1. Define SHM and mention any two examples. Derive the differential equation for SHM using Hooke’s law.
2. What are forced oscillations? Derive the expression for steady state amplitude and phase angle in case of forced oscillations.
3. Define force constant and mention its physical significance. Derive the expression for force constant for springs in series and parallel combination.
4. What are damped oscillations? Derive the expression for decaying amplitude and hence discuss the case of decaying amplitude.
5. With a neat diagram explain the construction and working of Reddy shock tube. Mention any two applications of shock waves.
6. State the conservation laws of mass, energy and momentum with relevant equations. Mention any two characteristics of Shock waves.
7. State de Broglie hypothesis and show that the de Broglie wavelength of an electron is found to be equal to 1.226/√V nm.
8. Using Heisenberg’s uncertainty principle, show that electrons do not reside inside the nucleus.
9. Set up one – dimensional time – independent Schrodinger’s equation.
10. Derive the expression for energy eigen value and eigen function for an electron in one dimensional potential well of infinite height.
11. Define spontaneous and stimulated emissions. Obtain an expression for energy density of radiation under equilibrium condition in terms of Einstein’s coefficients.
12. Explain the construction and working of CO2 laser with the help of suitable diagrams.
13. Derive an expression for numerical aperture in an optical fiber and state the condition for propagation.
14. Define V-number and fractional index change. With neat diagrams, explain the different types of optical fibers.
15. Define attenuation. Explain the types of fiber losses.
16. With the help of block diagram explain point to point communication using optical fiber. Mention the merits of optical fiber communications.
17. Define fermi energy and fermi factor and explain the variation of fermi factor with temperature.
18. What are the assumptions of quantum free electron theory. Discuss any two major successes of Quantum free electron theory.
19. What is polarization analyze the mechanism through which polarization occurs?
20. Evaluate Claussius- Mossotti equation by defining internal field in 3D plane.
21. Derive the expression for electrical conductivity of a semiconducting material.
22. with neat diagram, explain the principle, construction and working of Atomic Force Microscope.
23. Explain the construction and working of X-Ray diffractometer.
24. With neat diagram, explain the principle, construction and working of X-ray photoelectron spectroscope.
25. Describe the construction and working of Scanning Electron Microscope with the help of a neat diagram.
26. Illustrate the working of Transmission Electron Microscope.
27. Define nano composites . Explain their various types.