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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B. Tech I Year I Semester Supplementary Examinations August-2021

SEMICONDUCTOR PHYSICS

(Common to CSE & CSIT)

Time: 3 hours

Max. Marks: 60

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

UNIT-I

- 1 a Using classical free electron theory, derive an expression for electrical conductivity in metal. **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 5.8×10^{28} conduction electron/ m^3 . Given $m = 9.1 \times 10^{-31} \text{ kg}$, $e = 1.6 \times 10^{-19} \text{ C}$. **4M**

OR

- 2 a Write brief note on Fermi Dirac distribution. **6M**
- b What is the effect of temperature on Fermi Dirac distribution function? **6M**

UNIT-II

- 3 a What is Fermi level? Prove that the Fermi level lies exactly in between conduction band and valance band of intrinsic semiconductor. **6M**
- b Derive Einstein's relation in semiconductors. **6M**

OR

- 4 a Describe the construction and working mechanism of LED. **8M**
- b Determine the wavelength of LED fabricated by the CdS material with band gap of 2.42 eV **4M**

UNIT-III

- 5 a Derive Schrödinger's time dependent wave equation. **8M**
- b An electron is moving under a potential field of 15kv. Calculate the wavelength of electron wave. **4M**

OR

- 6 a Explain the Faraday's law and Ampere's law through the Maxwell equations. **8M**
- b An electron is bound in a one dimensional infinite well having a width of $1 \times 10^{-10} \text{ m}$. Find the energy values in the ground state and the first two excited states. **4M**

UNIT-IV

- 7 a Describe the construction and working principle of He-Ne Laser with the help of a neat diagram. **8M**
- b Mention the application of laser in different fields. **4M**

OR

- 8 a Describe the construction and the working principle of optical fibre. **8M**
- b Mention applications of optical fibres. **4M**

UNIT-V

- 9 a Explain the concept of Quantum Confinement in nano materials. **8M**
- b Write the applications of nanomaterial in industries and information technology. **4M**

OR

- 10 a What are the techniques available for synthesizing nanomaterials? **4M**
- b Explain the construction and working principle of Scanning Electron Microscope. **8M**

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