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Question Paper Code: 91003

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

- Which of the following is the basic building block of a crystal? CO1- U
(a) unit cell (b) basis (c) lattice (d) primitive cell
- Calculate the inter planar distance for 321 plane in SC lattice with CO2- App
 $a = 4.12 \times 10^{-10} \text{m}$
(a) $2.20 \times 10^{-10} \text{m}$ (b) $1.011 \times 10^{-10} \text{m}$ (c) $2.30 \times 10^{-10} \text{m}$ (d) $3.20 \times 10^{-10} \text{m}$
- The mathematical expression for existence of stimulated emission is CO1- U
proposed by
(a) newton (b) einstein (c) rutherford (d) schrodiger
- Calculate the wavelength of the emission from GaAs semiconductor CO3- App
laser whose band energy is 3eV.
(a) $4.141 \times 10^{-5} \text{m}$ (b) $4.141 \times 10^{-7} \text{m}$ (c) $4.141 \times 10^{-3} \text{m}$ (d) $4.141 \times 10^{-2} \text{m}$
- Matter waves are not..... waves CO1- U
(a) electromagnetic (b) electric (c) magnetic (d) transverse
- In a finite Potential well, the potential energy outside the box is CO1- U
(a) zero (b) infinite (c) constant (d) variable

7. A copper wire of length 3m and 1mm diameter is subjected to a tension of 5N. CO2- App
Calculate the elongation produced, if the young's modulus of copper is 120GPa.
- (a) 15m (b) 1800m (c) 0.125×10^{-3} m (d) 15.9mm
8. Which is more elastic? CO1- U
(a) Water (b) Air (c) Solid (d) Crystal
9. Holography is based on the principle of CO1- U
(a) Interference (b) diffraction (c) polarisation (d) double refraction
10. Maximum limit up to which stress is applied on body without CO1- U
deformation is called
(a) limit (b) elastic limit (c) strain (d) torque

PART – B (5 x 2= 10 Marks)

11. What are Bravias Lattices? CO1- U
12. Laser is called as a non-material knife. Justify CO2- App
13. Explain wave function CO1- U
14. What are the effects of hammering and annealing on elasticity of a material? CO1- U
15. Define neutral axis. CO1- U

PART – C (5 x 16= 80 Marks)

16. (a) (i) Explain the seven crystal system on the basis of lattice CO1- U (10)
parameters.
(ii) α -iron of atomic weight 55.85 solidifies into BCC structure CO2- App (6)
and has a density 7860 kgm^{-3} . Calculate the radius of an atom
Or
- (b) (i) Apply the concepts of crystal structures and find the packing CO1- U (12)
factor of BCC and FCC.
(ii) Lithium crystalizes in BCC structure. Calculate the lattice CO2- App (4)
constant, given that the atomic weight and density for lithium are
 6.94 and 530 kgm^3 respectively.
17. (a) What are the different pumping mechanisms used in lasers? Give CO1- U (16)
an example for each.
Or
- (b) (i) Explain the lasing schemes and working of a Nd:YAG laser. CO3- U (12)
(ii) Find the relative population of the two states in a Nd-YAG CO3- App (4)
laser that produces a light beam of wavelength 6943 \AA at 300 K.

18. (a) Deduce Rayleigh jeans law and Wien's displacement law from Planck's law of radiation. CO2- U (16)
- Or
- (b) (i) Derive the Schrodinger's time independent wave equation on the basis of de-Broglie's hypothesis CO4- U (12)
- (ii) A neutron of mass 1.675×10^{-27} kg is moving with a kinetic energy 10 keV. Calculate the de-Broglie wavelength associated with it. CO4- App (4)
19. (a) Explain three moduli of elasticity with suitable diagram. CO1- U (16)
- Or
- (b) (i) Categorize the various factors affecting the elastic nature of the materials. CO3- U (12)
- (ii) A spherical ball contracts in volume by 0.01% when subjected to a normal pressure of 10^8 Nm^{-2} . Find the bulk modulus of the material. CO6- App (4)
20. (a) (i) Classify lasers based on active medium with one example for each. CO1- U (8)
- (ii) Transition occurs between metastable state E_3 and an energy state E_2 just above the ground state. If emission is at $1.1 \mu\text{m}$ CO3- App (8)
- Or
- (b) Explain molecular gas laser and with neat sketch, explain the construction and working of CO_2 laser using energy level diagram. CO1- U (16)

