B

10001

Reg. No.:_____ Name:_____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: PH100

Course Name: ENGINEERING PHYSICS

Max. Marks: 100 Duration: 3 Hours

Part A

Answer ALL questions. Each question carries 2 marks

1. What do you mean by quality factor of an oscillator?
2. What is the relation between path difference and phase difference in wave motion?
3. Two independent sources of light cannot produce interference fringes. Why?
4. Define dispersive power of a grating.
5. Distinguish between plane polarized light and unpolarized light.
6. What is Meissner effect?
7. What is phase space?
8. What is the probability interpretation of wave function?
9. What is the relation connecting reverberation time and total absorption?
10. What is magnetostriction effect?
11. Write any two advantages of Hologram over photographic images.
12. Distinguish between Step index fibre and Graded index fibre.

Part B

Answer any 10 questions. Each question carries 4 marks

13. Compare an electrical and mechanical oscillator.
14. A transverse wave on a stretched string is described by $y(x, t) = 4.0 \sin (25t+0.016x+\pi/3)$ where x and y are in cm and t is in second.
    Obtain the (i) Speed (ii) Amplitude (iii) Frequency and(iv)Initial phase at the origin.
15. With Newton's rings arrangement, nth dark ring formed by light of wavelength 6000 A^0 coincides with the $(n+1)^{th}$ dark ring for light of wavelength 4500A^0. If the radius of curvature of the convex surface is 90 cm, find the diameter of the nth ring for light wavelength 6000 A^0.
16. A plane transmission grating has 6000 lines/cm. Find the angular separation between two wavelengths 500 nm and 510 nm in the 3^{rd} order.

17. The refractive index of calcite is 1.658 for ordinary ray and it is 1.486 for extraordinary ray. A slice having thickness 0.9×10^{-4}cm is cut from the crystal. For what wavelengths this slice will act as a (i) Quarter wave plate. (ii)Half wave plate
18. Distinguish between type I and type II super conductors with examples.
19. Calculate the de Broglie wavelength of electron whose kinetic energy is 10keV.
20. Distinguish between Macrostate and Microstate of a system
21. The volume of a hall is $3000m^3$. It has a total absorption of $100m^2$sabine. If the hall is filled with audience who add another $80m^2$sabine, then find the difference in reverberation time.
22. What is NDT? How ultrasonic wave is used for NDT.
23. What is the difference between Spontaneous emission and Stimulated emission?
24. What is a LED? Give its working principle.

Part-C

Answer any 3 questions. Each question carries 6 marks.

25. Considering the transverse vibration in a stretched string, derive the differential equation of one-dimensional wave.
26. Light from a monochromatic source is allowed to fall on a single slit. Two lenses are given. With the help of a neat diagram write the experimental set up for obtaining the diffraction pattern. Deduce the conditions for getting bright and dark regions on the screen. Also 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 as an analyzer?
28. Formulate Schrodinger's time dependent equation starting from a plane wave equation by using de Broglie's formula and Einstein's relation for photon energy.

Part-D

Answer any 3 questions. Each question carries 6 marks.

29. With a neat diagram explain how ultrasonic waves are produced by piezoelectric oscillator
30. What are the factors affecting the acoustics of a building?
31. Outline the principle and working of Ruby Laser.
32. Define numerical aperture of an optical fibre and derive an expression for NA of a step index fibre.