

Code No: 132AA

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech I Year II Semester Examinations, November/December - 2020****ENGINEERING PHYSICS – II****(Common to EEE, ECE, CSE, EIE, IT, ETM)****Time: 2 hours****Max. Marks: 75****Answer any five questions  
All questions carry equal marks**

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1. Describe Davisson and Germer's experiment and explain how it enabled the verification of wave nature of matter. [15]
- 2.a) Discuss the Kronig-Penny model for the motion of an electron in a periodic potential.  
b) The minimum energy possible for a particle entrapped in a one dimensional box is  $3.2 \times 10^{-18}$  J. What are the next three energies (in eV) the particle can have. [11+4]
3. Sketch the energy diagrams of a) an intrinsic b) n-type c) p-type semiconductors. Indicate Fermi, Donor and acceptor levels wherever present. [5+5+5]
4. Derive an expression for the carrier density in n-type semiconductors and give a qualitative discussion about variation of Fermi level with temperature. [15]
5. Deduce Clausius-Mossotti equation and explain its use in predicting the dielectric constant. What is the importance of dielectric constant? [15]
- 6.a) What is meant by local field in a dielectric material and how is it calculated for a cubic structure.  
b) An electric field of  $10^5$  V/m is applied on a sample of neon at NTP. Calculate the dipole moment induced in each atom. Given dielectric constant for neon = 1.000134. Also find the atomic polarizability of neon gas. [11+4]
- 7.a) How super conductors are classified? Explain their properties.  
b) Describe Meissner effect? [9+6]
- 8.a) List a methods of synthesis of nanomaterials.  
b) Write a short note on XRD technique for characterization of nano material. [5+10]

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