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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

First Semester B.Tech Degree Regular and Supplementary Examination December 2023 (2019 Scheme)

Course Code: PHT 110
Course Name: ENGINEERING PHYSICS B
(2019 -Scheme)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks Marks

1		Define sharpness of resonance.	(3)
2		State the laws of transverse vibration of a stretched string.	(3)
3		Why interference fringes of newton's rings arrangement are circular in shape?	(3)
4		What do you mean by resolving power of a grating? What are the factors it depends on?	(3)
5		Prove the non-existence of electron in atomic nucleus by applying uncertainty principle.	(3)
6		What are the necessary conditions for a physically acceptable wave function?	(3)
7		Define sound intensity level. Give the values of threshold of hearing and threshold of pain.	(3)
8		What is the principle behind magnetostriction oscillator? Write an example.	(3)
9		Differentiate between Spontaneous emission and Stimulated emission.	(3)
10		Briefly explain what will happen if the refractive index of the cladding is greater than that of the core in an optic fibre.	(3)

PART B

Answer one full question from each module, each question carries 14 marks.

MODULE 1

11	(a)	Set up the differential equation for a forced harmonic oscillator and solve it.	(10)
	(b)	A transverse wave on a stretched string is described by $y(x,t)=2\sin(20t+0.021x+\pi/6)$ where x and y are in cm and t is in second. Obtain (1)Amplitude (2)Initial phase (3)speed (4)frequency	(4)
12	(a)	Derive the differential equation of a one dimensional wave and find its solution	(10)

(b) In a forced oscillator the amplitude increases **from 0.02mm** at low frequencies to a value **5mm** at frequency **100Hz**. Find relaxation time, damping constant and Q factor. (4)

MODULE 2

13 (a) Describe the experiment to find the refractive index of a liquid using Newtons rings arrangement (10)

(b) A wedge air film is enclosed between glass plate separated at one edge by a wire of 0.06×10^{-3} **m** diameter at a distance of **0.15m** from the edge. Calculate the fringe width. The wavelength of light used is 6×10^{-7} **m.** (4)

14 (a) Give the theory of plane transmission grating and explain intensity (10)

(b) distribution. (4)

Explain with neat diagram Rayleigh criterion of resolution.

MODULE 3

15 (a) Why do nanomaterials exhibit properties different from those of their classical counter parts? (5)

(b) Explain the optical, electrical and mechanical properties of nanomaterials. (9)

16 (a) Formulate the time dependent Schrodinger's equation starting from the plane wave equation and deduce the time independent Schrodinger equation. (10)

(b) Calculate the voltage that must be supplied to an electron microscope to produce an electron of wavelength **3 Å.** (4)

MODULE 4

17 (a) Explain how ultrasonic waves are used in SONAR and NDT? (10)

(b) Given that the velocity of ultrasonic waves in sea water is equal to **1440m/s.** Find the depth of a submerged submarine if an ultrasonic pulses reflected from the submarine is received **0.52 s** after sending ultrasonic waves. (4)

18 (a) Explain reverberation and reverberation time? What is the significance of Reverberation time? Explain the factors affecting the acoustics of a building and their corrective measures. (10)

(b) The volume of a hall is **2265 m^3** It has a total absorption of **92.9 Sabine**. If the hall is filled with audience then absorption is doubled. Find the difference in reverberation time. (4)

MODULE 5

19 (a) What is the principle of holography? With neat diagrams explain the process of recording and reading in holograms. (8)

(b) Explain the working of a semiconductor laser. Mention any two of its applications with the property of the laser used. (6)

20 (a) Draw the block diagram of a laser system. Explain the roles of (i) Active medium (ii) Pump source and (iii) Resonator cavity in the working of a laser. (10)

(b) With neat diagrams distinguish between step index and graded index fibres. (4)

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