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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B Tech I Year I Semester Supplementary Examinations Feb-2021

SEMICONDUCTOR PHYSICS

(Common to CSE & 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	Define the terms i)Mean free path ii)Relaxation time iii)Mobility iv) Drift Velocity	8M
	b	Find the mobility of electrons in copper if there are $9x10^{28}$ valence electrons/m^3 and the conductivity of copper is $6x10^7$mho/m.	4M

UNIT-II

3	a	What is intrinsic semiconductor and explain the formation of extrinsic semiconductors through doping.	6M
	b	Derive the expression for intrinsic carrier concentration.	6M
		OR	
4	a	Describe the Hall Effect in semiconductors.	8M
	b	Write the applications of Hall Effect.	4M

UNIT-III

5	a	Derive Schrödinger's time independent wave equation.	8M
	b	Explain the physical significance of wave function.	4M
		OR	
6	a	Describe wave & particle nature of matter waves.	4M
	b	State and Explain Stoke's Theorem and Gauss's Theorem.	8M

UNIT-IV

7	a	Describe the construction and working principle of Nd:YAG Laser with the help of a neat diagram.	8M
	b	Calculate the wavelength of emitted radiation from GaAs which has a band gap of 1.44eV.	4M
		OR	
8	a	What is the numerical aperture of an optical fibre and derive an expression for it.	8M
	b	An optical fibre has a numerical aperture of 0.20 and cladding refractive index of 1.59. Determine the refractive index of core and the acceptance angle for the fibre in water has a refractive index of 1.33.	4M

UNIT-V

9	a	Explain Sol-Gel technique for synthesis of nanomaterials.	8M
	b	Write advantages of sol-gel process.	4M
		OR	
10	a	What is Graphene? Write brief note on its properties.	6M
	b	Write applications of Graphene in various fields.	6M

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