

Code No: 111AD

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech I Year Examinations, June - 2014

ENGINEERING PHYSICS

(Common to all Branches)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

- 1.a) Define lattice parameters, unit cell, space lattice. [2m]
- b) Explain significance of Burger's vector. [3m]
- c) Compare waves and particles. [2m]
- d) Explain canonical ensemble. [3m]
- e) Write short notes on Clausius-Mosotti equation. [2m]
- f) Describe Hysteresis behavior of ferromagnetic material. [3m]
- g) Explain population inversion in lasers. [2m]
- h) Write short notes attenuation in fibers. [3m]
- i) Write principle of photodiodes. [2m]
- j) Discuss about sol-gel technique. [3m]

PART- B

- 2.a) Discuss about seven crystal systems and their corresponding Bravais lattice.
 - b) Explain salient features of miller indices.
- OR**
- 3.a) Explain principle of X-ray diffraction.
 - b) Discuss how X-ray powder method can be used for the determination of crystal parameters.
- 4.a) Explain significance of ψ .
 - b) Estimate the energy of a particle limiting to one dimensional potential well and extend it to three dimensions?
- OR**
- 5.a) Explain the properties of microcanonical and canonical ensembles.
 - b) What is Fermi energy and derive the equation for the calculation of Fermi energy based on its density of states?
- 6.a) Derive expressions for electronic and ionic polarizations.
 - b) Discuss about internal fields in solids.
- OR**
- 7.a) Define permeability, susceptibility, magnetic field induction, and explain classification of magnetic materials based on magnetic moment?
 - b) Explain domain theory of ferromagnetism on the basis of hysteresis curve?

- 8.a) Explain the concepts of spontaneous and stimulated emission and what is population inversion?
b) Describe principle and working of semiconductor diode laser?

OR

- 9.a) Describe the principle of an optical fiber and discuss briefly attenuation in optical fibers.
b) Discuss about Newton's rings experiment and deduce the equation for the calculation of radius curvature of planoconvex lens.

- 10.a) Discuss about surface to volume ratio of nanomaterials and discuss about applications of nanomaterials.
b) Explain the fabrication of nanomaterials by physical vapor deposition and chemical vapor deposition?

OR

- 11.a) Estimate the position of Fermi level and calculate concentration of electrons in an n-type of semiconductor.
b) Explain the concept of Hall effect.
