A   Reg. No. :

Question Paper Code: 91003

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

First Semester

Civil Engineering

19UPH103- ENGINEERING PHYSICS

(Common to ALL branches)

(Regulation 2019)

Duration: Three hours   Maximum: 100 Marks

Answer ALL questions

PART A - (10 x 1 = 10 Marks)

1. The coordination number for FCC lattice is   CO1- R

   (a) 12   (b) 6   (c) 8   (d) 24

2. The number of atoms per unit cell for a simple cubic crystal structure is   CO1- R

   (a) 4   (b) 1   (c) 2   (d) 6

3. Atomic packing factor for BCC crystal lattice is   CO1- R

   (a) 32%   (b) 52%   (c) 74%   (d) 68%

4. If N_1 and N_2 are the number of atoms in ground state and excited state   CO2- R
   respectively, then in population inversion

   (a) $N_1 < N_2$ (b) $N_1 > N_2$ (c) $N_1 = N_2$ (d) $N_1 > 2N_2$

5. A hologram contains the information about   CO2- R

   (a) Amplitude of the object   (b) Phase of the object

   (c) Both amplitude and phase of the object   (d) None of these

6. If λ_m is the wavelength corresponding to maximum energy and T is the   CO3- R
   absolute temperature, then according to Wien's displacement law,

   (a) $\lambda_m T = $ constant   (b) $\lambda_m / T = $ constant   (c) $\lambda_m T^{1/2} = $ constant   (d) $\lambda_m / T^{1/2} = $ constant

7. According to Planck's hypothesis, the exchange of energy between the radiation and matter is not continuous but it is limited to the integral multiple of   CO3- R

   (a) $1/h\nu$ (b) h/ν (c) ν/h (d) $h\nu$

8. If a particle having mass m is moving with velocity v, the deBroglie wavelength associated with the matter wave is   CO3- R

   (a) $\lambda = h/mv$ (b) $\lambda = h/mv^2$ (c) $\lambda = h^2/mv$ (d) $\lambda = mv/h$

9. The modulus of elasticity is   CO4- R

   (a) Stress × Strain   (b) Stress / Strain   (c) Strain / Stress   (d) Stress× Young's modulus

10. The ratio of lateral strain to linear strain is   CO4- R

    (a) Elastic limit   (b) Young's modulus   (c) Rigidity modulus   (d) Poisson's ratio

PART – B (5 x 2= 10 Marks)

11. Calculate the Miller Indices of a plane which cuts the intercepts of 2, 3, 4 units along x, y and z axes respectively.   CO1- App

12. Define unit cell.   CO1- R

13. What is holography?   CO2- R

14. Mention any two physical significance of the wave function ψ.   CO3- R

15. State Hooke's law.   CO4- R

PART – C (5 x 16= 80 Marks)

16. (a) (i) Derive the relation between interplanar distance 'd' and lattice constant 'a' for a plane whose Miller indices are (h k l).   CO1- U   (8)

    (ii) Show that the c/a ratio for an ideal HCP structure is $\sqrt{8/3}$ CO1- U   (8)

    Or

    (b) Explain with necessary diagram point defects and line defects that occur in crystals.   CO1- U   (16)

17. (a) Prove the existence of stimulated emission of radiation for laser action to take place using Einstein's theory.   CO2- U   (16)

    Or

    (b) Describe the construction and working of CO_2 laser.   CO2- U   (16)

18. (a) (i) Show that the atomic packing factor for FCC is 74%.   CO1- U   (8)

    (ii) Derive Schrodinger's time independent wave equation.   CO3- U   (8)

    Or

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(b) (i) Explain surface defects in crystals.   CO1- U   (8)

      (ii) Derive Schrodinger's time dependent wave equation.   CO3- U   (8)

19. (a) Show that Compton shift in wavelength depends on scattering angle using Compton effect.   CO3- U   (16)

<div align="center">Or</div>

  (b) Solve Schrodinger's wave equation for a particle lying in a one dimensional box of length 'a'.   CO3- U   (16)

20. (a) What is a cantilever? Derive an expression to find the depression produced in a cantilever fixed at one end and loaded at the other end.   CO4- U   (16)

<div align="center">Or</div>

  (b) (i) Draw the stress strain curve for a ductile material and explain it.   CO4- U   (8)

      (ii) Discuss the factors affecting elasticity.   CO4- U   (8)

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