

**R16**

Code No: 132AA

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech I Year II Semester Examinations, April - 2018****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) Show that matter waves velocity is greater than the velocity of light. [2]
- b) Explain Heisenberg uncertainty principle. [3]
- c) Write any three applications of direct band gap semiconductors. [2]
- d) Draw E-K diagram and explain briefly. [3]
- e) Define Polarization in dielectric materials. [2]
- f) Show that  $P = \epsilon_0 E (\epsilon_r - 1)$ . [3]
- g) Show that  $\mu_r = 1 + \chi$ . [2]
- h) What is superconductivity [3]
- i) What is nano scale? [2]
- j) Explain how nanomaterials show size dependent properties. [3]

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

- 2.a) Derive an expression for energy of a particle in one dimensional potential box. [6+4]
  - b) Explain classification of materials based on band theory of solids. [6+4]
- OR**
- 3.a) Explain how de-Broglie's hypothesis supports the concept of the duality. [4+6]
  - b) Describe Kronig-Penny model. [4+6]
- 4.a) Determine the concentration of holes in the valance band of intrinsic semiconductors. [5+5]
  - b) With neat diagram explain how Fermi energy level varies in n-type and p-type semiconductors with respect to temperature. [5+5]
- OR**
- 5.a) With neat diagram explain energy diagram of PN junction diode. Explain how energy levels varies with respect to forward bias and reverse bias. [5+5]
  - b) Distinguish between n-type and p-type semiconductors. [5+5]
- 6.a) Derive an expression for ionic polarizability. [5+5]
  - b) Describe ferro electricity of dielectric materials. [5+5]
- OR**
- 7.a) Explain  $\text{BaTiO}_3$  structure and behaviour with respect to temperature. [5+5]
  - b) Derive an expression for Internal fields in dielectric material. [5+5]

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- 8.a) Explain origin of magnetic moment in magnetic materials.  
b) What are the applications of superconductivity?

[5+5]

OR

- 9.a) Write a short note on properties of anti-ferro and ferri magnetic materials.  
b) Distinguish between dia, para, ferro magnetic materials.

[5+5]

- 10.a) Explain characterization of nanomaterials by using XRD.  
b) Discuss CVD method for the preparation of nanomaterials.

[4+6]

OR

- 11.a) Explain PVD method for the preparation of nanomaterials.  
b) With neat diagram explain Ball Mill method.

[5+5]

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