C 6285

Name.................................

Reg. No.............................

COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, MAY 2010

EN/PTEN 09 103—ENGINEERING PHYSICS

(2009 admissions)

Time : Three Hours

Maximum : 70 Marks

Part A

Answer all the questions.
Each question carries 2 marks.

1. How can Newton rings experiment be used to determine refractive index of liquid ?

2. What is the difference between unit cell and primitive cell ?

3. Why population inversion is necessary to achieve in lasing action ?

4. Explain zener breakdown.

5. What is called nanomaterials ?

$(5 \times 2 = 10 \text{ marks})$

Part B

Answer any four questions.
Each question carries 5 marks.

6. What is half wave plate ? Explain its action on polarized light incident on it with its electric vector E making an angle θ with the optic axis of the half wave plate.

7. Derive the expression for the distance between the atomic planes such as (100) and (110) planes of the cubic crystals.

8. The position and momentum of a 1 keV electron are simultaneously determined. If its position is located within 0.1 nm, what is the percentage of minimum uncertainty in its momentum ?

9. Consider a range of light entering 2 m. long step index fiber, whose refractive index arid diameter of the core are 1.48 and 60 μm respectively. If the incident ray makes an angle of 3.43° with the axis of the fiber, how many reflections will it undergo within the fiber ?

10. Explain how the Fermi level changes with the increasing amount of impurity in *n*-type and *p*-type semiconductor.

11. Explain the properties and applications of carbon nanotubes (CNT).

$(4 \times 5 = 20 \text{ marks})$

Turn over

Part C

Answer Section (a) or Section (b) of each question.
Each question carries 10 marks.

12. (a) Explain the following :—

    (i) Double refraction.

    (ii) Optic axis

    (iii) Positive and negative refractive index crystals.

How can we experimentally distinguish between plane polarized, circularly polarized and elliptically polarized light.

Or

  (b) Explain :

    (i) Basic principle of holography.

    (ii) Recording and reconstruction of holograms.

13. (a) Explain population inversion. Describe the construction and working of a semiconductor laser with band diagram.

Or

  (b) Explain how the reverberation time affects the acoustic of building. Also give a brief account of corrective measures.

14. (a) Explain the phenomenon involved at junction of the superconductor using A.C. Josephson effect.

Or

  (b) Explain the principle and working of LED with suitable diagram.

15. (a) Derive Schrodinger time dependent and time independent equation.

Or

  (b) What is piezoelectric crystal ? How can it be used for the production of longitudinal ultrasonic waves through oscillator circuit ?