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# GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Second Semester – Regular) Examinations, September – 2021

## BBSBS1021 – ENGINEERING PHYSICS

(Common to all branches)

Time: 2 hrs

Maximum: 50 Marks

### Answer ALL Questions

The figures in the right hand margin indicate marks.

#### PART – A: (Multiple Choice Questions)

(1 x 10 = 10 Marks)

#### Q.1. Answer ALL questions

[CO#] [PO#]

- a. The restoring force of an oscillator is minimum at \_\_\_\_\_ position. [CO1] [PO1]  
 (i) Extreme (ii) Mean  
 (iii) Both extreme and mean (iv) None
- b. A particle executes SHM with amplitude 8.5 cm. The displacement from the mean where the particle will pass half PE and half KE is about \_\_\_\_\_ cm. [CO1] [PO2]  
 (i) 6 (ii) 8  
 (iii) 10 (iv) 12
- c. The velocity of the longitudinal wave in a medium of density  $\rho = 9.8 \times 10^3 \text{ Kg/m}^3$  and Bulk modulus  $B = 12 \times 10^{11} \text{ N/m}^2$  is \_\_\_\_\_. [CO1] [PO2]  
 (i)  $1.11 \times 10^4 \text{ m/s}$  (ii)  $1.11 \times 10^3 \text{ m/s}$   
 (iii)  $3.22 \times 10^4 \text{ m/s}$  (iv)  $3.22 \times 10^3 \text{ m/s}$
- d. The structure of optical fiber contains [CO2] [PO1]  
 (i) Core (ii) Cladding  
 (iii) Jacket (iv) All of these
- e. Superconductor behaves like a [CO3] [PO1]  
 (i) Ferromagnetic material (ii) Paramagnetic material  
 (iii) Diamagnetic material (iv) None of these
- f. Gradient of a scalar field is a [CO4] [PO1]  
 (i) Scalar (ii) Vector  
 (iii) Tensor (iv) None of these
- g. If divergence of a vector field is zero then the vector is called [CO4] [PO2]  
 (i) Irrotational (ii) rotational  
 (iii) solenoidal (iv) linear
- h. Which Maxwell equation depicts the non-existence of isolated magnetic poles [CO4] [PO1]  
 (i) 1<sup>st</sup> (ii) 2<sup>nd</sup>  
 (iii) 3<sup>rd</sup> (iv) 4<sup>th</sup>
- i. The minimum energy required for photoelectric effect is termed as [CO5] [PO1]  
 (i) potential energy (ii) kinetic energy  
 (iii) threshold frequency (iv) work function
- j. Find the Compton shift for X-ray which is scattered by  $60^\circ$ . [CO5] [PO2]  
 (i)  $0.0122 \text{ \AA}$  (ii)  $0.122 \text{ \AA}$   
 (iii)  $1.22 \text{ \AA}$  (iv) Zero

**PART – B: (Short Answer Questions)****(2 x 5 = 10 Marks)**Q.2. Answer **ALL** questions

[CO#] [PO#]

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|--|-----|-----|
| a. Show that the displacement versus velocity graph for a simple harmonic oscillator is an ellipse.                              | CO1 | PO1 |
| b. The Numerical Aperture of an optical fibre is 0.5 and the core index is 1.54. Calculate the refractive index of the cladding. | CO2 | PO2 |
| c. Differentiate between step index and graded index fibers.   | CO2 | PO1 |
| d. Evaluate curl of the vector field, $\vec{B} = 2\hat{i} xy + 4\hat{j} yz + 5\hat{k} zx$  | CO4 | PO2 |
| e. Find the de Broglie wavelength of a particle of mass 40 g, moving with speed 1km/s.   | CO5 | PO2 |

**PART – C: (Long Answer Questions)****(6 x 5 = 30 Marks)**Answer **ANY FIVE** questions

Marks [CO#] [PO#]

- |  |     |     |     |
|--|-----|-----|-----|
| 3. Set up the differential equations for a damped harmonic oscillator. Find the solution for the under damped oscillation.   | (6) | CO1 | PO1 |
| 4. Discuss with a neat diagram that how interference fringes are produced in Newton's Ring Experiment. Derive the expression of diameter of the dark and bright rings  | (6) | CO1 | PO1 |
| 5. Discuss the principle, construction and working of a He-Ne Gas laser.   | (6) | CO2 | PO1 |
| 6. What is an optical fiber? Discuss the application of optical fibers in communication (FOCL) with suitable diagram. Discuss its advantages and disadvantages.  | (6) | CO2 | PO1 |
| 7. What are the methods to determine the Miller Indices of a crystal plane? Find the Miller indices of a crystal plane having the intercepts 2a, 3b and ∞.   | (6) | CO3 | PO2 |
| 8. Differentiate between dia, para and ferro magnetic material. Mention two applications of magnetic materials.  | (6) | CO3 | PO1 |
| 9. Derive the expression for electromagnetic wave equation in terms of electric and magnetic field in free space using Maxwell's equations   | (6) | CO4 | PO1 |
| 10. In a photoelectric experiment, the threshold wavelength of tungsten cathode is 2300Å. Calculate the work function of the metal if it is irradiated by a light of wavelength 1800Å. Find the maximum energy of the emitted electrons. | (6) | CO5 | PO2 |

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