Question Paper Code : 11625

B.E./B.Tech. DEGREE EXAMINATION, JANUARY 2013.

First Semester

(Common to all Branches)

PH 2111/PH 13/080040001 — ENGINEERING PHYSICS — I

(Regulation 2008/2010)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What is acoustic grating?

2.   What is inverse piezoelectric effect?

3.   Explain stimulated emission.

4.   Name any two uses of lasers in medicine.

5.   Define total internal reflection.

6.   Calculate the numerical aperture and hence the acceptance angle for an optical fibre whose core and cladding has refractive index of 1.59 and 1.40 respectively.

7.   Give the significance of wave function.

8.   Write Planck's radiation formula.

9.   What are Bravais lattices?

10. What are lattice parameters of a unit cell?

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is the phenomenon of magnetostriction? Using that phenomenon explain how high frequency sound waves are produced. (2 + 10)

   (ii) A nickel crystal of length 10 cm with density 8.1×10^3 kg/m³ and Youngs modulus 8.2×10^{11} N/m² is used in a magnetostrictive oscillator. Determine the fundamental frequency of the ultrasonic waves generated. (4)

Or

   (b) (i) Explain in detail how a A- Scan technique is employed to locate a defect. (12)

   (ii) Find the depth of a submarine if an ultrasonic pulse reflected from the submarine is received 0.33 sec after sending out the ultrasonic waves. Given the sound velocity in sea water is 1440 m/sec. (4)

12. (a) Describe the construction and working of CO_2 laser and their uses. (16)

Or

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

13. (a) Give an account of fibre optic communication system and its advantages. (16)

Or

   (b) Discuss about the various types of optical fibres. (16)

14. (a) Give an account of Scanning Electron Microscope. (16)

Or

   (b) Derive Schrödinger time dependent wave equation. (16)

15. (a) What are Miller indices? Show that for a cubic lattice the distance between two successive (h k 1) planes is given by $d = a/\sqrt{h^2 + k^2 + l^2}$. (4 + 12)

Or

   (b) Calculate the number of atoms per unit cell, coordination number and packing factor for F.C.C and B.C.C structures. (4 + 4 + 4 + 4)

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