Reg. No. : | | | | | | | | | | |

Question Paper Code: 11003

B.E. / B.Tech. DEGREE EXAMINATION, OCTOBER 2014.

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. What is acoustic grating?
2. How depth of the sea can be measured using ultrasonic waves?
3. What do you mean by population inversion?
4. Define spontaneous emission and stimulated emission.
5. Write any four major advantages of optical fibre communication over other conventional communication systems.
6. Define acceptance angle of a fibre.
7. What are the advantages of scanning electron microscope?
8. What are matter waves?
9. What are the coordination numbers for BCC and FCC structures?

10. A crystal plane cuts at 3a, 4b and c distances along the crystallographic axes. Find the Miller Indices of the plane.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Describe in detail the production of ultrasonic waves by Piezo-electric method. (12)

(ii) Describe different methods of detecting ultrasonic waves. (4)

Or

(b) (i) Draw a block diagram of ultrasonic flaw detector. Describe the working of ultrasonic flaw detector for non-destructive testing by reflection mode. (12)

(ii) Explain ultrasonic A-scan display used for data presentation. (4)

12. (a) (i) Describe the construction and working of CO_2 laser with necessary diagrams. (12)

(ii) A Nd-YAG laser emits light at wavelength of 1.063×10^{-6}m. If the output power is 20 W, then how many photons are emitted in ten minutes when the laser is in operation? Wavelength $\lambda = 1.063 \times 10^{-6}$ m. Output power P = 20 W. (4)

Or

(b) (i) Explain the construction and working of homojunction semiconductor laser. (10)

(ii) Explain the construction of a hologram with a neat diagram. (6)

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) Explain in detail how optical fibers are characterized according to the material, refractive index and modes of propagation. (12)

(ii) Explain the working of any one fibre optic sensor. (4)

14. (a) What is Compton Effect? Derive an expression for the frequency of the scattered photon in terms of the frequency of incident radiation and scattering angle. (16)

Or

(b) Apply Schrodinger wave equation for a particle in a box (one dimensional case). Derive expressions for eigen functions and corresponding energies. (16)

15. (a) 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)

Or

(b) (i) Derive the inter-planar distance between any two neighboring planes. (10)

(ii) Write a note on Frenkel defect and Edge dislocation. (6)