} - \frac{t}{0.02})$ where t is in seconds; 'y' and 'x' are in cm. Find (i) Amplitude (ii) Wavelength (iii) Frequency.	[1]	(4)

MODULE II

			CO	Marks
13.	a)	What is an air wedge? Derive the expression for bandwidth of interference fringes in an air wedge. Describe an experiment to determine the diameter of a thin wire using air wedge.	[2]	(10)
	b)	A parallel beam of light 6058 Å is incident on a glass plate of refractive index 1.5 such that the angle of refraction in the plate is 30˚. Calculate the smallest thickness of the plate which will appear dark by reflection.	[2]	(4)

OR

			CO	Marks
14.	a)	Explain the action of plane transmission grating. What is grating element? Deduce the grating equation in terms of grating element.	[2]	(10)
	b)	Define resolving power of an optical instrument. With the help of figure explain Rayleigh's Criterion for resolution. Write equation for resolving power of a plane transmission grating.	[2]	(4)

MODULE III

			CO	Marks
15.	a)	Derive time dependent Schrödinger equation for a moving particle and hence derive the time independent Schrödinger equation.	[3]	(10)
	b)	An electron is bound by a potential box of infinite height having width of 2.5 Å. Calculate the lowest three permissible energies (in eV) that the electron can have.	[3]	(4)

OR

			CO	Marks
16.	a)	Explain quantum confinement in nanomaterial. Compare quantum sheets, quantum wire, and quantum dot.	[3]	(10)
	b)	Write brief note on the electrical and optical properties of nanomaterial.	[3]	(4)

MODULE IV

			CO	Marks
17.	a)	Discuss the various factors affecting the acoustics of buildings and give their remedies.	[4]	(10)
	b)	What is meant by reverberation time? Calculate the total absorption in a classroom of volume 248 m³ and reverberation time 0.78 s.	[4]	(4)

OR

			CO	Marks
18.	a)	What is magnetostriction effect? With the help of a figure explain how this effect can be used for the production of ultrasonic waves?	[4]	(10)
	b)	What is piezoelectric effect? Calculate the fundamental frequency of a quartz crystal of 2 mm thickness. The density of the crystal is 2650 kg/m³ and Young's modulus is $7.9\times10^{10}\,N/m^2$.	[4]	(4)

MODULE V

			CO	Marks
19.	a)	Draw a neat diagram to represent the components of a ruby laser. Explain the construction, working and energy level diagram for Ruby laser.	[5]	(10)
	b)	What are the differences between an ordinary photograph and a hologram.	[5]	(4)

OR

			CO	Marks
20.	a)	Define Numerical Aperture of an optical fiber. Derive the expression for Numerical Aperture of a step index fiber? How is it related to acceptance angle of the fiber?	[5]	(10)
	b)	Briefly explain intensity modulated sensor.	[5]	(4)

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