

Physics Assignment No. 1

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Class: CE34, ME34

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Chapters: Semiconductors, Mechanics and Mechanics of Solids.

Q1. Differentiate conductor and insulator.

Q2. What is semiconductor? How its resistivity varies with temperature? How many types of semiconductors are there? Explain briefly.

Q3. What is diode?

Q4. What is forward bias and reverse bias?

Q5. What are majority and minority carriers?

Q6. Define diffusion current and drift current.

Q7. What is Fermi level and Fermi energy?

Q8. Explain the working of p-n diode.

Q9. What is transistor?

Q10. Explain briefly solar cell and LED by giving their respective working principle and working.

Q11. Define the following: Inertia, Elasticity, Restoring force, Stress, Strain, Hooke's Law, Impedance, Resonance, Progressive waves, Standing Waves.

Q12. What is a harmonic oscillator? Develop wave equation for harmonic oscillator (HO).

Q13. Solve the differential equation: $\frac{d^2x}{dy^2} + \omega^2 x = 0$ where x is a function of

y and $x=x_0$ when $y=0$.

Q14. Prove that total energy of HO at any instant of time is constant.

Q15. Differentiate damped and undamped oscillations.

Q16. Write short notes on (i) Damped oscillator and (ii) Forced oscillator.

Q17. Develop wave equation for damped oscillator and discuss various cases possible.

Q18. Explain qualitatively the behavior of forced oscillator.

Q19. Define following parameters associated with damped oscillator: (i) relaxation time (τ) (ii) logarithmic decrement (δ) (iii) quality factor (Q). Express the first two parameters (i.e. τ and δ) in terms of third i.e. Q.

Q20. Explain briefly the concept of impedance matching.