Applied physics 2023 10-02-2023

R-22

PART-B

UNIT-I

1. What is photo electric effect? Discuss its characteristics. Pirive The equation for photo electric effect.
2. Describe in detail, with a neat diagram, Davison and Germer experiment to show that particels behave like Waves.
3. Write the time-Iddipendent Schrodinger's wave equation of electron and write the physical interpretation of Ψ

[OR]

Explain The physical significance of Wave function

4. Write the time-dependent Schrodinger's Wave equation of an electron
5. Assuming the time-independent schrodinger's Wave equation, discuss The solution for a particle in one-dimenssional potential well of infinate height.

[OR]

Obtain expressions for energy levels and Wave functions of a particle enclosed in one dimensional potential box of infinate height.

6. a) Discuss The kroning penny model for The motion of an electron in a periodic potential
   b) Explain E-K diagram [Energy Wave Vector graph]
7. Explain The Cocept of effective mass of an electron.
8. a) Discuss The origin of energy band structure in solids
   b) Distinguish between Conductors, Semiconductors and insulators.
9. What do you mean by Fermi energy? Obtain an expression for it.

10. a) Explain free electron theory of solids. [Lorentz-drude, Somerfield, Zone]

b) Explain bloch theorem.

UNIT-II

1. a) Distinguish between intrinsic and extrinsic semiconductors with suitable example.

b) Give the differences blw direct and indirect band gap semiconductors.

2. a) State and explain hall effect. Give applications of hall effect.

b) Explain Construction Working principle of LED, Solar cell

3. Explain Construction Working principle of APD & PIN.

4. Explain the Construction and Working of PN & zener diode.

5. Explain the Construction and principle of operation of BJT (Bipolar Junction transistor)

6. a) Explain principle and operation of N-PN transistor

b) Explain principle and operation of PNP transistor.

UNIT-III

1. a) Give relation blw electric Susceptability (χ_e) and dielectric Constant ϵ_0.

[or]

Show that $\chi = (\epsilon_r - 1)$

b) types of polarisations Mechanisms

2. a) What is ferroelectricity? Describe the applications of ferroelectric applications

b) What is pezoelectricity? Describe the important applications of pezoelectricity.

3. Explain construction and working of LCD?

4. Describe The hysteresis loop of ferro magnets. how can it be used to distinguish blw hard and soft magnetic materials?

5. Explain Magneto striction and magnetoresistance? give three applications.

6. a) Explain Magnetic Sensors? Write its applications.

b) What are multiferroics?

7) Explain about The liquid and solid electrolytes and give three advantages disadvantages:

8) Explain Construction & Working of Li ion batteries. ? Applications.

9) Explain Construction & Working of Super capacitors? Applications

10. Explain Construction & working of Magnetic bubble memories? and its applications

UNIT – IV

1. a) Describe Sol-gel Method to synthesis of Nano material.

b) How do you characterize nano materials by XRD?

2. a) Describe The ballmill method to synthesis nano material.

b) What is nano scale? Explain The quantum Confinement at nano scale?

3. How do you characterize nano materials by SEM, TEM (electron microscope)

4. a) Describe CVD (chemical vapor diposition) Method to synthesis of nano material.

b) Describe PVD [physical vapour deposition] method to synthesis of nano material.

5. a) Give applications of Nano materials?

b) What are the properties of Nano materials?

UNIT-V

1. a) What are Einstein's co-efficients? Derive the relation b/w the probability of spontaneous emission and stimulated emission in terms of Einstein's coefficients? (b) Explain three quantum process. (OR). what is Absorption, spontaneous & stimulated Emission

2. Distingush b/w spontaneous and stimulated emission process of light.

3. With the help of suitable diagram, Explain the Construction and working of a ruby laser.

4. With necessary theory and energy level diagram, explain the Construction and working of a He-Ne gas laser.

5. a) Explain the Construction & working of Co2 Laser.

6. b) Explain the Construction & working of Ar LASER.

6. a) Describe the principle, Construction and working of a Nd-Yag laser List out its advantages

7. b) Describe the principle, Construction and working of a Semiconductor diode laser.

7. Derive an expressions for Acceptance angle & Numerical apperture and

8. discuss the concept of acceptance cone for an optical fiber.

Explain the construction and working of a step-index fiber? Discuss the propagation of light signal in step-index fiber?

[or]

Explain classification of optical fiber's

9. a) Describe The basic elements of a fiber optics communication system with block diagram

b) Give basic principle of Total internal reflection [TIR]

10. a) Explain about signal attenuation in optical fibers

b) Write applications of optical fibers.

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