

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*

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|----|--|-------|
| 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. (4)
 Obtain (1)Amplitude (2)Initial phase (3)speed (4)frequency
- 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 **$0.06 \times 10^{-3} \text{m}$** diameter at a distance of **0.15m** from the edge. Calculate the fringe width. The wavelength of light used is **$6 \times 10^{-7} \text{m}$** . (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 \AA** . (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)
