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

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.

13	The frequency of a tuning fork is **500 Hz** and its Q factor is $\mathbf{7\times10^4}$. Find the relaxation time. Also calculate the time after which its energy becomes $\mathbf{(1/10)^{th}}$ 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** $\mathbf{A^0}$ and **5896** $\mathbf{A^0}$. 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 **2.5x 10^{-10}m**. Calculate the three lowest permissible quantum energies of the electron.

20 Write three postulates of FD statistics and it's 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)

****