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

Question Paper Code: U1P03

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

First Semester

Civil Engineering

21UPH103- ENGINEERING PHYSICS

(Common to ALL branches)

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. If the Miller indices of two planes are (211) and (422), then they are: CO4 -App

   (a) Parallel (b) perpendicular (c) they are at an angle of 45° (d) none of the above

2. Copper has FCC structure and its atomic radius is $1.273X10^{-10}$m. Find the lattice parameter. CO4 - App

   (a) 4.26×10^{-10}m (b) 4.28×10^{-10}m (c) 5.33×10^{-10}m (d) 3.6×10^{-10}m

3. If in a young's double slit experiment the distance between the two slits is halved and the distance between the slit and the screen is doubled then fringe width CO1-U

   (a) remains the same (b) decreased by 4 times

   (c) increases by 4 times (d) increases by 2 times

4. Zero order fringe can be identified using CO1-U

   (a) White light (b) yellow light (c) Achromatic light (d) Monochromatic light

5. For semiconductor laser the band gap is 0.80 ev. What is the wavelength of light emitted. CO3- App

   (a) 1.223μm (b)1.064μm (c)1.321μm (d) 1.55μm

6. Holography is based on the principle of CO1-U

   (a) Interference (b) Diffraction (c) Polarization (d) Double refraction

7. In a finite Potential well, the potential energy outside the box is CO2-U

(a) zero (b) infinite (c) constant (d) variable

8. Matter waves are not_____ waves. CO2-U

(a) electromagnetic (b) electric (c) magnetic (d) transverse

9. A man grows into a giant such that his linear dimensions increase by a factor of 9. Assuming that his density remains the same, the stress in the leg will change by a factor of CO6-Ana

(a) 1/9 (b) 81 (c) 1/81 (d) 9

10. Maximum limit up to which stress is applied on body without deformation is called CO2-U

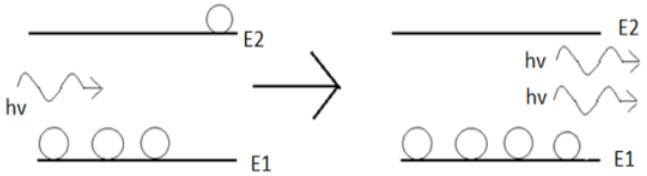
(a) limit (b) elastic limit (c) strain (d) torque

PART – B (5 x 2= 10Marks)

11. The lattice constant for a FCC structure is 4.938 Å. Calculate the Interplanar spacing of (220) planes. CO4-App

12. Why colours are formed in thin films? CO1- U

13. CO1- U



Explain the above Pictorial Representation

14. State the properties of matter waves? CO2- U

15. Read the following two statements carefully and state with reasons. Analyze whether it is true or false. CO6-Ana

(a) The young's modulus of rubber is greater than that of steel.

(b) The stretching of a coil is determined by its shear modulus.

PART – C (5 x 16= 80Marks)

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) Apply the theory of Young's double slit experiment and calculate the width of bright and dark fringes. CO1- U (16)

Or

(b) Describe the necessary theory, the method of determining the refractive index of a given liquid medium using the Newton's rings method. CO1- U (16)

18. (a) (i) Derive Einstein's A and B coefficients. CO1- U (12)

(ii) Calculate the relative population of sodium atoms in sodium lamp in the first excited state and ground state at a temperature of 250°C [$\lambda = 590$ nm] CO4 App (4)

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) Explain Compton shift? Show that the Compton shift CO2- U (16)

$$\Delta\lambda = \frac{h}{m_0 c}(1 - cos\theta)$$

Or

(b) Derive Schrodinger time independent and time dependent wave equations. CO2- U (16)

20. (a) (i) Draw the stress-strain diagram. What do you infer from this curve? CO2- U (10)

(ii) A wire of length 10m and diameter 2 mm elongates 0.2 mm when stretched by a weight of 0.55 kg Calculate Young's modulus of the material of the wire CO4-App (6)

Or

(b) Describe with necessary theory, the method of determining a young's modulus of the material of the beam of rectangular cross section by bending it uniformly. CO2- U (16)