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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech I Year I Semester Supplementary Examinations December-2021

PHYSICS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a Define Mechanical Oscillator. 2M
- b Write two differences between stimulated and spontaneous emission of radiations. 2M
- c What is Heisenberg's uncertainty principle? 2M
- d Define Drift Velocity. 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 Derive the equation & solution of S.H.M. 6M
- b Draw the Mechanical Analogy of S.H.M. 4M

OR

- 3 a Explain detailed mechanism & solution of equation in electrical oscillator. 6M
- b A capacitor of 5 μ F is discharged through 2 ohm resistance and 3 henry inductance. Calculate the frequency of oscillation. 4M

UNIT-II

- 4 a State population inversion and give its importance in the production of laser. 6M
- b The wavelength of emission is 6000 and the coefficient of spontaneous emission is $10^6/s$. Determine the coefficient for stimulated emission. 4M

OR

- 5 a Explain the construction and working of Nd:YAG laser with suitable energy level diagram. 8M
- b What are the advantages of Nd:YAG laser? 2M

UNIT-III

- 6 Derive Schrödinger's time independent wave equation. 10M

OR

- 7 a Describe the behavior of particle in a one-dimensional infinite potential well in terms of Eigen values and function. 7M
- b An electron is confined to a one-dimensional potential box of $2 A_0$ length. Calculate the energies corresponding to the second and fourth quantum states (in eV). 3M

UNIT-IV

- 8 a What are the salient features of classical free electron theory? 6M
- b Using free electron model derive an expression for electrical conductivity in metal. 4M

OR

- 9 a Derive the expressions for intrinsic carrier concentration and Fermi level for intrinsic semiconductor. 6M
- b The following data are given for intrinsic Ge at 300K, $n_i = 2.4 \times 10^{19} \text{ m}^{-3}$, $\mu_e = 0.39 \text{ m}^2 \text{ v}^{-1} \text{ s}^{-1}$, $\mu_h = 0.19 \text{ m}^2 \text{ v}^{-1} \text{ s}^{-1}$. Calculate the resistivity of the sample. 4M

UNIT-V

- 10 a Write the differences between nanotechnology and NanoScience. 3M
- b Explain ball-milling technique for synthesis of nanomaterial. 7M

OR

- 11 a Define Condensation, Crystal growth and Nucleation. 6M
- b Write brief note on working and characteristics of carbon nanotubes based field effect transistor (FET). 4M

END