Registration No:

B.TECH 1ST SEMESTER REGULAR EXAMINATIONS, DECEMBER 2017
ENGINEERING PHYSICS
Subject Code:BBSBS1021
Time: 3 Hours
Max Marks : 100
The figures in the right hand margin indicate marks.

PART-A   (10X1 = 10 MARKS)

Answer all questions.

a. A particle executes SHM with amplitude 4cm. The displacement from the mean where the particle will pass half PE and half KE is _____?
b. The damping coefficient of an oscillator is 0.88 /sec. and the frequency is 512 hz. The Q-factor of the oscillator is _____?
c. In case of Newton's ring experiment the rings are produced by division of _____?
d. The working principle of optical fiber is _____?
e. _____ + _____= Crystal structure.
f. An ice cube is not a crystal because_____.
g. The relation between magnetic relative permeability and magnetic susceptibility is ___.
h. Divergence of a vector field is a _____ ?
i. Write the expression for the De Broglie's wavelength for an electron moving under a electric potential?
j. Write the time independent Schrodinger equation for a free particle of mass 'm' moving along z-axis.

PART-B   (15 x 2 = 30 MARKS)

Answer any fifteen questions from the following.

1. Show that the displacement verses velocity graph for a simple harmonic oscillator is an ellipse.
2. A wave function is represented by: $Y(x,t)= 12 \sin (8\pi t-0.5x)$, where x is in cm. Find amplitude, frequency, wave velocity and wavelength.
3. Write the conditions of interference.
4. Differentiate between Fresnel and Fraunhofer Diffraction.
5. There are 44 number of fringes are visible in the field of view of the microscope when a light of wavelength of $\lambda= 6000A^0$ is used . If the light is replaced by $\lambda= 4500A^0$, then how many number of fringes will be visible in a Bi-prism Experiment ?
6. The principal focal length of a Zone is 12cm. For wavelength $4000A^0$. The area of the zones are _____?
7. Explain lattice translational vector with the help of diagram?
8. The lattice constant of a cubic lattice is 'a' $=2A^0$. Calculate the spacing between {1 2 0}.
9. write the properties of Dielectric materials?
10. What is Curie temperature?
11. What is Meissner's effect?
12. Magnetic monopole does not exist, justify using appropriate law ?
13. Find the Gradient of scalar field S, where $S = x^2 + y^2 +z^2-9$

14. State Gauss law in electrostatics and obtain its differential form.
15. Show graphically the variation of stopping potential with frequency of incident light in photoelectric effect..
16. Write the Schrodinger time independent equation for a body of mass 'm'moving freely in the ZX plane.
17. Calculate the de Broglie wavelength of a neutron whose kinetic energy is 0.025ev.
18. If the uncertainty in position of an electron is 4×10^{-10} m, calculate the uncertainty in its momentum.
19. Define CNT and its classifications.
20. Write the characteristics of a wave function in quantum mechanics.

PART-C   (6 x 5 = 30 MARKS)

Section-i   **Answer any Six questions**

1. A damped oscillator reduces its amplitude to 1/10 of the original after making 20 number of oscillations. If the time period of the oscillator is 2 sec. then find the relaxation time of the oscillator.
2. Differentiate between " coherent" & "incoherent "superposition.
3. Differentiate between Zone plate and Convex lens.
4. A superconductivity sample has critical fields at 1.2×10^5 A/m and 3.8×10^5 A/m for temperature 2 K and 12 K respectively. Calculate the transitional temperature and critical field at 0 K and 3.2K
5. Evaluate divergence and curl of A at (1,2,3), where. A = $2\hat{\imath}$ xy + $4\hat{\jmath}$ yz + $5\hat{k}$ zx
6. State Faraday's law of electromagnetic induction and mention its differential form
7. State Heisenberg's uncertainty relation. The uncertainty in velocity of an electron is 7.3×10^5 m/s. Find the uncertainty in its position.
8. Discuss the properties and applications of CNT. Write two application of nano particles.

Section-ii   **Answer any Two questions**   (2 x 15 = 30 MARKS)

1. a. Set up the differential equations for a damped harmonic oscillator. Find the solution for the under damped oscillation. Discuss the three types of damped motion with examples?
   b. Discuss with a neat diagram that how interference fringes are produced in Bi-prism Experiment.
2. a. What is an optical fiber? Discuss different parts of an optical fiber? Differentiate between the step- index and graded-index optical fibers ? Discuss its applications and advantages?
   b. Derive Bragg's for crystal diffraction? Find the lattice parameter of a cubic crystal which produces 1st order X-ray diffraction from a plane (111) with wavelength 2.5 A^0 and angle of diffraction 30^0.
3. Write all the Maxwell's equations in differential as well as integral form and state the fundamental laws from which they are derived ?Distinguish between conduction current and displacement current.
4.a. Define Uncertainty principle ?Using it prove the Non-existence of electron in Nucleus?
   b. State and write Poynting theorem and justify that it explains about the conservation of electromagnetic energy?

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