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Question Paper Code: 31P03

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

First Semester

Civil Engineering

01UPH103 - ENGINEERING PHYSICS

(Common to ALL Branches)

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. How depth of the sea can be measured using ultrasonic waves?
2. Ultrasound cannot be produced by loudspeakers. Why?
3. What do you mean by population inversion?
4. Define optical pumping.
5. The refractive index of core and cladding are 1.60 and 1.50 respectively. Calculate the critical angle at core-cladding interface.
6. Distinguish between an active and passive sensor.
7. What is meant by degenerate and non-degenerate states?
8. Write the one dimensional Schrödinger time independent wave equation for a free particle.
9. Define space lattice and lattice points
10. Mention any two differences between edge and screw dislocation.

PART - B (5 x 16 = 80 Marks)

11. (a) What is inverse piezoelectric effect? Describe the construction and working of a piezoelectric generator to produce ultrasonic sound waves (16)

Or

- (b) Describe the method of determining the velocity of ultrasonic waves using acoustic grating. (16)

12. (b) Describe the construction and working of Nd-YAG laser with neat energy level diagram. (16)

Or

- (b) (i) Describe the method of construction and reconstruction of hologram. (12)
(ii) Mention any four medical applications of laser. (4)

13. (a) (i) Explain the double crucible technique of fibre drawing. (10)
(ii) A step index fiber has a core refractive index of 1.48. If the core diameter and the numerical aperture of the fiber are respectively 50 μm and 0.5, find the refractive index of the cladding, the acceptance angle and maximum number of modes of light of wavelength 1 μm the fiber can carry. (6)

Or

- (b) (i) With neat diagram explain the fabrication of optical fiber by crucible-crucible method. (8)
(ii) Discuss the advantages of optical fiber communication over conventional metallic type wire communication. (8)

14. (a) (i) Derive an expression for Schrodinger time independent wave equation. (12)
(ii) State the physical significance of wave function. (4)

Or

- (b) Explain the construction and working of transmission electron microscope. Give its merits and demerits. (16)

15. (a) Deduce the atomic packing factor of FCC crystal with neat diagram. (16)

Or

(b) Show that in ideal hexagonal closed packed structure c/a ratio is 1.663 and the density of atomic packing factor equals to that of the face-centered cubic structure. (16)

