A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code: U1P03

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

First Semester

Civil Engineering

21UPH103- ENGINEERING PHYSICS

(Common to ALL branches)

(Regulation 2021)

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- U

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

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

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

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

   (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- U

   (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- U

   (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- U

   (a) $\lambda_m T$ = constant (b) λ_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- U

(a) 1/ hν (b) h/ν (c) ν/h (d) hν

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

(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- U

(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- U

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

PART – B (5 x 2= 10 Marks)

11. Draw the planes for Miller Indices (100), (110), and (111) CO1-App

12. Why colours are formed in thin films? CO2-U

13. Distinguish between spontaneous and stimulated emissions? CO3- U

14. What is physical significance of wave function? CO4-U

15. What are the effects of hammering and annealing on elasticity of a material? CO5-U

PART – C (5 x 16= 80 Marks)

16. (a) What are miller indices? Sketch two successive (110) planes. Show that for a cubic lattice the distance between two successive plane (h k l) is given by CO1- U (16)

$$d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

Or

(b) What is axial ratio? Prove that the packing factor of HCP is 0.74. CO1- U (16)

17. (a) Explain the formation of interference fringes in an air-wedge shaped film. How is the thickness of the wire determinedby this method? CO2- U (16)

Or

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

18.	(a)	Derive Einstein's A and B coefficients.	CO1- U	(16)
		Or		
	(b)	Explain the modes of vibrations of CO_2 molecule. Describe the construction and working of CO_2 laser with necessary diagrams.	CO1- U	(16)
19.	(a)	With the concepts of quantum theory of black body radiation, derive an expression for energy distribution and use it to prove Wien's law and Rayleigh jeans law.	CO4- U	(16)
		Or		
	(b)	Obtain the Eigen values and Eigen functions for an electron enclosed in a one dimensional potential box.	CO4- U	(16)
20.	(a)	A patient's leg was put into traction, stretching the femur from a length of 0.46 m to 0.461 m. The femur has a diameter of 3.05 cm. With the knowledge that bone has a Young's modulus of $\sim 1.6 \times 10^{10}$ in tension, what force was used to stretch the femur?	CO6- Ana	(16)
		Or		
	(b)	A circular and square cantilever is made of same material and has equal area of cross-section and length. Analyze the ratio of their depression for a given load.	CO6- Ana	(16)