

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech examinations (S) September 2020 S1/S2 (2015 Scheme)

Course Code: PH100
Course Name: ENGINEERING PHYSICS

Max. Marks: 100

Duration: 3 Hours

PART A*Answer all questions, each carries 2 marks.*

Marks

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| 1 | Explain any two practical cases of damping. | (2) |
| 2 | State the laws of transverse vibration of a stretched string. | (2) |
| 3 | What are antireflection coatings? | (2) |
| 4 | Define dispersive power of a grating and write an expression for it. | (2) |
| 5 | What is optic axis and principal section of a doubly refracting crystal? | (2) |
| 6 | Define critical temperature and critical field of a superconductor. | (2) |
| 7 | Justify the statement "No light source can emit true monochromatic light". | (2) |
| 8 | Distinguish between bosons and fermions. | (2) |
| 9 | What is echelon effect? How can it be remedied? | (2) |
| 10 | How ultrasonic waves are detected using a thermal detector? | (2) |
| 11 | What are the basic components of a laser system? | (2) |
| 12 | What is the working principle of LED? | (2) |

PART B*Answer any 10 questions, each carries 4 marks.*

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| 13 | The frequency of a tuning fork is 500 Hz and its Q factor is 7×10^4 . Find the relaxation time. Also calculate the time after which its energy becomes $(1/10)^{\text{th}}$ of its initial undamped value. | (4) |
| 14 | The equation of transverse vibration of a stretched string is given by $y = 0.00327 \sin (72.1x - 2.72t)$, x and y are in metre and t in seconds. Evaluate (i) Amplitude (ii) Wavelength (iii) Frequency and (iv) Velocity of wave. | (4) |
| 15 | Account for the colours of thin films viewed in white light. | (4) |
| 16 | Two lines in the second order spectrum of a plane transmission grating are resolved. If the lines are due to lights of wavelengths $5890 \text{ \AA}$ and $5896 \text{ \AA}$. Find the minimum number of lines in the grating. | (4) |
| 17 | Explain how anisotropy in crystalline solids contributes to double refraction. | (4) |
| 18 | Explain Type I and Type II Superconductors. | (4) |
| 19 | An electron is confined in a potential which closely approaches an infinite | (4) |

- square well of width $2.5 \times 10^{-10} \text{ m}$. Calculate the three lowest permissible quantum energies of the electron.
- 20 Write three postulates of FD statistics and its distribution equation. (4)
- 21 Calculate the reverberation time of a hall having volume 4000 m^3 and total sound absorption of **160 Sabine**. Find the additional sound absorption required for an optimum reverberation of **1.5 s**. (4)
- 22 An ultrasonic source of frequency **0.09 MHz** sends down a pulse towards sea bed which returns after **0.55 s**. The velocity of sound in water is **1800 m/s**. Calculate the depth of the sea and wavelength of the pulse. (4)
- 23 What is population inversion? Using energy level diagrams explain how it is achieved in a Helium-Neon laser? (4)
- 24 What are the advantages of optical fibre communication over conventional mode of communication? (4)

PART C

Answer any three questions, each carries 6 marks.

- 25 Write the differential equation of a forced harmonic oscillator. Derive the expressions for the amplitude and phase difference. (6)
- 26 Discuss in detail Fraunhofer diffraction at a single slit and obtain the expression for width of central maximum. (6)
- 27 Define circularly and elliptically polarised light. What is a quarter wave plate? How it can be used to analyze circularly and elliptically polarized light? (6)
- 28 (a) Assuming the time dependent Schrodinger equation derive time independent Schrodinger equation. (6)
- (b) What are eigen values and eigen functions?

PART D

Answer any three questions, each carries 6 marks.

- 29 Define reverberation and reverberation time. Write Sabine's formula. What is its significance? (6)
- 30 What is the principle of a piezoelectric oscillator? With the circuit diagram explain the working of a piezoelectric oscillator. (6)
- 31 Explain the construction and reconstruction of a hologram. Give its advantages over photograph. (6)
- 32 Define numerical aperture of an optic fibre. Obtain an expression for the numerical aperture of a step index fibre. (6)
