R18

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech I Year II Semester Regular Examinations May 2019
SEMICONDUCTOR PHYSICS
(Common to ECE, CSE, CSIT)

Time: 3 hours   Max. Marks: 60

PART-A
(Answer all the Questions **5 x 2 = 10** Marks)

1	**a**	What are the merits of quantum free electron theory?	2M
	b	Define the word depletion layer.	2M
	c	What is meant by luminescence of optical materials?	2M
	d	Mention the basic principle in the propagation of light signal through the optical fibre.	2M
	e	Define top down and bottom up process.	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	**a**	What are the salient features of classical free electron theory? Derive an expression for electrical conductivity in a metal.	7M
	b	Mention its drawbacks.	3M

OR

3	**a**	Define the terms i) Mean free path ii) Relaxation time iii) Mobility.	6M
	b	Find the mobility of electrons in copper if there are 9x1028 valence electrons/m3 and the conductivity of copper is 6x107mho/m?	4M

UNIT-II

4	**a**	Obtain the conductivity of intrinsic semiconductor with relevant expressions?	5M
	b	The following data are given for an intrinsic Ge at 300K. Calculate the conductivity and resistivity of the sample. (n_i= 2.4 x1019m-3, μ_e = 0.39 m2-V-1S-1, μ_p = 0.19 m2-V-1S-1).	5M

OR

5	**a**	Describe the Hall Effect in a semiconductors.	7M
	b	Write the applications of Hall Effect.	3M

UNIT-III

6	**a**	Elucidate broadly radiative and non-radiative mechanisms in semiconductors.	5M
	b	Explain the construction and working mechanism of solar cells with suitable diagrams.	5M

OR

7	**a**	Describe the construction and working mechanism of solar cells.	6M
	b	Broadly explain the differences between light emitting diodes and photo detectors.	4M

UNIT-IV

8	**a**	Derive the relation between the various Einstein's coefficients of absorption and emission of Radiation.	6M
	b	Explain population inversion.	4M

OR

9	**a**	Describe optical fibre communication system.	6M
	b	Mention the application of optical fibre in sensors.	4M

UNIT-V

10	**a**	Explain why surface area to volume ratio very large for nano materials.	5M
	b	Find the surface area to volume ratio of Sphere using surface area and volume calculation for the given radius is 5 meter.	5M

OR

11	**a**	Write the physical properties of carbon nanotubes.	5M
	b	Write the applications of nanomaterial in various fields.	5M

END