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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations July-2021

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	Formulate Fermi-Dirac distribution function.	2M
	b	Define Hall effect.	2M
	c	Illustrate the direct band gap of semiconductors.	2M
	d	List the characteristics of laser.	2M
	e	Write various structures of carbon nano tubes.	2M

PART-B

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

UNIT-I

2	a	Differentiate direct and indirect band gap of semiconductors.	5M
	b	Explain the Fermi-Dirac distribution function.	5M
		OR	
3	a	What are Brillouin zones? List the corresponding values for a wave vector of first and second Brillouin zones.	5M
	b	Write the brief note on effective mass of an electron.	5M

UNIT-II

4	a	What is intrinsic semiconductor? Derive the expression for intrinsic charge carrier concentration.	5M
	b	Discuss the effect of temperature on Fermi level of an extrinsic semiconductor.	5M
		OR	
5	a	Derive the Einstein's relation in semiconductor.	5M
	b	Distinguish between ohmic contact and Schottky barriers in junction diodes.	5M

UNIT-III

6	a	Elaborate radiative and non-radiative mechanisms in semiconductors.	5M
	b	Describe the charge carrier separation mechanism in photo detectors.	5M
		OR	
7	a	Outline the principle and characteristics of Avalanche diode.	5M
	b	Discuss the structure and working mechanism of Avalanche diode.	5M

UNIT-IV

8	a	Develop the relation between various Einstein's coefficients of absorption and emission of radiation.	6M
	b	Explain the different pumping mechanisms in laser.	4M
		OR	
9	a	What is numerical aperture of an optical fiber and derive the expression for it.	5M
	b	Differentiate step index and graded index fibers.	5M

UNIT-V

10	a	What are nanomaterials? Write the classification of nanomaterials.	5M
	b	Explain why surface area to volume ratio is very large for nanomaterials.	5M
		OR	
11	a	What are carbon nanotubes? Mention its structure.	5M
	b	What is Graphene? Write a brief note on its properties	5M

END