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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER B.TECH DEGREE EXAMINATION (Special), AUGUST 2021

Course Code:	**20PHT100**
Course Name:	**Engineering Physics A**
Max. Marks:	**100**

Duration: 3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

		CO
1.	Derive differential equation for a forced harmonic oscillation.	[1]
2.	State three laws of vibration in a stretched string.	[1]
3.	Why Newton's Rings are circular? What will happen to the diameter if we insert a liquid between plano convex lens and plane glass plate?	[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.	[2]
5.	State Uncertainty Principle. Write three uncertainty relations.	[3]
6.	Write a short note on surface to volume ratio in nanomaterials.	[3]
7.	Derive the relation connecting magnetic susceptibility and relative permeability.	[4]
8.	State Gauss's divergence theorem and Stoke's theorem. Write corresponding equations.	[4]
9.	What are Cooper pairs? Explain how do they form?	[5]
10.	Distinguish between critical angle and acceptance angle of an optical fibre.	[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 damped oscillation and deduce its solution. Discuss three cases with graphs.	[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)	Derive one dimensional wave equation and obtain its solution.	[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)	Considering thin film interference obtain expressions for conditions of brightness and darkness in thin film.	[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)	Distinguish between Interference and Diffraction.	[2]	(4)

MODULE III

			CO	Marks
15.	a)	Using time independent Schrödinger wave equation develop an expression for energy eigen values and normalized wave function for a particle in one dimensional potential well.	[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 mechanical and electrical properties of nanomaterial.	[3]	(4)

MODULE IV

			CO	Marks
17.	a)	Distinguish between diamagnetic, paramagnetic and ferromagnetic materials.	[4]	(10)

	b)	Prove Ampere's Circuital law.	[4]	(4)

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OR

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			CO	Marks
18.	a)	Starting from Maxwell's equation prove that light is an electromagnetic wave.	[4]	(10)
	b)	Differentiate between conduction current and displacement current	[4]	(4)

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MODULE V

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			CO	Marks
19.	a)	What is superconductivity? Explain type I and type II superconductor with the help of graph.	[5]	(10)
	b)	Show that superconductors are perfect diamagnets.	[5]	(4)

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OR

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

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