R18

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech I Year I Semester Supplementary Examinations November 2020
PHYSICS
(Electrical & 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 What are the characteristics lasers?   **2M**
    c Mention any two properties of matter waves.   **2M**
    d Distinguish between intrinsic and extrinsic semiconductors.   **2M**
    e Define nucleation.   **2M**

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

UNIT-I

2 **a** What are damped oscillations? Derive the equation of motion and solution of damped oscillator.   **7M**
    b An under damped oscillator has its amplitude reduced to $(1/10)^{th}$ of its initial value after 100 oscillations. If time period is 2 seconds, calculate (1) the damping constant and (2) the decay modulus.   **3M**

OR

3 **a** Describe Energy damped harmonic oscillator.   **7M**
    b The amplitude of a second pendulum falls to half-initial value in 150 seconds. Calculate the Q- factor.   **3M**

UNIT-II

4 **a** Derive the relation between the various Einstein's coefficients of absorption and emission of radiation.   **7M**
    b The wavelength of emission is 6000 A^0 and the coefficient of spontaneous emission is 10^6/s. Determine the coefficient for stimulated emission.   **3M**

OR

5 **a** Explain the construction and working principle of He-Ne laser with suitable energy level diagram.   **8M**
    b Write few advantages of He-Ne laser.   **2M**

UNIT-III

6 **a** Derive Schrödinger's time independent wave equation.   **7M**
    b Explain the physical significance of wave function.   **3M**

OR

7 **a** How is Eigen energy values of a particle in one-dimensional potential box quantized?   **6M**
    b An electron is bound in a one-dimensional box having size of 4 X 10-10 m. What will be its minimum energy?   **4M**

UNIT-IV

8 **a** Derive the expressions for intrinsic carrier concentration and Fermi level for intrinsic semiconductor.   **10M**

OR

9 **a** Explain Drift and diffusion processes in semiconductors.   **7M**
    b Find the diffusion coefficient of electron in silicon at 300K if $\mu_e = 0.19$ $m^2 v^{-1} s^{-1}$.   **3M**

UNIT-V

| 10 | **a** | What is Quantum Confinement? | 4M |
| | **b** | Write the applications of nanomaterials. | 6M |

OR

| 11 | **a** | What are the techniques available for synthesizing nanomaterials? | 3M |
| | **b** | Explain ball-milling technique for synthesis of nanomaterial. | 7M |

END