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Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019
Course Code: PH100
Course Name: ENGINEERING PHYSICS

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 2 marks.

Marks

1	Define sharpness of resonance.	(2)
2	What will happen to fundamental frequency when length of string reduced to one third of original length kept under same tension?	(2)
3	What is meant by optical path?	(2)
4	Distinguish between Fresnel and Fraunhofer diffraction.	(2)
5	Distinguish between positive and negative crystals.	(2)
6	Give any four applications of superconductivity.	(2)
7	What is meant by an eigenvalue equation?	(2)
8	What are microstates and macrostates?	(2)
9	Define intensity of sound wave. Give its equation.	(2)
10	Explain the principle of a piezoelectric oscillator.	(2)
11	What are the characteristic properties of a laser?	(2)
12	Define acceptance angle and numerical aperture of an optical fibre.	(2)

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

13	What is a damped harmonic oscillator? Draw the graph showing the variation of amplitude with time in case of over damped, critically damped and under damped oscillator.	(4)
14	A wave is represented by **y= 1.5sinπ (0.03x – 7t)** where amplitude measured in meters and time in seconds. Evaluate Period, frequency, wave length and velocity of the wave.	(4)
15	Write the construction and working of an antireflection coating.	(4)
16	What should be the minimum number of lines in a grating which will just resolve in the second order of lines whose wavelengths are **5890Å and 5896 Å**?	(4)
17	Calculate the minimum thickness of a quartz plate which would convert plane polarized light of wavelength **589 nm** into circularly polarized light. The principal refractive indices of the ordinary and extra ordinary rays are	(4)

1.544 and **1.553** respectively.

18	Explain Type I and Type II Superconductors.	(4)
19	With the help of uncertainty principle, explain why electron cannot exist inside the nucleus.	(4)
20	Prove that at absolute zero, the probability of occupancy of an energy level below Fermi level is 1. Also show that under the same conditions the probability of occupancy of an energy level above Fermi level is 0.	(4)
21	A hall has a volume of is **600 m³**. It is required to have the reverberation time of **1.5 s**. What should be the total absorption in the hall?	(4)
22	A nickel rod of length **10 cm** is used in a magnetostriction oscillator. Calculate the frequency of ultrasonic waves generated, Nickel has Young's modulus of **210 G Pa** and density of **8900 kg/m³**.	(4)
23	Distinguish between spontaneous and stimulated emission of radiation.	(4)
24	A fibre cable has an acceptance angle of **30⁰** and a core of refractive index **1.4**. Calculate the refractive index of the cladding.	(4)

PART C
Answer any three questions, each carries 6 marks.

25	Considering transverse vibrations of a stretched string derive the one dimensional wave equation.	(6)
26	Show that the radius for n^{th} dark ring formed in a Newton's rings experiment is proportional to $\sqrt{\lambda}$.	(6)
27	Describe the construction of a Nicol prism. Explain its working as a polarizer and as an analyzer.	(6)
28	Compare the Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics.	(6)

PART D
Answer any three questions, each carries 6 marks.

29	Define reverberation and reverberation time. What is the significance of reverberation time? Compare reverberation and echo.	(6)
30	What is magnetostriction effect? With the help of a circuit diagram explain the production of ultrasonic waves using a magnetostriction oscillator.	(6)
31	What are the basic components of a laser system? How are these requirements satisfied in the case of Ruby laser?	(6)
32	What is Photovoltaic effect? Explain the structure and working of a solar cell. Draw the I-V graph.	(6)

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