Code No: 121AD **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year Examinations, August/September - 2017
ENGINEERING PHYSICS
(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, ETM, MMT, AE, AME, MIE, PTE, CEE, MSNT)

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) What is Bravais lattice? What are the different space lattices in cubic system? [2]
b) Explain with suitable diagram, the Powder method of determination of crystal structure. [3]
c) Explain the Physical significance of wave function. [2]
d) Give three differences between Bose-Einstein and Fermi Dirac statistics. [3]
e) Define displacement vector and electric susceptibility. [2]
f) Explain Hysteresis of ferro-magnetic material. [3]
g) Give the condition for bright and dark band in interference of reflected light in thin films. [2]
h) Define spontaneous, stimulated emission of radiation and population inversion. [3]
i) Draw the I-V characteristics of PN junction diode. [2]
j) What is nanotechnology? Give one method of each- Top down and Bottom up approach for fabrication of nanomaterials. [3]

PART-B

(50 Marks)

2.a) Define Unit Cell, lattice parameter and coordination number.
b) Obtain an expression for the packing factor of FCC structure. [5+5]

OR

3.a) Derive Bragg's law of X-ray diffraction.
b) Describe with neat diagram Laue's method of determination of crystal structure. [5+5]

4.a) What are matter waves. Explain their properties.
b) Explain the de-Broglie hypothesis. Explain G.P.Thomson's experiment in support of this hypothesis. [5+5]

OR

5.a) Derive and expression for density of states of electrons.
b) Define effective mass of an electron. Explain its significance. [5+5]

6.a) Explain Electric susceptibility, Electric polarization. Give a relation between the two.
b) Describe Lorentz method to calculate the internal field of a cubic structure. [5+5]

OR

7.a) Explain the differences between hard and soft magnetic materials.
b) Define the terms magnetic moment (B), magnetization (M) and magnetic field (H). Obtain an expression relating to these quantities. [5+5]

8.a) Explain the concept of coherence. What are the necessary conditions for constructive and destructive interference?
b) What is double refraction? Discuss the construction of Nicol prism. [5+5]

OR

9.a) Describe the construction of GaAs semiconductor laser.
b) Derive an expression for acceptance angle for an optical fiber. How is it related to numerical aperture? [5+5]

10.a) Derive an expression for the carrier concentration of p-type semiconductors.
b) An auditorium has a volume of $5000m^3$. What should be the total absorption in the hall if the reverberation time of 1.25 seconds is to be maintained? [5+5]

OR

11.a) What are nanomaterials? Why do they exhibit different properties?
b) Describe the bottom up methods by which nanomaterials are fabricated. [5+5]

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