

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

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| 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

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| 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° 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) |

B

B2102

Pages: 2

- 2.11 x 10⁻⁸s. 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)
