GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

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

Total Number of Pages : 2 AR-18 B.TECH

1st Semester (BACK PAPER) Examination-December 2019

BBSBS1021 ENGINEERING PHYSICS

Time : 3 Hours Maximum : 100 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) 10 x 2=20 Mark

Q.1. Answer *All* Questions

a The resistive force of a damped harmonic oscillator is maximum at _____position.
a. mean b. end c. 5cm d. none

b The damping coefficient of an oscillator is 0.88 /sec. and the frequency is 512 Hz. The Q-factor of the oscillator is _____.
a. 290.90 b. 1666.20 c. 1826.90 d. 1999.53

c The resultant amplitude of superposition of two harmonic waves of same amplitude and frequency, but different phases, is equal to the amplitude of either wave. The phase difference between the two waves is _____.
a. $\pi/3$ b. π c. $\pi/4$ d.$2\pi/3$

d The value of susceptibility for paramagnetic materials is always _____.
a. Positive b. Negative c. Zero d. Infinity

e The smallest volume unit cell in a crystal structure is called as:
a. primitive b. fcc c. bcc d. None

f Find the Miller indices of a crystal plane having the intercepts 1a, 2b and 3c with the crystallographic axes respectively?
a. (1 3 5) b. (1 4 5) c. (2 3 7) d. (6 3 2)

g The SI unit of electric displacement is _____
a. C m^{-2} b. Vm^3 c. C m^3 d. V m^{-2}

h Divergence of a vector field is a _____
a. Scalar b. Pseudo Scalar c. Vector d. Tensor

i The Photoelectric effect is_____.
a Slow process b. Instantaneous process c. Isothermal process d. Adiabatic process

j The minimum frequency required for photoelectric effect is known as :
a. work function b. threshold frequency c. stopping frequency d. None

PART – B: (Short Answer Questions) 10X2=20 Marks

Q.2. Answer *ALL* questions

a Write the differential equation of a damped harmonic oscillator. ?[

b Write the classical wave equations for a. Traverse wave in a string, b. Longitudinal wave in a medium of density ‘d’, c. Electromagnetic wave in vacuum.

c How coherent sources are produced by the division of wave front in case of Bi- prism experiment.

d Find the Miller indices of a crystal plane having the intercepts 2a,3b and 4c.

e Define Bragg's law?

f What are the methods to determine the Miller indices of a crystal plane?

g State Maxwell’s equation in electromagnetism which connects magnetic field vector with electric displacement vector.

h Find the Gradient of scalar field S, where $S = x^2 + y^2 + z^2 - 9$.

i Write the Schrodinger time independent equation for a body of mass ‘m’ moving freely in the ZX plane.

j Write the Schrodinger time independent equation for a body of mass ‘m’ moving freely along Y-axis.

PART – C: (Long Answer Questions) 4X15=60 Marks

Answer *ALL* questions

Q.3

a Set up the differential equation for the forced harmonic oscillator. Find the solution and discuss about the resonance. 7

b Define logarithmic decrement, relaxation time and quality factor of damping motion? 8

OR

c Derive the expression for the resultant amplitude of the superposition of two wave having equal frequencies and different amplitudes. 7

d How coherent sources are produced by the division of wave front in case of Bi prism experiment. 8

Q.4

a Discuss the construction and properties of the reciprocal lattice. 7

b Determine the reciprocal lattice of Simple Cubic lattice. 8

OR

c Determine the reciprocal lattice of FCC lattice and BCC lattice. 7

d Differentiate between dia, para and ferro magnetic materials 8

Q.5

a Derive the expression for electromagnetic wave equation in terms of electric and magnetic field in free space using Maxwell's equations. 5

b 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). 10

OR

c State and write Poynting theorem and justify that it explains about the conservation of electromagnetic energy 7

d Evaluate Curl Grad f, where f is a scalar field and div curl $\vec{A}$, where $\vec{A}$ is a vector field. 8

Q.6

a Define Uncertainty principle? Using it find the ground state of one dimensional harmonic oscillator 7

b Normalize the wave function ψ(x, t) = $\sqrt{\frac{2}{\pi}}\cos x$ for a particle moving in one dimension between x= -$\frac{\pi}{2}$, and x=$\frac{\pi}{2}$ 8

OR

c Using Schrodinger's equation, discuss the case of a one dimensional potential Step. Mention its reflection and transmission coefficients 7

d State Heisenberg's Uncertainty principle? A 10 gm particle moves with a speed of 20m/s. If its position is determined with an accuracy of 1 mm, find the uncertainty in its linear momentum 8

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