A   Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 91003

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

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. Which of the following is the basic building block of a crystal?   CO1- U

   (a) unit cell   (b) basis   (c) lattice   (d) primitive cell

2. Calculate the inter planar distance for 321 plane in SC lattice with   CO2- App
   $a = 4.12 \times 10^{-10}$m

   (a) 2.20×10^{-10}m   (b) 1.011×10^{-10}m   (c) 2.30×10^{-10}m   (d) 3.20×10^{-10}m

3. The mathematical expression for existence of stimulated emission is   CO1- U
   proposed by

   (a) newton   (b) einstein   (c) rutherford   (d) schrodiger

4. Calculate the wavelength of the emission from GaAs semiconductor   CO3- App
   laser whose band energy is 3eV.

   (a) 4.141×10^{-5}m   (b) 4.141×10^{-7}m   (c) 4.141×10^{-3}m   (d) 4.141×10^{-2}m

5. Matter waves are not…………………. waves   CO1- U

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

6. 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) $0.125 \times 10\text{-}3$ 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 Å at 300 K.

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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 1.1μm　　CO3- App　(8)

Or

(b) Explain molocular gas laser and with neat sketch, explain the construction and working of CO_2 laser using energy level diagram.　　CO1- U　(16)

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