Reg. No._____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SECOND SEMESTER B TECH DEGREE EXAMINATION, MAY 2017

PH 100: ENGINEERING PHYSICS

Max. Marks: 100 Duration: 3 hours

PART A

Answer all questions. Each question carries 2 marks.

1. Explain two practical cases of damping.
2. Distinguish between longitudinal waves and transverse waves.
3. How can you test the planeness of surfaces using an air wedge?
4. Distinguish between Fresnel and Fraunhofer diffraction.
5. What is a half wave plate? Write the equation for its thickness.
6. What is Meissner effect?
7. Give the probability interpretation of the wave function.
8. What are bosons and fermions? Give examples.
9. What is absorption coefficient of sound?
10. What is inverse piezoelectric effect?
11. Explain population inversion and metastable level in a laser.
12. What is an avalanche photodiode?

PART B

Answer any 10 questions. Each question carries 4 marks.

13. Derive an equation for the velocity of propagation of the waves for transverse vibrations of a stretched string.
14. In a Newton's rings experiment the diameters of the 4^{th} and 12^{th}dark rings are 0.4 cm and 0.7 cm respectively. Find the diameter of the 20^{th} dark ring.
15. Derive the differential equation of damped harmonic oscillation.
16. A plane transmission grating having 5×10^5 lines per metre is used at normal incidence. Calculate the angular separation, in the second order, between the two sodium lines of wavelengths 589 nm and 589.6 nm.
17. Describe the experimental procedure for producing circularly and elliptically polarized light.
18. What is a SQUID? Mention some important applications of SQUIDs.
19. Explain the absence of electrons in the nucleus on the basis of the uncertainty principle.
20. What are the important postulates of Maxwell-Boltzmann statistics?

21. The volume of a room is 500 m^3. The wall area of the room is 250 m^2 and the floor area is 150 m^2. The average sound absorption coefficient of the wall is 0.03, the floor is 0.05 and the ceiling is 0.8. Calculate the reverberation time.
22. A nickel rod of length 10 cm is used in a magnetostriction oscillator. Calculate the frequency of ultrasonic waves generated. Young's modulus of nickel is 210 x 10^9 N/m^2 and density of nickel is 8900 kg/m^3.
23. Explain the process of recording and reading a hologram.
24. With a block diagram, explain the working of an optical communication system.

PART C

Answer any three questions. Each question carries 6 marks.

25. Frame the differential equation of a forced harmonic oscillator and obtain its solution.
26. With the help of a neat diagram, explain the formation of diffraction pattern with a single slit. Deduce the equations for the bright and dark fringes and the width of the central maxima.
27. With a neat diagram explain how a nicol prism is constructed. Describe how it produces plane polarized light.
28. Write down the Schrodinger equation for a particle in a one dimensional infinite square well potential and obtain the equation for wave function of the particle.

PART D

Answer any three questions. Each question carries 6 marks.

29. Explain the thermal method of detection of ultrasonic waves. Describe one method of non destructive testing using ultrasonic waves. Mention four medical applications of ultrasonic waves.
30. What are the characteristics of musical sound? What are the factors affecting acoustics of a building?
31. What are the basic components of a laser system? How are these requirements satisfied in the case of a Ruby laser?
32. Define numerical aperture of an optic fibre. Obtain an expression for the numerical aperture of a step index fibre.

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