Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: PH100

Course Name: ENGINEERING PHYSICS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 2 marks. Marks

1	What do you understand by Quality factor? On what factors does it depend?	(2)
2	Write down equation that represents a wave having amplitude 5cm, period 0.002 sec and velocity 1500m/s that moves along **–x** axis.	(2)
3	Why is the centre of Newton's rings pattern dark in reflected system?	(2)
4	What do you mean by resolving power of an optical instrument?	(2)
5	Define Plane of Vibration and Plane of Polarization.	(2)
6	Why a superconductor is called a perfect diamagnet?	(2)
7	What are the characteristics of a well-defined wave function?	(2)
8	Find the smallest volume of a unit cell in phase space for a particle obeying quantum statistics.	(2)
9	What is absorption coefficient?	(2)
10	What is SONAR? Give one use of it.	(2)
11	Distinguish between spontaneous emission and stimulated emission.	(2)
12	What is a photo-detector? Give two examples.	(2)

PART B

Answer any 10 questions, each carries 4 marks.

13	What is the condition for critical damping in the case of a damped harmonic oscillator? With the help of the expression for displacement write how this condition affects the amplitude of the oscillator?	(4)
14	The string of violin **36 cm** long and has a mass of **0.2gm**. With what tension it must be stretched to tune **1000 Hz**.	(4)
15	In a Newton's ring arrangement, if a drop of water (**μ = 4/3**) is placed in between lens and the plate, the diameter of the **10^{th}** dark ring is found to be **0.6 cm**. Obtain the radius of curvature of the face of the lens in contact with the plate. The wavelength of light used is **6000Å**.	(4)
16	Compare grating and prism spectra.	(4)
17	A plane polarised light is incident on a piece of quartz and parallel to the axis. Find the least thickness for which the ordinary and extra-ordinary rays combine to form plane polarized light. Given that the refractive indices for the ordinary and extra-ordinary rays are **1.5442** and **1.5533** respectively and wavelength of	(4)

light is **500nm**.

18	Briefly explain the BCS theory of superconductivity.	(4)
19	Obtain energy and momentum operators.	(4)
20	State the postulates of Bose-Einstein statistics.	(4)
21	The volume of a hall is **3000 m^3**. It has a total absorption of **100 m^2Sabine**. If the hall is filled with audience who add another **80m^2Sabine**, find the difference in reverberation time.	(4)
22	Calculate the thickness of quartz crystal required to produce ultrasonic waves of frequency **1 MHz**. Young's modulus and density of quartz are **8 x 10^{10} N/m^2** and **2650 kg/m^3** respectively.	(4)
23	What is resonant cavity? What is its importance in the production of laser light?	(4)
24	What is an LED? Give its working principle. What are the main uses of it?	(4)

PART C

Answer any three questions, each carries 6 marks.

25	Frame the differential equation of a forced harmonic oscillator and obtain its solution.	(6)
26	Derive cosine law and explain colours in thin films in reflected light	(6)
27	Distinguish between Type I and Type II superconductors citing examples. Explain the formation of Cooper pairs according to BCS theory.	(6)
28	State Uncertainity principle. Explain the absence of electron inside the nucleus using this principle.	(6)

PART D

Answer any three questions, each carries 6 marks.

29	Write any six factors affecting acoustics of buildings and their remedies.	(6)
30	What are ultrasonic waves? What is NDT? Explain how the ultrasonic pulse technique is used for non-destructive testing of materials.	(6)
31	With a neat figure and energy level diagrams, explain the construction and working of a Helium-Neon laser.	(6)
32	With a neat diagram derive an expression for numerical aperture. Give any four applications of optical fibre.	(6)

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