Code No: 132AA **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year II Semester Examinations, September - 2023

ENGINEERING PHYSICS - II

(Common to EEE, ECE, CSE, EIE, IT)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	State the Heisenberg's uncertainty principle.	[2]
b)	Give the importance of E-K curve by plotting it.	[3]
c)	Why doping process is required for semiconductors.	[2]
d)	How energy bands are formed? Explain.	[3]
e)	Define displacement vector.	[2]
f)	How local field arises in dielectrics? Explain.	[3]
g)	How magnetic induction is different from magnetic intensity.	[2]
h)	What is the magnetic field effect on superconductivity?	[3]
i)	How does quantum confinement impact the conductivity of nanomaterials.	[2]
j)	How does the dominance of electromagnetic forces affect the behavior of magnetic material? Explain.	[3]

PART - B

(50 Marks)

2.a) Derive an expression for Schrodinger time dependent wave question.
b) What are the matter waves? Discuss their properties. [5+5]

OR

3. How Kronig Penney model explains the origin of energy bands? Explain in detail. [10]

4.a) Explain the working principle of a solar cell. Describe its I-V characteristics curve.
b) Distinguish between direct and indirect energy band gap semiconductors. [5+5]

OR

5.a) Obtain the expression for carrier concentration in the conduction band of an intrinsic semiconductor.
b) Why Fermi level is nearer to the valance band in the case of P-type semiconductor? Explain with an energy band diagram. [5+5]

6.a) What are the dielectric materials? Explain the behavior of polar and non-polar dielectrics under static electric fields.
b) What is an electronic polarization? Obtain an expression for electronic polarizability. [5+5]

OR

7.a) Derive an expression for Internal field of dielectric solid.

b) A water molecule has a dipole moment of 6.2×10^{-30} C.m. What is the polarization of water drop of 0.1 cm radius polarized in the same direction? [7+3]

8.a) Explain the B-H curve of ferromagnetic material on the basis of domain theory.

b) What are the properties of ferrimagnetic materials? Explain. [7+3]

OR

9.a) What are superconductors? Discuss their properties.

b) Discuss the Meissner effect. Show that perfect diamagnetism and zero resistivity are two independent and essential properties of the superconductor. [5+5]

10. Write a short note on bottom-up and top-down fabrication of nanomaterials. [10]

OR

11. Differentiate between CVD and PVD method for synthesis of nanomaterial. Explain CVD method along with its principle and advantages over other synthesis method. [10]

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