

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

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

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech Degree S1 (S, FE) S2 (S, FE) Examination December 2023 (2015 Scheme)

**Course Code: PH 100****Course Name: ENGINEERING PHYSICS**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all Questions. Each question carries 2 Marks*

Marks

- |    |   |     |
|----|---|-----|
| 1  | Give two examples for practical cases of damping.                               | (2) |
| 2  | Distinguish between transverse waves and longitudinal waves.                    | (2) |
| 3  | What are coherent sources?  | (2) |
| 4  | Define resolving power and dispersive power of a grating.                       | (2) |
| 5  | With a neat diagram explain double refraction.                                  | (2) |
| 6  | What are critical temperature and critical magnetic field in superconductivity? | (2) |
| 7  | Mention any two properties of a well defined wave function.                     | (2) |
| 8  | Define micro states and macro states.   | (2) |
| 9  | Distinguish between musical sound and noise.                                    | (2) |
| 10 | Explain the thermal detection process for ultrasonic waves.                     | (2) |
| 11 | What are metastable level and population inversion in a laser?                  | (2) |
| 12 | Write a note on intensity modulated fibre optic sensor?                         | (2) |

**PART B***Answer any 10 questions. Each question carries 4 Marks*

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|----|---|-----|
| 13 | Write down the differential equation of electrical and mechanical oscillators and give any four points of comparison between the two oscillators.                                       | (4) |
| 14 | Calculate the frequency of the fundamental note produced by a string, 2m long and weighing 2 gm, kept stretched by a load of 600 kg.  | (4) |
| 15 | Derive the expression for the bandwidth of interference fringes in air wedge experiment.  | (4) |
| 16 | Light of wavelength 589.3 nm is incident normally on a plane transmission grating having 6000 lines/cm. Calculate the angle at which the principal maxima of the first order is formed. | (4) |
| 17 | What are quarter wave plate and half wave plate? Write down the equations for the thickness of the quarter wave plate and half wave plate.  | (4) |

- 18 Explain the properties of Type I and Type II superconductors with graphs. (4)
- 19 Explain the absence of electrons in the nucleus using uncertainty principle. (4)
- 20 Write down any four postulates of Fermi-Dirac statistics. (4)
- 21 Calculate the reverberation time of a hall having volume  $4000 \text{ m}^3$  and total sound absorption of  $160 \text{ m}^2$  sabine. Find the additional sound absorption required for an optimum reverberation of  $1.5 \text{ s}$ . (4)
- 22 Calculate the fundamental frequency of vibration of a quartz crystal of thickness  $8 \text{ mm}$  at resonance. Young's modulus and density of quartz are  $7.9 \times 10^{10} \text{ N/m}^2$  and  $2650 \text{ kg/m}^3$  respectively. (4)
- 23 List any four applications of LASER. (4)
- 24 With diagram explain the working of an LED. Give any two applications of LED. (4)

### PART C

*Answer any three questions. Each question carries 6 Marks*

- 25 Write down the differential equation of a damped harmonic oscillator and obtain its solution. Give conditions and draw displacement -time curve for three cases (6)
- 26 Draw a neat diagram and explain the experimental arrangement for obtaining Newton's rings. Derive an expression for the diameter of  $n^{\text{th}}$  dark ring in Newton's rings experiment. (6)
- 27 Explain the different steps for detecting light of unknown polarization. (6)
- 28 Write down Schrodinger equation for a particle in a one dimensional box and obtain its normalized wave functions. (6)

### PART D

*Answer any three questions. Each question carries 6 Marks*

- 29 What are the six major factors affecting acoustics of a building? Suggest their remedies to enhance the acoustic quality? (6)
- 30 What is magnetostriction effect? With a neat diagram explain how ultrasonic waves are produced by a magnetostriction oscillator. (6)
- 31 With necessary diagrams explain the construction and working of Ruby laser. (6)
- 32 Define numerical aperture of an optic fibre? Derive the expression for numerical aperture of a step index fibre. (6)

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