R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year II Semester Examinations, August - 2019
ENGINEERING PHYSICS – II
(Common to EEE, ECE, CSE, EIE, IT, ETM)

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) Draw a E-K curve. [2]
 b) What are matter waves? Explain their properties. [3]
 c) Explain about the formation of PN junction. [2]
 d) Explain the effect of temperature and dopents on the Fermi level in a n- type semiconductors. [3]
 e) Give the differences between dielectric materials and insulating materials. [2]
 f) Deduce Clausius- Mossotti relation. [3]
 g) Explain the effect of magnetic field on a superconductor. [2]
 h) What should be the characteristics of permanent magnetic materials? [3]
 i) Define top-down and bottom-up approach for synthesis of nanomaterials. [2]
 j) What is Nanotechnology? How is it useful to society? [3]

PART-B

(50 Marks)

2.a) Derive time independent Schrodinger's wave equation.
 b) An electron is bound in a one dimensional box of width 0.4nm. What is its minimum energy?
[8+2]

OR

3.a) Explain the origin of formation of energy bands in solids.
 b) State Heisenberg uncertainty principle. Calculate the uncertainty in measurement of momentum of an electron if an uncertainty in locating it is 1 A^0. [6+4]

4. Derive an expression for the density of holes in the valence band of p-type semiconductor. [10]

OR

5. Explain the construction and working principle of Solar cell and discuss any two applications of solar cell. [10]

6.a) What are the ferro-electric substances? Give the theory of ferro-electricity and mention their applications.
 b) Derive an expression for ionic polarizability of an ionic solid. [5+5]

OR

7.a) Explain the Electronic polarization in atom and obtain an expression for electronic polarizability in terms of the radius of the atom.
 b) The radius of a gaseous atom is 0.062 nm. Calculate the polarizability of the gas and its relative permittivity. Given that the number of atoms of the gas is 2.7×10^{25} per m^3.
[8+2]

8.a) Describe with examples the different types of magnetic materials.
 b) Write a short note on Bohr magneton.

OR

[8+2]

9.a) Explain the principle of formation of domains in a ferromagnetic materials.
 b) Explain the hysteresis loop observed in ferromagnetic material.

[4+6]

10.a) What are the general properties of the nanomaterials.
 b) Explain qualitatively why they are significantly different compared with those of the bulk materials of the same composition.
 c) Explain Ball milling method.

OR

[3+3+4]

11.a) Describe the CVD technique for synthesis of nano materials.
 b) What are the advantages and applications of nano materials?

[6+4]

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