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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**

(AUTONOMOUS)

**B.Tech I Year I Semester Supplementary Examinations December-2021****SEMICONDUCTOR PHYSICS**

(Common to CSE &amp; CSIT)

Time: 3 hours

Max. Marks: 60

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

- 1 a What are the salient features of classical free electron theory? Derive an expression for electrical conductivity in a metal? **8M**
- b Mention the drawbacks of Classical free electron theory **4M**

**OR**

- 2 a Describe the electrical conductivity in a metal using quantum free electronic theory. **8M**
- b Find relaxation time of conduction electron in metal if its resistivity is  $1.54 \times 10^{-8} \Omega\text{-m}$  and it has  $5.8 \times 10^{28}$  conduction electron/m<sup>3</sup>. Given  $m = 9.1 \times 10^{-31}$  kg,  $e = 1.6 \times 10^{-19}$  C. **4M**

**UNIT-II**

- 3 a What is intrinsic semiconductor and explain the formation of extrinsic semiconductors through doping? **6M**
- b What is Fermi level? Prove that the Fermi level lies exactly in between conduction band and valance band of intrinsic semiconductor. **6M**

**OR**

- 4 a Describe the Hall Effect in semiconductors. **8M**
- b Write the applications of Hall Effect. **4M**

**UNIT-III**

- 5 a Derive the expression for de Broglie wavelength for an electron. **8M**
- b Explain the properties of matter waves. **4M**

**OR**

- 6 a State and Explain Stoke's Theorem and Gauss's Theorem, **8M**
- b An electron is confined to a one dimensional potential box of 2 Å length. Calculate the energies corresponding to the second and forth quantum states (in eV). **4M**

**UNIT-IV**

- 7 a Describe the construction & working principle of NdYAG Laser with the help of a neat diagram **9M**
- b Calculate wavelength of emitted radiation from GaAs which has a band gap of 1.44 eV. **3M**

**OR**

- 8 a Differentiate step index and graded index fibers. **6M**
- b Write brief note on attenuation in optical fibers. **6M**

**UNIT-V**

- 9 a What is nanomaterial? Write the classification of nanomaterials. **6M**
- b Write the applications of nanomaterial in industries and information technology **6M**

**OR**

- 10 a Explain ball milling technique for synthesis of nanomaterial? **8M**
- b Write applications of Graphene in various fields **4M**

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