

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

First Semester B.Tech Degree (S, FE) Examination June 2024 (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	Write down the features of Q factor of an oscillator.	(3)
2	Define wavelength, frequency and wave velocity of a wave.	(3)
3	Find the minimum thickness of antireflection coating wave (magnesium fluoride of refractive index 1.42) to be deposited on glass plate of refractive index 1.5, for light of wavelength 500nm.	(3)
4	Distinguish between Fresnel and Fraunhofer diffraction	(3)
5	What are the conditions of a well behaved wave function?	(3)
6	Explain the effect of increased surface to volume ratio in nanomaterial's	(3)
7	Write down the significance of reverberation time	(3)
8	Write any three properties of ultrasonic waves.	(3)
9	What are the difference between spontaneous and stimulated emission	(3)
10	Distinguish between step index and graded index fibres	(3)

**PART B***Answer one full question from each module, each question carries 14 marks.***MODULE 1**

- 11 (a) Formulate the differential equation of a forced harmonic motion and find the expression for its amplitude and phase (10)
- (b) A transverse wave on a stretched string is described by (4)
- $$y(x, t) = 4\sin(10t - 0.021x + \frac{\pi}{3})$$
- Where x and y are in cm and t in seconds  
find 1.amplitude 2.wavelength 3.frequency 4.speed
- 12 (a) Derive an expression for fundamental frequency of transverse vibration in a stretched string. (10)
- (b) A string when stretched by a weight of 2 kg gives a note of frequency 112Hz.what weight will produce a frequency twice the above frequency? (4)

**MODULE 2**

- 13 (a) Explain how newton's rings are formed. Derive the expression to find wavelength of incident monochromatic light. (10)
- (b) Sodium light (589.9nm) strikes a film of oil on water at an angle  $30^\circ$ . The 8<sup>th</sup> dark band is seen. Compute the thickness of oil film if the refractive index of the oil is 1.44 (4)
- 14 (a) What is diffraction? Derive grating equation. What is meant by dispersive power of grating? (10)
- (b) A plane grating just resolves two lines in the second order. Calculate the total number of lines on the grating if  $d\lambda = 0.1\text{nm}$  &  $\lambda = 500\text{nm}$  (4)

**MODULE 3**

- 15 (a) Derive time dependent Schrodinger's equation and hence obtain time independent equation (10)
- (b) Calculate the voltage that must be supplied to an electron microscope to produce an electron of wavelength  $4.5\text{\AA}$  (4)
- 16 (a) Write a note on (9)
- i. Nano sheet
  - ii. Nanowire
  - iii. Quantum dot
- (b) Write any five applications of nanomaterials. (5)

**MODULE 4**

- 17 (a) Explain the terms absorption coefficient and reverberation time and discuss the factors that affecting the acoustics of a hall and give their remedies. (9)
- (b) An auditorium has dimension of  $35 \times 15 \times 6$ . The average absorption coefficient of wall, ceiling and floor are 0.03, 0.36, and 0.26 respectively. Evaluate reverberation time of the hall (5)
- 18 (a) With a neat circuit diagram explain the principle and working of piezoelectric oscillator. (10)
- (b) An ultrasonic source of 0.09MHz sends down a pulse towards the sea bed which return after 0.55s. The velocity of sound in water is 1800m/s. Calculate the depth of the sea. (4)

MODULE 5

- 19 (a) With a neat diagram, explain the construction and working of He-Ne laser. (10)
- (b) Give any four application of holographic technique. (4)
- 20 (a) With a block diagram explain the working of an optical fibre communication system and mention any three advantages of optical fibres. (10)
- (b) The numerical aperture of the optical fibre is 0.295 and refractive index of core is 1.54. calculate the refractive index of cladding and acceptance angle (4)

\*\*\*\*