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Question Paper Code: 91003

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

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 respectively, then in population inversion CO2- R
(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 absolute temperature, then according to Wien's displacement law, CO3- R
(a) $\lambda_m T = \text{constant}$ (b) $\lambda_m / T = \text{constant}$ (c) $\lambda_m T^{1/2} = \text{constant}$ (d) $\lambda_m / T^{1/2} = \text{constant}$

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 \times Strain (b) Stress / Strain (c) Strain / Stress (d) Stress \times 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 CO₂ 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

- (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)
- Or
- (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)
- Or
- (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)

