Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Second Semester B.Tech Degree Examination June 2022 (2019 scheme)

Course Code: PHT110

Course Name: ENGINEERING PHYSICS B

(2019 -Scheme)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks Marks

1	Distinguish between free oscillation and damped oscillation.	(3)
2	What will happen to fundamental frequency when length of string reduced to one third of original length kept under same tension?	(3)
3	Why thin transparent films appear to be beautifully coloured under sunlight?	(3)
4	Write any three difference between Fresnel and Fraunhofer diffraction?	(3)
5	Give the physical significance of the wave function.	(3)
6	What are the reasons for the change of properties of materials at nano sizes?	(3)
7	Distinguish between musical sound and noise?	(3)
8	Mention the properties of ultrasonic waves and list its significant industrial and medical applications?	(3)
9	What do you mean by pumping in lasers? List any three pumping methods used.	(3)
10	Draw a properly labelled block diagram of a fibre optic communication system.	(3)

PART B

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

MODULE 1

11	(a)	Write the differential equation of a forced harmonic oscillator and find its solution. Derive an expression for amplitude and phase difference.	(10)
	(b)	A simple harmonic wave is represented by **$y=8\sin 2\pi(t/0.05 - 0.05x)$**.Find wavelength, wavevector ,amplitude and velocity of wave. Also find displacement of particle **40cm** from the origin and **2s** after the start of motion.(x,y in cm and t in second).	(4)

12 (a) Derive an expression for the velocity of transverse waves in a stretched string and state the laws of transverse vibrations. (10)

(b) The amplitude of an undamped harmonic oscillator reduces to **1/10 th** of its initial value after **100** oscillations. Its time period is **1.15 s**. Find the damping constant and relaxation time. (4)

MODULE 2

13 (a) Explain air wedge arrangement with neat diagram, deduce the expression for band width of air wedge arrangement and hence the diameter of thin wire using this setup. (10)

(b) Newton's rings are observed by source emitting light of wavelength λ_1**=3000Å** and λ_2**=2500Å**.It is found that n^{th}dark ring due to $\lambda_1$coincides with $(n+1)^{th}$ dark ring due to λ_2.If the radius of curvature of lens is **90cm**,calculate the diameter of n^{th}dark ring of λ_1. (4)

14 (a) Explain the construction of a grating and derive grating equation. (10)

(b) A plane transmission grating of length **6cm** has **5000lines/cm**. Find the resolving power of grating and the smallest wavelength difference that can be resolved for light of wavelength **5000Å** in the second order. (4)

MODULE 3

15 (a) Apply Schrodinger equation to derive the energy values and normalised wave functions for a particle confined to an infinite potential box of width L. (10)

(b) Explain the phenomenon of quantum mechanical tunnelling with any two examples. (4)

16 (a) Write a note on quantum confinement and based on this explain nano sheets, nano wire and quantum dots. (10)

(b) Write any four applications of nanotechnology in medical field. (4)

MODULE 4

17 (a) What is Piezo electric effect? Explain with a circuit diagram the generation of ultrasonics using a piezo electric oscillator. (10)

(b) A quartz crystal of thickness **1mm** is vibrating at resonance. Calculate the fundamental frequency ,given Youngs modulus=**7.9x10** ^{10}**N/m**^{2} and density=**2650Kg/m**^{3}. (4)

18 (a) Explain the terms i) Decibel ii) Sabine's formula iii) reverberation iv) reverberation time v) echo. (10)

(b) A cinema hall has a volume of $20000m^3$.It is required to have a reverberation time of 4s. What should be the total absorption of the hall? (4)

MODULE 5

19 (a) With properly labelled diagrams, explain the construction and working of He-Ne Laser. (10)

(b) Calculate the acceptance angle and critical angle for a step index fibre whose refractive indices are 1.5 (core) and 1.45 (cladding). The launching medium is air. (4)

20 (a) What do you mean by acceptance angle and acceptance cone of an optical fibre? Obtain the expression for the acceptance angle of an optic fibre. (10)

(b) Distinguish between spontaneous and stimulated emissions. (4)

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