Code: 15A56101 **R15**

B.Tech I Year I Semester (R15) Regular & Supplementary Examinations November/December 2018

**ENGINEERING PHYSICS**

(Common to CE, EEE & CSE)

Time: 3 hours Max. Marks: 70

**PART – A**

(Compulsory Question)

*****

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

(a) Distinguish between the division of phase and division of amplitude in interference, give an example for each.

(b) What is optical fibre? Explain the phenomenon on which the optical fibre works.

(c) What is Bragg's law?

(d) Mention the properties of ultrasonics.

(e) A photon has a wavelength of 1.2 A. Calculate its energy in eV and momentum (Plank's constant is $6.62 \times 10^{-34}$ JS, $v = 3 \times 10^{8}$ m/sec)

(f) What are the merits of classical free electron theory? Explain.

(g) Explain the formation of depletion region in p-n junction.

(h) Distinguish between soft and hard magnetic materials.

(i) Explain the isotope effect in superconductors.

(j) Mention a few applications of nanomaterials.

**PART – B**

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

**UNIT – I**

2 (a) Obtain the conditions for maxima and minima due to interference of reflected light in thin films of uniform thickness.

(b) A soap film of refractive index 1.33 and thickness 5000A is exposed to white light. What wavelengths in the visible region are reflected?

**OR**

3 (a) What is population inversion? How it is achieved? Derive the relation between the probabilities of spontaneous and stimulated emission in terms of Einstein's coefficients.

(b) Calculate the wavelength of emitted radiation from GaAs which has the band gap of 1.44 eV.

**UNIT – II**

4 (a) Describe the properties of ultrasonic waves.

(b) Describe different methods of detection of ultrasonic waves.

**OR**

5 (a) Discuss seven crystal systems and their Bravais lattices with suitable examples.

(b) Calculate the ratios $d_{100}:d_{110}:d_{111}$ for a simple cubic lattice.

**UNIT – III**

6 (a) Write the Schrodinger wave equation for a particle in an infinitely deep potential well and find its Eigen values and Eigen functions.

(b) Find the energy of an electron moving in an infinitely high potential box of width 1 A. (Mass of the electron is $9.1 \times 10^{-31}$ kg and $h = 6.63 \times 10^{-34}$ Js)

**OR**

7 (a) Explain the formation of bands in solid.

(b) Discuss the concept of allowed energy bands in solids on the basis of Kronig-Penny model.

Contd. in page 2

Code: 15A56101

R15

**UNIT – IV**

8 (a) Explain the drift and diffusion currents.
(b) Discuss direct and indirect band gap semiconductors and mention their applications in devices.

**OR**

9 (a) What do you understand by hysteresis loop? Explain the loop on the basis of domains.
(b) How do you determine the value of retentivity and coercivity from the hysteresis loop?

**UNIT – V**

10 (a) What do you mean by critical field in superconductivity? Explain.
(b) Explain the BCS theory of superconductivity.

**OR**

11 (a) Write a note on quantum confinement.
(b) Discuss the optical, thermal, mechanical and magnetic properties of nanomaterials.

*****