Q.P. Code: 19HS0851 **R19**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year I Semester Regular Examinations January 2020

SEMICONDUCTOR PHYSICS

(CSE and CSIT)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1	**a**	Describe the electrical conductivity in a metal using quantum free electronic theory.	**8M**
	b	Write advantages of quantum free electron theory over classical free electron theory.	**4M**

OR

2	**a**	What is effective mass of an electron? Obtain the expression for effective mass of electron in periodic potential.	**8M**
	b	Find relaxation time of conduction electron in metal if its resistivity is $1.54 \times 10^{-8}\Omega$-m and it has 5.8×10^{28} conduction electron/m^3. Given that m= 9.1×10^{-31} kg, e = 1.6×10^{-19} C.	**4M**

UNIT-II

3	**a**	Explain the formation of p-n junction diode.	**6M**
	b	Elaborate the variations in width of depletion layer under forward and reverse biased conditions.	**6M**

OR

4	**a**	Discuss the construction and working mechanism of LED.	**8M**
	b	Determine the wavelength of LED fabricated by the CdS material with band gap of 2.45eV.	**4M**

UNIT-III

5	**a**	Outline the behavior of particle in a one-dimensional infinite potential well in terms of eigen values and eigen function.	**8M**
	b	An electron is confined to a one-dimensional potential box of 2 Å width then, calculate the energies corresponding to the second and forth quantum states (in eV).	**4M**

OR

6	**a**	Write Maxwell's equations for electromagnetic waves in differential and integral form.	**6M**
	b	Explain the propagation of electromagnetic wave in non-conducting media.	**6M**

UNIT-IV

7	**a**	Derive the relation between the various Einstein's coefficients of absorption and emission of radiation.	**8M**
	b	Explain the condition for population inversion.	**4M**

OR

8	**a**	Differentiate step index and graded index fibers.	**6M**
	b	Give the applications of an optical fiber in various fields.	**6M**

UNIT-V

9	**a**	Explain the Sol-Gel technique for synthesis of nanomaterial.	**6M**
	b	Write the advantages of sol-gel process.	**6M**

OR

10	**a**	What are carbon nanotubes? Mention its structures.	**6M**
	b	Describe the applications of Carbon nanotubes.	**6M**

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