

B.Tech I Year I Semester (R15) Regular Examinations December/January 2015/2016

ENGINEERING PHYSICS
(Common to CE, EEE and CSE)

Time: 3 hours

Max. Marks: 70

PART – A
(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- (a) Distinguish between Fresnel and Fraunhofer diffraction
 - (b) What is population inversion? Give four applications of lasers
 - (c) Calculate the interplanar spacing for a (321) plane in a simple cubic lattice whose lattice constant is 4.2\AA .
 - (d) Draw the crystal planes having miller indices (111), (110), (010) and (100).
 - (e) Show that the de Broglie wavelength for an electron is found to be $\frac{12.26}{\sqrt{V}} \text{\AA}$.
 - (f) What are the basic assumptions of classical free electron theory?
 - (g) Explain drift and diffusion currents
 - (h) Define magnetic susceptibility and permeability. Obtain the relation between them.
 - (i) What is Meissner effect? Explain
 - (j) Write short note on 'Quantum dots'.

PART – B
(Answer all five units, 5 X 10 = 50 Marks)**UNIT – I**

- 2 Give the relevant theory of Fresnel's biprism to determine the wavelength of monochromatic light source.

OR

- 3 Describe the construction and working of Nd:YAG laser.

UNIT – II

- 4 What are Miller indices? Find the Miller indices for a given plane. Derive the expression for interplanar distance between two consecutive planes described by Miller indices (hkl).

OR

- 5 What is piezoelectric effect? Explain the production ultrasonics using piezoelectric crystal with necessary circuit diagram.

UNIT – III

- 6 Show that the energy of an electron confined in a one dimensional potential well of length L and infinite depth is quantized.

OR

- 7 Explain the 'Kronig-Penney' model of solids and show that it leads to energy band structure of solids.

UNIT – IV

- 8 What is Hall effect? Derive the expression for Hall voltage and Hall coefficient. Mention important applications of hall effect.

OR

- 9 Distinguish between ferro, para and diamagnetic materials. Discuss the applications of soft ferrites.

UNIT – V

- 10 Explain the BCS theory of superconductors. Discuss the magnetic behavior of type-I and type-II superconductors.

OR

- 11 Define top-down and bottom-up approach. Describe various techniques of physical vapour deposition.
