Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST/SECOND SEMESTER B.TECH DEGREE EXAMINATION, JULY 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	Draw a graph showing the variation of amplitude with frequency of the driver in the case of a forced harmonic oscillator.	(2)
2	Differentiate longitudinal waves from transverse waves.	(2)
3	Explain the reason why the central spot of Newton's rings pattern appears dark in reflected light.	(2)
4	Write any two differences between interference and diffraction phenomenon.	(2)
5	What is Kerr Effect?	(2)
6	What is Meissner effect?	(2)
7	State and explain Heisenberg's uncertainty principle.	(2)
8	What is a phase space?	(2)
9	What is reverberation time? Write down Sabine's formula for reverberation time.	(2)
10	What are the frequency ranges of ultrasonic sound and infrasonic sound?	(2)
11	Write any two differences between a photograph and a hologram.	(2)
12	What is a photodiode?	(2)

PART B

Answer any 10 questions, each carries 4 marks

13	Write down the differential equation for a forced harmonic oscillator and obtain its solution.	(4)
14	A thin inextensible string of length 1 meter is stretched by a weight of 1 *kg*. What should be the new weight so that the fundamental frequency of the string is doubled?	(4)
15	What is Rayleigh's criterion for resolution of grating? Derive expressions for resolving power and dispersive power of a grating.	(4)
16	A soap bubble having a refractive index of 1.33 is suspended in air. When an observer looks at a spot on the soap bubble at an angle of 0^o with the normal, he finds that orange colour of wavelength 600 *nm* is absent in the reflected light. Find the minimum thickness of the soap bubble.	(4)
17	Linearly polarized light changes into circularly polarized light when passed through a thin calcite plate. If the principal refractive indices for the extraordinary and ordinary rays are 1.486 and 1.658 respectively and the wavelength of the light is 589 *nm*, then what is the minimum thickness of the calcite plate?	(4)
18	Describe any four applications of superconductors.	(4)
19	A certain excited state of Helium atom is known to have an average lifetime of	(4)

$2.11 \times 10^{-8} s$. What is the minimum uncertainty with which the frequency of the emitted radiation can be measured?

20 Differentiate between Fermi-Dirac and Bose-Einstein statistics. Also write down the distribution function in each case. (4)

21 When a door of height 3 *m* and width 1.5 *m* is kept open, the noise intensity level is found to be 60 *dB*. How much acoustic power enters through the door? (4)

22 What is NDT? Describe with the help of a figure any one method of ultrasonic NDT. (4)

23 What is LASER? Explain the three basic components of a LASER system. (4)

24 Define acceptance angle. Derive an expression for numerical aperture of an optical fibre. (4)

PART C

Answer any three questions, each carries 6 marks

25 Setup the differential equation of motion of a damped harmonic oscillator and obtain its solution. Derive an equation for displacement of particle for underdamped oscillations and draw a plot between time and displacement of the particle. (6)

26 Explain the formation of Newton's rings. Describe how wavelength of a monochromatic source can be determined by forming Newton's rings. (6)

27 With reference to a crystal, explain the terms optic axis and principal section. What is double refraction and explain the difference between positive crystals and negative crystals. (6)

28 A subatomic particle of mass ***m*** is trapped in a one-dimensional infinite square well potential of width ***L***. Using Schrödinger equation obtain the energy eigen values of the particle. (6)

PART D

Answer any three questions, each carries 6 marks

29 Give an account of any three factors affecting the acoustics of a hall. How are they remedied? (6)

30 What is piezoelectric effect? Draw the diagram of a transistor based piezoelectric oscillator and explain its working. Write down an equation for the frequency of the above oscillator. (6)

31 Draw a neat diagram of a He-Ne LASER and explain its construction. Explain its working with the help of energy level diagram of He and Ne. (6)

32 How does light propagate in an optical fibre? Distinguish between step index fibre and graded index fibre. Explain with a block diagram an optical communication system. (6)

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