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Question Paper Code : 97177

B.E./B.Tech. DEGREE EXAMINATION, DECEMBER 2015/JANUARY 2016

First Semester

Civil Engineering

PH 2111 – ENGINEERING PHYSICS – I

(Common to All branches)

(Regulations 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is cavitation?
2. A nickel rod is used to produce ultrasonic waves of frequency f . If ultrasonic waves with frequency $2f$ is to be produced what should be the length of the nickel rod?
3. Calculate the wavelength of radiation emitted by an LED made up of a semiconducting material with band gap energy 2.8 eV.
4. What are the advantages of oxygen assisted laser cutting?
5. How will you calculate the loss in optical fibre communication?
6. Which one is the best sensor : temperature sensor or pressure sensor?
7. Find the lowest energy of an electron confined to move in a one dimensional box of length 1Å. Express the result in electron volts.
8. What is meant by normalization of wavefunction?
9. What are Bravais lattices?
10. What are lattice parameters of a unit cell?

PART B — (5 × 16 = 80 marks)

11. (a) Describe the production of ultrasonic waves using
 - (i) Magnetostriction effect
 - (ii) Piezoelectric method.

Or

- (b) Discuss the industrial and medical applications of ultrasonic waves.

12. (a) Describe the construction and working of CO₂ and their uses. (16)

Or

(b) Describe the construction and working of He-Ne laser and their uses. (16)

13. (a) Explain in detail the classification of optical fibre.

Or

(b) Describe the principle of fibre optic sensors. Explain fibre optic displacement sensor and fibre optic temperature sensor.

14. (a) (i) What is Compton effect? Obtain an expression for Compton shift. (10)

(ii) Describe briefly about the working of scanning electron microscope. (6)

Or

(b) (i) Write Schrodinger's equation for a particle in a box. Solve it to obtain eigen values and eigen functions and show that they are discrete. (10)

(ii) Obtain Rayleigh Jeans law from Plancks theory. Is Rayleigh Jeans law valid for all wavelengths? (6)

15. (a) (i) What are Miller indices? Mention the steps involved to determine the Miller indices with example. (2 + 4)

(ii) The material zinc has HCP structure. If the radius of the atom is $\frac{1}{4}$ th of the diagonal of hexagon, calculate the height of the unit cell in terms of atomic radius. (2)

(iii) Show that the packing factor for HCP is 74%. (8)

Or

(b) (i) Define the terms polymorphism and allotropy. (2)

(ii) Explain in detail the crystal defects and their types. (14)