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Reg. No: ⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech I Year I Semester Supplementary Examinations November-2020
SEMICONDUCTOR PHYSICS
(Common to CSE and CSIT)

Time: 3 hours   Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 a Write the postulates of classical free electron theory and derive an expression for electrical conductivity in metals. **7M**

b Classify the solids into conductor, semiconductor and insulators based on band theory. **5M**

OR

2 a Describe Fermi Dirac distribution function. How it varies with temperature. **8M**

b Define the following i) Mobility ii) Drift Velocity **4M**

UNIT-II

3 a What is intrinsic semiconductor? Derive the expression for electrical conductivity in intrinsic semiconductor. **8M**

b Calculate the conductivity and resistivity of the sample using the following data. Intrinsic Ge at 300K, $n_i = 2.45 \times 10^{-19} m^{-3}$, $\mu_e = 0.38$ m^2-V^{-1}S^{-1}, $\mu_p = 0.19$ m^2-V^{-1}S^{-1}. **4M**

OR

4 a State and explain Hall Effect in semiconductors. Give its applications. **7M**

b Derive Einstein's relation in semiconductors **5M**

UNIT-III

5 a Derive Schrödinger's time independent wave equation. **8M**

b List the physical significance of wave function. **4M**

OR

6 a Write the significance of Divergence and Curl of Electromagnetic fields. **8M**

b An electron is bound in a one-dimensional box having size of 4×10^{-10}m. What will be its minimum energy and second excited state energy in eV? **4M**

UNIT-IV

7 a Explain the construction and working principle of Nd :YAG laser with the help of a suitable diagram. **6M**

b Mention the applications of laser in different fields. **6M**

OR

8 a Define acceptance angle and numerical aperture of an optical fibre and derive an expression for them. **8M**

b An optical fibre has a core refractive index of 1.44 and cladding refractive index of 1.40. Find its numerical aperture and acceptance of an optical fiber. **4M**

UNIT-V

9 a Explain the basic principle of nanomaterials. **6M**

b Write advantages of sol-gel process. **6M**

OR

10 a What is nanotechnology? Give applications of carbon nanotubes (CNT'S) in various Fields. **6M**

b Write the physical properties of carbon nanotubes. **6M**

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