Q.P. Code: 19HS0851 R19

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

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

SEMICONDUCTOR PHYSICS

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1	**a**	Explain the electrical conductivity in metal by using quantum free electron theory.	**6M**
	b	Outline the conductors, semiconductors and insulators based on the band theory of solids.	**6M**

OR

2	**a**	What is Fermi-Dirac distribution function, how it varies with temperature.	**6M**
	b	Derive the expression for effective mass of an electron in periodic potential lattice.	**6M**

UNIT-II

3	**a**	Evolve the expression for charge carrier concentration in intrinsic conductors.	**7M**
	b	What is Fermi energy level? Describe the effect of temperature on fermi energy level of an extrinsic semiconductor.	**5M**

OR

4	**a**	Summarize the Hall effect in semiconductors. Give its applications.	**6M**
	b	Describe the construction and working of light emitting diode.	**6M**

UNIT-III

5	**a**	Discuss the de-Broglie's hypothesis for mater waves.	**4M**
	b	Obtain the expression of Schrodinger time dependent wave equation.	**8M**

OR

6	**a**	Write the significance of divergence and curl of an electromagnetic field.	**5M**
	b	Describe the propagation of electromagnetic wave in non-conducting medium	**7M**

UNIT-IV

7	**a**	State and explain the characteristics of a Laser.	**6M**
	b	Write a short note on population inversion.	**6M**

OR

8	**a**	Define the acceptance angle and numerical aperture. Derive the expression for acceptance angle and numerical aperture of an optical fiber.	**8M**
	b	Calculate the critical angle and numerical aperture, if the material of core and cladding are 1.52 and 1.49 respectively.	**4M**

UNIT-V

9	**a**	Explain the basic principles of nanomaterials.	**6M**
	b	What are nanomaterials? How they are classified.	**6M**

OR

10	**a**	Describe the synthesis process of nanomaterials by using sol-gel method.	**8M**
	b	List the applications of nanomaterials in various fields.	**4M**

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