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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, AUGUST 2016

PH100 ENGINEERING PHYSICS

Max. Marks: 100 Duration: 3 Hours

Part-A

Answer all questions. Each question carries 2 marks.

1. What is a forced oscillator?
2. What are the factors on which the frequency of vibration of a stretched string depends?
3. Write the principle of superposition of waves.
4. What is grating element. How it is related with the number of lines drawn per unit length of the grating.
5. What is double refraction?
6. What is Meissner effect?
7. Write the normalization condition of a wave function and its significance.
8. What is the minimum size of a cell in phase space in Quantum Statistics? What is the probability of occupancy for the Femi level at non zero absolute temperature?
9. The absorption co- efficient of open window is one. Justify the statement.
10. Mention any four applications of ultrasonic waves.
11. Name four outstanding characteristics of Laser.
12. Name the two different types of fibre optic sensors.

Part-B

Answer any 10 questions. Each question carries 4 marks

13. Compare electrical and mechanical oscillating systems.
14. Equation of transverse wave travelling along a string is $y = 4\sin\pi(0.010x - 2.0t)$ where x and y are in centimetres and t is in second. Find (i)Amplitude (ii)Wavelength (iii)Initial phase at the origin and (iv)Frequency of the wave
15. With the help of Cosine law, how can you account for the colours of thin films?
16. What is the highest order of spectrum which may be seen with light of wavelength 5 X 10^{-5}cm by means of grating with 3000 lines/cm.

17. Calculate the thickness of a doubly refracting crystal required to introduce a path difference of $\lambda/2$ between the ordinary and extra ordinary rays. Given λ=6000 A^0, μ_o=1.544, μ_e=1.5533.
18. What is super conductivity? Define transition temperature and critical magnetic field.
19. What is the significance of operators in Quantum mechanics? What is Hamiltonian operator? Write its expression.
20. Write any four assumptions of Maxwell - Boltzmann Statistics.
21. Calculate the reverberation time of a hall having volume 4000m^3 and total sound absorption of 160 m^2 sabine.
22. An ultrasonic source of 0.09 MHz sends down a pulse towards the sea bed which returns after 0.55 second. The velocity of sound in water is 1800 m/s. Calculate the depth of the sea and wave length of the pulse.
23. What is population inversion? How it can be achieved?
24. Name the principle behind the propagation of light through an optic fibre. How the essential conditions for this phenomenon is satisfied in optic fibres. List three advantages of fibre optic communication.

Part-C

Answer any 3 questions. Each question carries 6 marks

25. Derive one-dimensional wave equation and write its solution.
26. With the help of a diagram, deduce the conditions for darkness and brightness in the case of Fraunhofer diffraction at a single slit. Obtain the width of central maximum.
27. How a Nicol prism can be constructed from a calcite crystal. How can it be used as a polarizer and analyzer?
28. Write the Schrodinger equation for a particle in one dimensional infinite square well potential and derive the normalized wave function.

Answer any 3 questions. Each question carries 6 marks.

29. How can you produce ultrasonic waves using piezoelectric oscillator.
30. Explain the factors affecting the acoustics of a building.
31. "Laser is light amplification by stimulated emission of radiation." Define the terms absorption, spontaneous emission and stimulated emission. Derive the relation between Einstein coefficients.
32. What is a hologram? How can it be re- constructed? Write any 2 advantages of holograms over photographic images.