B **B1B001** **Total Pages:2**

Reg. No._____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B TECH DEGREE EXAMINATION JANUARY 2017

Course Code**: PH 100**

Course Name**: ENGINEERING PHYSICS**

Maximum Marks : 100 Duration : 3 hours

PART A

Answer all questions. Each question carries 2 marks

1. What is resonance in forced oscillation? Give one example.
2. Distinguish between transverse and longitudinal waves with examples.
3. What are coherent sources?
4. Why diffraction of light is not as evident in daily experience as that of sound waves?
5. What are positive and negative uniaxial crystals?
6. Define critical magnetic field in superconductors? How this is related to the temperature of superconductor?
7. What is meant by wave function? Write its normalization condition.
8. What are bosons and fermions? Give examples.
9. Define reverberation and reverberation time.
10. Mention any two medical applications of ultrasonic waves.
11. What is a laser? What are the three requisites for laser action to take place?
12. Distinguish between an LED and a semiconductor laser.

PART B

Answer any 10 questions. Each question 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 case of an oscillator by clearly marking the conditions for the above cases in the graph itself.
14. The equation of a transverse vibration of a stretched string is given by

    $y = 1.5 \times 10^{-3} \sin\left(\frac{2\pi}{8}x - 80\pi t\right)$

    Where x is measured in metres and t in seconds. Evaluate (i) Amplitude (ii) Wavelength (iii) Frequency and (iv) Velocity of wave?
15. If the diameter of n^{th} dark ring in an arrangement giving Newton's rings changes from 0.03m to 0.025m as a liquid is introduced between the lens and plate, what is the value of refractive index of the liquid?
16. A parallel beam of monochromatic light of wavelength 589.6 nm from a narrow slit is diffracted by a plane transmission grating containing 6000 lines/cm, placed normal to the beam. Calculate the angle at which the second order diffracted images of the slits will be observed.

17. Calculate the thickness of (i) a quarter wave plate (ii) a half wave plate. Given $\mu_e = 1.553$ and $\mu_o = 1.553$ and $\lambda = 5000$Å.
18. What is Meissner effect? Prove that a superconductor acts as a perfect diamagnet.
19. An electron confined in an one dimensional box of width 'L' is known to be in its first excited state. Determine the probability density of electron in the central half.
20. Distinguish between Bose-Einstein statistics and Fermi- Dirac statistics.
21. The area of interior surface of an auditorium is 3340 m^2. Its reverberation time is 1.5 seconds. If average absorption coefficient of interior surface is 0.4, find the volume of auditorium.
22. With a neat circuit diagram explain the working of a Piezoelectric Oscillator to produce ultrasonic waves.
23. What type of pumping method is used in ruby laser? Draw the energy level diagram of a ruby laser.
24. Mention any four applications optical fibre.

PART C

Answer any 3 questions. Each question carries 6 marks

25. Derive an expression for the velocity of transverse waves in stretched uniform string.
26. Obtain an expression for fringe width in wedge shaped thin film.
27. Distinguish between type I and type II superconductors with relevant graphs.
28. State Heisenberg's uncertainty principle. Write its mathematical form for the following pairs of variables (i) position and momentum (ii) energy and time (iii) angular position and angular momentum. How this principle can be used to prove the absence of electrons inside the nucleus of an atom.

PART D

Answer any 3 questions. Each question carries 6 marks.

29. What are the basic requirements of an acoustically good hall?
30. What are NDT and SONAR? How ultrasonic waves are used in it?
31. What is holography? How is it different from ordinary photography? Draw the diagrams illustrating the recording and reconstruction of a hologram.
32. With a neat diagram obtain an expression for the numerical aperture of an optical fibre.