PH3151 ENGINEERING PHYSICS

IMPORTANT QUESTIONS AND QUESTION BANK

UNIT I MECHANICS

2-Marks

1. Define centre of mass of the system?
2. What is radius of gyration?
3. Define angular momentum?
4. Define rigid body rotation?
5. State parallel axis theorem?
6. What factors the moment of inertia depends?
7. What is torsional pendulum?
8. What is double pendulum?
9. What is the difference between centre of gravity and centre of mass?
10. What is the relation between torque and angular momentum?

13-Marks

1. Derive an expression for kinetic energy of the system of particles? (8marks)
2. Derive the equation of rotational motion about fixed axis? (8marks)
3. State and prove the theorem of parallel axes and perpendicular axes for the moment of inertia of a rigid body? (8marks)
4. State and prove the theorem of parallel axes and perpendicular axes for the moment of inertia of a plane lamina? (8marks)
5. Derive the relation between rotational kinetic energy and moment of inertia? (8marks)
6. Discuss the moment of inertia of a diatomic molecule? (8marks)
7. Derive an expression for angular moment of a rigid body? (8marks)
8. Explain conversation of angular momentum with examples? (8marks)
9. Discuss the rotational energy states of a rigid diatomic molecule? (8marks)
10. Write a note on non-linear oscillations and its importance? (8marks)
11. Discuss the centre of mass and obtain the expression for the same for the system of particles. And also outline the motion of centre of mass? (8marks)
12. Derive the expression for the moment of inertia of a solid sphere. (i) About a diameter (ii) About a tangent. (8marks)
13. Describe the principle, construction and working of gyroscope and also mention the application in various filed?
14. Derive an expression for time period of torsion pendulum. Explain how it is used to find rigidity modulus of a wire?
15. Infer the definition for double pendulum. Discuss its theory and characteristics behaviour exhibited by this system?

UNIT-II ELECTROMAGNETICS WAVES

2-Marks

1. Give the maxwell's equations in differential form?
2. Give the maxwell's equations in integral form?
3. Write the maxwell's equations for free space?
4. What is pointing vector?
5. What is skin depth?
6. Define intensity of EM wave?
7. Define reaction pressure?
8. Define the polarization of the wave?
9. Write down the maxwell's equations for conducting medium?
10. Write down the expression for velocity of EM wave in the free space?

13-Marks

1. Deduce the equation of conduction current density, displacement current density and prove electromagnetic waves are transverse?
2. Write maxwell equations and explain the characteristics of each equation?
3. Discuss the source of electromagnetic waves and also mention the properties of electromagnetic waves?
4. Deduce the equation of propagation of EM wave through a dielectric medium?
5. Discuss the phase and orientation of EM wave in matter?
6. Explain the reception and transmission of cell phones?
7. Discuss the electromagnetic energy flow and pointing vector?
8. Deduce the equation of intensity of an EM wave in vacuum?
9. Write a short note on momentum and radiation pressure?
10. Write a short note on (i) intensity of an EM waves (ii) momentum and radiation pressure?
11. Derive maxwells equation in differential and integral form?
12. Give an account of maxwell equation in free space apply the equation to deduce the electromagnetic wave equation and also determine the velocity in vacuum and conditions on the wave field?
13. Derive the wave equation for conducting medium using maxwell equation and also determine skin depth in conducting medium?
14. Discuss polarization in electromagnetic waves and also describe the production of EM waves?
15. Discuss the propagation of EM wave from vacuum to a nonconducting medium?

UNIT-III OSCILLATION OPTICS AND LASERS

2-Marks

1. Define simple harmonic motion?
2. Mention the types of oscillations?
3. What is resonance?
4. Define standing waves?
5. What is interference?
6. State doppler effect?
7. What is air wedge?
8. What is total internal reflection?
9. What is laser material processing?
10. What is the principle of laser action?

13-Marks

1. Explain the harmonic motion and discuss in characteristics?
2. Discuss the phenomenon of sharpness of resonance?
3. Derive the wave equation for standing waves?
4. Discuss the analogy between electrical and mechanical oscillating system?
5. Deduce the differential equation and for forced oscillations?
6. Describe the different pumping mechanisms used in lasers?
7. Discuss the application in lasers industry?
8. Explain the modes of vibration of CO2 molecule. Describe the construction and working of CO2 lasers with neat diagrams?
9. Explain the principle and construction working of a semiconductor diode laser with neat diagrams?
10. Deduce the wave equation for progressive wave?
11. State and explain Doppler's effect?
12. Calculate the apparent pitch of a note due to an motion of source and listener?
13. Discuss the energy transfer of wave through the vibration of the string and also deduce expression of same?
14. How can this be used for measuring the wavelength of monochromatic light and also derive the formula?
15. Explain the construction and working of Nd-YAG laser with neat diagram?

UNIT-IV BASIC QUANTUM MACHANICS

2-Marks

1. State Compton effect?
2. What is matter waves?
3. What is Compton wave length?
4. What is wave function?
5. What is quantum hypothesis?
6. Define degenerate state?
7. Define correspondence principle?
8. Define non-degenerate state?
9. State the properties of the matter waves?
10. What are Eigen values and Eigen functions?

13-Marks

1. Derive the expression for de-Broglie wavelength for matter waves?
2. Express the de-Broglie wavelength in terms of energy and voltage?
3. Describe the experimental part of Compton effect with necessary diagrams?
4. Derive the Eigen values and Eigen energy function for 2D dimensional box?
5. Derive the Eigen values and Eigen energy function for 3D dimensional box?
6. Discuss the particle problems starting from Schrodinger wave equation Eigen?
7. Derive an expression for the change in wavelength suffered by ana Xray photon when it collides with an electron and describe the experimental part with necessary diagrams?
8. Derive the Schrodinger's time independent wave equations?
9. Derive the Schrodinger's time dependent wave equations?
10. Derive an expression for energy levels of a particle enclosed in one dimensional potential box of width a and infinite height?
11. State and prove Bohr's correspondence principle?
12. Derive the wave equation for one dimensional box. Solve it to obtain eigen function and show that eigen values are discrete?
13. Derive the wave equations for Schrodinger's wave particles in infinite wall at three dimensional.?
14. Derive the function of eigen values and also explain about the probability of density?
15. Explain and details about it Compton wavelength and neat block diagrams?

UNIT-V APPLIED QUANTUM MECHANICS

2-Marks

1. What is harmonic oscillator?
2. Give examples for harmonic oscillator?
3. Define barrier penetration?
4. What is quantum tunneling?

5. Define magnification power?
6. Define resolving power?
7. What is resonant diode?
8. What is energy band?
9. What is valance band?
10. What is conduction band?

13-Marks

1. Obtain an expression for the energy levels of harmonic oscillator by applying Schrodinger wave equation?
2. Explain the principle and construction working of scanning tunneling microscope with suitable diagram and also mention the advantages, disadvantages and applications?
3. Explain the construction and working of resonant diode?
4. Discuss the principle in a finite potential well starting from Schrodinger wave equation?
5. Discuss Kronig penny model?
6. Describe the origin of energy bands in solids?
7. Explain the construction and working of resonant diode?
8. Describe the barrier penetration and quantum Tunneling?
9. Explain the concept of resonant tunneling?
10. Explain the Bloch's theorem for particles in a periodic potential?
11. Explain band theory of solids?
12. Explain the types of electron microscope and give its details?
13. What is the significance of harmonic oscillator?
14. Give the details about (i) Resonant diode (ii) Resonant tunneling?
15. Draw the energy bands and explain the conductor and insulator?