

**R13**

Code No: 111AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year Examinations, October/November - 2016

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****(25 Marks)**

- 1.a) Define atomic radius, coordination number and packing fraction. [2]
- b) Explain salient features of miller indices. [3]
- c) What is micro canonical ensemble? Explain. [2]
- d) State and explain about de Broglie's hypothesis. [3]
- e) Define magnetic permeability, susceptibility, magnetic field induction. [2]
- f) Explain Meissner effect. [3]
- g) Write short notes on population inversion. [2]
- h) What is numerical aperture? [3]
- i) Define Piezo-electricity. [2]
- j) What is the basic principle involved in TEM. [3]

**PART-B****(50 Marks)**

- 2.a) Discuss about various types of bonding in solids and also discuss about the properties of various types of crystals.
- b) Estimate the number of Frenkel defects at a given temperature.
- c) Explain Laue's method of X-ray diffraction and compare merits and demerits. [3+3+4]

**OR**

- 3.a) Obtain expression for inter-planar spacing (d) of orthogonal crystal system.
- b) Explain powder method of X-ray diffraction.
- c) Discuss about NaCl crystal structure. [3+3+4]

- 4.a) Derive Schrodinger's time independent equation.
- b) Explain the origin of energy band formation.
- c) What is the significance of matter waves? Explain. [4+3+3]

**OR**

- 5.a) Explain the motion of an electron in a periodic potential with the help of Kronig-Penney model.
- b) Compare M-B, B-E and F-D statistics. [5+5]

- 6.a) Derive expressions for ionic and electronic polarizations. [4+3+3]  
b) Explain hysteresis behavior in case of ferroelectric materials.  
c) What is Bohr magneton and explain its significance.

**OR**

- 7.a) Derive Classius-Mosotti equation. [4+3+3]  
b) Explain the origin of magnetic moment.  
c) Compare soft and hard magnetic materials.

- 8.a) Explain principle, construction and working of Nicol prism. [3+4+3]  
b) Discuss about diffraction grating experiment.  
c) Establish the relation between Einstein's coefficients.

**OR**

- 9.a) Obtain an expression for numerical aperture. [3+3+4]  
b) Explain attenuation in optical fibers.  
c) Explain application of optical fibers in communication systems.

- 10.a) Calculate carrier concentration in p-type semiconductor and also find the position of Fermi level. [3+3+4]  
b) Explain the measurement of absorption coefficient of material.  
c) Define reverberation and time of reverberation.

**OR**

- 11.a) Discuss about direct and indirect band gap semiconductors. [4+3+3]  
b) Explain chemical vapor deposition method of synthesis of nano-materials.  
c) Write short notes on photodiodes.

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