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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S1 (S,FE) S2 (S,FE) Exam May 2025 (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		What is Q-factor of a damped harmonic oscillator ? How is it related to angular frequency?	(3)
2		Differentiate between transverse and longitudinal waves with examples.	(3)
3		Explain the principle and working of antireflection coatings.	(3)
4		Define dispersive power of grating. Write its expression and explain the terms.	(3)
5		Using uncertainty theory prove that electrons are absent in atomic nucleus.	(3)
6		Briefly explain any three medical applications of nano technology	(3)
7		Define intensity of sound. Write the unit of intensity of sound.	(3)
8		What are the characteristics of ultrasonic waves?	(3)
9		Explain the terms population inversion and metastable level in lasers	(3)
10		What are the advantages of optic fibre communication system?	(3)

PART B

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

MODULE 1

11	(a)	Derive the differential equation of a damped harmonic oscillator and obtain its solution. Mention the three different cases.	(10)
	(b)	Write the differential equations for mechanical and electrical oscillators. Compare them with any three points.	(4)
12	(a)	Derive the expression for velocity of transverse waves in a uniform stretched string.	(10)
	(b)	Calculate the fundamental frequency of a string of 1 m long and mass 2g when it is stretched by suspending a mass of 4 kg at its end.	(4)

MODULE 2

13 (a) Explain the formation of interference fringes in an air wedge arrangement and obtain the expression for bandwidth. Write any one use of airwedge arrangement. (10)

(b) In a Newton's rings experiment, the diameter of 5^{th} ring and 15^{th} ring are 0.4 cm and 0.6 cm respectively. If the radius of curvature of plano convex lens is 1m, find out the value of wavelength (λ) used. (4)

14 (a) What is grating element? Derive grating equation. (10)

(b) Distinguish between resolving power and dispersive power of a grating. (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 short note on quantum confinement. Explain nano sheet, nano rod and quantum dot. (10)

(b) Calculate the De Broglie wavelength of a neutron having kinetic energy of 1 eV. Given $h=6.62 \times 10^{-34}$ Js, $m=1.6 \times 10^{-27}$ kg (4)

MODULE 4

17 (a) What are the factors affects the acoustics of a building. Explain remedies. (10)

(b) A quartz crystal of thickness 0.001 m vibrates at its resonance. Calculate the fundamental frequency of the crystal. Given that young's modulus (Y) of the crystal is 7.96×10^{10} N/ m^2 and density (ρ) of quartz crystal is 2670 kg/m^3. (4)

18 (a) With the help of a neat diagram explain how ultrasonic waves are produced by a magnetostriction oscillator. (10)

(b) A cinema hall has a volume of 7500 m^3. It is required to have a reverberation time of 1.5seconds. What should be the total absorption of the hall. (4)

MODULE 5

19 (a) Explain the construction and working of a Ruby laser with properly labelled diagram. (10)

(b) Distinguish between spontaneous emission and stimulated emission (4)

20 (a) Explain the principle of optic fibre cable. Distinguish between step index fibre and graded index fibre. Write any four applications of optic fibres. (10)

(b) If an optic fibre has a core of refractive index 1.56 and cladding of refractive index 1.48. Calculate numerical aperture and acceptance angle. (4)

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