Q.P. Code: 18HS0851 **R18**

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B Tech I Year II Semester Supplementary Examinations October-2020

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**	Define Fermi energy level.	**2M**
	b	Write the relation between mobility and Hall coefficient.	**2M**
	c	What is direct band gap semiconductor?	**2M**
	d	Define population inversion.	**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**	Distinguish between direct and indirect band gap semiconductors.	**5M**
	b	Write brief note on Fermi Dirac distribution.	**5M**

UNIT-II

4	**a**	Obtain the expression for conductivity of intrinsic semiconductor with relevant expressions.	**6M**
	b	The following data are given for an intrinsic Ge at 300K. Calculate the conductivity and resistivity of the sample. (n_i= 2.4 x$10^{19}$$m^{-3}$, μ_e = 0.39 m^2-$V^{-1}S^{-1}$, μ_p = 0.19 m^2-$V^{-1}S^{-1}$).	**4M**
		OR	
5	**a**	Explain the formation of p-n junction.	**5M**
	b	Describe the variation of width of depletion layer under forward and reverse bias.	**5M**

UNIT-III

6	**a**	Explain the principle and characteristics of PIN diode.	**5M**
	b	Write brief note on structure and mechanism of PIN diode	**5M**
		OR	
7	**a**	What are the characteristics of solar cells?	**5M**
	b	What are the materials are used for fabrication of LED's?	**5M**

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 the construction and the working principle of optical fiber.	**5M**
	b	Mention the application of optical fiber in medicine.	**5M**

UNIT-V

10	**a**	Explain Sol-Gel technique for synthesis of nano-material.	**7M**
	b	Write advantages of sol-gel process.	**3M**
		OR	
11	**a**	What are carbon nano-tubes? Mention its structures.	**6M**
	b	Write the applications of nano-material in various fields.	**4M**

END