Code: 13A56101

R13

B.Tech I Year (R13) Supplementary Examinations June 2016

ENGINEERING PHYSICS

(Common to all branches)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Distinguish between spontaneous emission and stimulated emission.

(b) Find the numerical aperture of a glass cladded fibre made with core glass of refractive index 1.5 and cladding is doped to give a fractional index difference of 0.0005.

(c) What are point defects? Describe Frenkel and Schottky defects.

(d) X-ray of wavelength 1.75A are diffracted by (111) plane in a crystal at an angle 30 in the first order. Calculate inter atom spacing.

(e) Derive the expression for the de-Broglie wavelength of matter waves.

(f) Mention the main drawbacks of classical free electron theory of metals.

(g) Define drift and diffusion currents.

(h) Describe the origin of magnetic moments. Define Bohr magneton.

(i) Define the following terms in superconductors:
(i) Critical temperature. (ii) Critical magnetic field.

(j) What are carbon nanotubes? Mention the types of carbon nanotubes.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 Derive the expression for brightness and darkness for a monochromatic light beam reflected from a thin parallel film of transparent material.

OR

3 (a) What is population inversion? How it is achieved by optical pumping?

(b) Explain the principle and working of ruby laser.

UNIT - II

4 (a) What do you understand by Miller indices of a crystal plane? Explain.

(b) Obtain an expression for the spacing between two consecutive parallel planes of miller indices (hkl) of cubic crystal of lattice parameter ‘a’.

OR

5 What is piezoelectric effect? Explain the piezoelectric method of producing ultrasonic waves with neat circuit diagram

UNIT - III

6 Write the Schrodinger equation for a particle in a box. Solve it to obtain Eigen functions and show that the Eigen values are discrete.

OR

7 Discuss the Kronig-Penny model for the motion of an electron in a periodic potential. Show how the materials can be classified into conductors, insulators and semiconductors from E versus K graph.

UNIT - IV

8 What is Hall effect? Deduce the expression for Hall coefficient for p-type semiconductors and describe an experimental set up for measuring Hall voltage.

OR

9 Draw the B-H curve for a ferromagnetic material placed in a magnetic field and explain magnetic hysteresis on the basis of domain theory.

UNIT - V

10 (a) Discuss type-I and type-II superconductors.

(b) Discuss how BCS theory explains superconductivity.

OR

11 Classify the nanomaterials on the basis of dimensionality. Describe a method from each of top down and bottom up approaches of synthesis of nanomaterial.

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