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Question Paper Code : 37006

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

First Semester

Civil Engineering

PH 6151 — ENGINEERING PHYSICS — I

(Common to all branches)

(Regulation 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a primitive cell? Give an example.
2. Name few techniques of crystal growth from melt.
3. A copper wire of 3 m length and 1 mm diameter is subjected to a tension of 5N. Calculate the elongation produced in the wire if the Young's modulus of copper is 120 GPa.
4. State Newton's law of cooling.
5. Find the lowest energy of electron confined to move in a one dimensional box of length 1Å. Given.
 $m_e = 9.1 \times 10^{-31}$ kg
 $\lambda = 6.625 \times 10^{-34}$ JS.
6. Write the principle of transmission electron microscope.
7. State Weber-Fechner law.
8. Are ultrasonic waves electromagnetic waves in nature? Explain.
9. Can a two level system be used for the production of laser? Why?
10. Write any four major advantages of optical fibre communication over other communication systems.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is packing factor? Prove that the packing factor of HCP is 0.74. (2 + 10)
- (ii) Copper has fcc structure and its atomic radius is 1.273Å. Find
- (1) Lattice parameter and (2)
- (2) Density of copper. (2)

Given

Atomic weight of copper = 63.5

Avagadro's number = 6.026×10^{26} mol⁻¹.

Or

- (b) (i) Describe Bridgmann method of crystal growth. (8)
- (ii) Briefly explain the Chemical Vapour Deposition (CVD) method. (8)
12. (a) (i) Derive an expression for depression at the free end of cantilever due to load. (12)
- (ii) Give an account of I-shape Girders. (4)

Or

- (b) Describe with theory Lee's disc method of determination of thermal conductivity of a bad conductor. (16)
13. (a) (i) Derive Planck's law of radiation. (12)
- (ii) In a Compton scattering experiment the incident photons have a wavelength of 3Å. What is the wavelength of the scattered photons if they are viewed at an angle of 60° to the direction of incidence? (4)

Given :

$$M_e = 9.1 \times 10^{-31} \text{ Kg}$$

$$\lambda = 6.625 \times 10^{-34} \text{ Js}$$

$$C = 3 \times 10^8 \text{ ms}^{-1}.$$

Or

- (b) Write the principle, working, advantages and disadvantages of scanning electron microscope. (16)

14. (a) State and explain Sabine's formula for reverberation time of a hall. Derive Sabine's formula for reverberation time. (16)

Or

- (b) (i) Explain Piezo-electric effect. Describe the piezo-electric method of producing ultrasonic waves. (2 + 10)
- (ii) Calculate the velocity of ultrasonic waves in a liquid in an acoustic grating experiment using the following data. (4)

$$\text{Wavelength of light used} = 600\text{nm}$$

$$\text{Frequency of ultrasonic waves} = 100\text{MHz}$$

$$\text{Angle of diffraction} = 5^\circ$$

15. (a) (i) Describe the construction and working of Co_2 laser and their uses. (14)

- (ii) For a semiconductor laser, the bandgap is 0.9eV . What is the wavelength of light emitted from it. Use the following data: (2)

$$C = 3 \times 10^8 \text{ m/s}$$

$$\lambda = 6.625 \times 10^{-34} \text{ Js}$$

Or

- (b) Explain the construction and working of displacement and Temperature fibre optic sensors. (8+8)