GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

BD17001006

Registration No: | | | | | | | | | | |

Total Number of Pages : 02 B.TECH

AR-17

B.TECH 1ST SEMESTER EXAMINATIONS(BACK), DECEMBER 2019

BBSBS1021- ENGINEERING PHYSICS

Time: 3 Hours Max Marks : 100

The figures in the right hand margin indicate marks.

PART – A (10 x 1 = 10 MARKS)

Answer all questions.

a. Restoring force of an oscillator is maximum at _____position?

b. The superposition is said to be coherent if _____ remains constant between them?

c. The relation between path difference and phase difference is _____?

d. The fundamental unit that repeats to form a lattice is called _____.

e. Which of the following is the volume of the primitive unit cell.

(i) a.(b x c) (ii) b .(c x a) (iii) c. (a x b). (iv) none of these

f. Gauss divergence theorem converts a

(i) Line integral to volume integral (iii) Surface integral to volume integral

(ii) Line integral to surface integral (iv) Volume integral to line integral

g. The SI unit of electric displacement is _____

h. The divergence of a position vector is _____?.

(i) 0 (ii) 1 (iii) 2 (iv) 3

i. The minimum energy required for photoelectric effect is called _____.

j. The rest mass of a photon is _____.

PART-B (15 x 2 = 30 MARKS)

Answer any fifteen questions from the following.

1. When a load of 2 Kg. given to spring, it stretches 0.4 cm. If the load is replaced by another 5 Kg. then what will be the new time period of the oscillator?
2. Three waves of amplitudes 1cm, 2 cm, 3 cm and same frequency superpose coherently to produce a resultant wave. Find the resultant intensity?
3. Find the ratio of the fringe widths when the Bi prism experiment is set by two wavelengths of light $50000A^0$ and $6000A^0$?
4. The first focal length of a zone plate is 2.4 cm. for wavelength $5000A^0$. Find the radii of the 1^{st} and 2^{nd} transparent zones.
5. In an optical fiber, the core material has refractive index 1.6 and refractive index of the cladding material is 1.3. Calculate the acceptance angle?
6. Differentiate between crystalline and amorphous solid with examples?

7. What is the Numerical Aperture of an optical fiber cable with a cladding index of 1.378 and core index of 1.546?
8. Calculate the spacing between (1 0 0) and (1 1 1) planes of a cubic system of lattice parameter $2A^0$?
9. Find the Miller indices of a crystal plane having the intercepts 2a,3b and 4c.
10. Explain BCS theory of superconductivity
11. Find the magnitude of '*b*' of a solenoidal vector $\overrightarrow{A}=2\hat{\imath}\ x^2y+\ 3\hat{\jmath}\ y^2z+4\hat{k}\ z^2x$ at (1, 2, 3).
12. Evaluate curl of the vector field, $\overrightarrow{B}=2\hat{\imath}\ xy+\ 4\hat{\jmath}\ yz+5\hat{k}\ zx$
13. State Ampere's circuital law and obtain its differential form.
14. State Faraday's laws of electromagnetic induction.
15. Show that electromagnetic wave travels with the speed of light in free space.
16. A point source emits light with power 250 W. Find the average value of the Poynting vector at a distance of 2m from the source.
17. State Maxwell's equation in electromagnetism which connects magnetic field vector with electric displacement vector.
18. State Heisenberg's uncertainty relation.
19. Write the characteristics of a wave function in quantum mechanics.
20. Find the de Broglie wavelength of a particle of mass 40 g, moving with speed 1km/s.

PART-C (6 x 5 = 30 MARKS)

Section-I Answer any Six questions

1. Graphically explain the three types of damped motions with their conditions of occurrence.
2. Distinguish between longitudinal and transverse waves. Find the velocity of the longitudinal wave in a medium of density $\rho = 5x10^3$gm/cc and Bulk modulus $B=12x10^{11}$ dyne/cm^2?
3. Define (i) Pumping (ii) Population inversion (iii) Resonator cavity.
4. Compare diamagnetic, paramagnetic and Ferromagnetic materials.
5. What do you mean by Miller indices? Write down the steps to find out Miller indices.
6. Write the Gauss law in electrostatics. Derive an expression for the electric field at a distance 'r' from a point charge 'q' using Gauss law.
7. State Gauss divergence theorem. Using Gauss divergence theorem show that the volume of a sphere is $4/3\ \pi\ r^3$.
8. Write short notes on CNT with two applications.
    a. What is blackbody radiation? Mention its general characteristics. State Plank's formula for blackbody radiation.
    b. Normalize the wave function $\psi(x, t) = 2 \sin x$, $0 \leq x \leq 1$.

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Section – II Answer any Two questions (2 x 15 = 30 MARKS)

1. a. Discuss with a neat diagram that how interference fringes are produced in Newton's Ring Experiment and derive the expression for the diameters of the dark and bright rings? [10]

   b. Discuss the construction of zone plate? Show that a zone plate is similar to a convex lens? [5]

2. a. Discuss the construction, working and applications of Ruby solid state laser? [10]

   b. Mention the properties and application of Superconductors.

3. a. Differentiate between TYPE-I and TYPE-II superconductor. Determine the critical current density for 1mm diameter wire of aluminum at 1.0K, where, T_c=1.196K, $H_0 = 7.9X10^3$ A/m. [10]

   b. Discuss about the different types of magnetic materials? Give their examples and applications?[5]

4. a. Evaluate Curl Grad f, where f is a scalar field? [5]

   b. Using Schrodinger's equation, discuss the case of a free particle in one dimensional potential Well. Find its energy Eigen values of the excited states? [10]

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