

PHYSICS - IV

III Year

Long Answer Questions:

1. Draw the neat diagram of stern – gerlach experiment and explain it?
2. Describe vector atom model and explain different quantum no's associated with it?
3. Explain (i) L-S coupling (ii) J-J coupling (iii) spectral terms (iv) selection rules and (v) intensity rules & problems?
4. a) Explain doublet character of Na spectrum.
b) Explain singlet and triplet fine structure of in alkaline earth spectra?
5. Write a short notes on screening constants for alkali spectra?
6. a) Define Zeeman effect?
b) Draw the diagram of Zeeman effect and explain it? Discuss the classical theory of Zeeman effect?
c) Application of Zeeman effect?
7. Define Stark effect. Explain the experimental arrangement of Stark effect?
8. Discuss pure rotational spectrum of diatomic molecule in detail?
9. a) Define Raman Effect? Explain experimental arrangement of Raman Effect?
b) Explain classical theory of Raman Effect?
c) Explain quantum theory of Raman Effect?
10. Explain vibrational rotational spectrum?
11. What is photo electric effect? Describe experimental set up with which the photo electric effect can be studied?
12. State and explain Einstein's photo electric equation?
13. Give laws of photo electric emission?
14. What is Compton effect? Considering the Compton scattering. Derive expression for Compton shift?
15. a) State and explain fundamental postulates of Bohr's theory?
b) Derive the expression for the radii of Bohr's orbit?
c) Describe various spectral series of hydrogen atom?
d) Limitations of Bohr's theory?

16. Problems – on Bohr's theorem?
17. Distinguish between wave velocity and group velocity?
18. Describe the experiment of Davisson and Germer that demonstrate the wave character of electrons?
19. Describe G.P. Thomson experiment on electron diffraction and state and important conclusions?
20. Explain standing De-Broglie waves in Bohr's orbit & explain wavelength & circumference of electron orbits?
21. Problems on matter waves?
22. State Heisenberg uncertainty principle for
 - a) Position and momentum
 - b) Energy & time
23. Explain the consequences of uncertainty principle for diffraction of single slit & gamma ray microscope?
24. Problems <Compulsory> Heisenberg's.
25. State and postulates of quantum mechanics?
26.
 - a) Deduce Schrodinger time – independent wave equation?
 - b) Deduce Schrodinger time dependent wave equation?
27. Write a short notes on (a) Eigen values (b) Eigen function
28. Obtain an expression for transmission co-efficient of rectangular potential barrier?
29. Obtain an expression for Harmonic oscillator?
30. Write a short notes on (i) nuclear radius (ii) Mass (iii) density (iv) nuclear spin (v) magnetic dipole moment (vi) quadrupole moment?
31. Explain binding energy of nucleon. Calculate binding energy of nucleon?
32. Explain P-P scattering & P-W scattering?
33. Explain nuclear forces?
34. Meson theory (or) Yukawa's potential?
35. Explain liquid drop model?
36. Semi empirical mass formula
37. Shell model.
38. What is nuclear reaction? Different types of nuclear reactions explain
39. Write a short notes on direct reaction with suitable examples?

40. Bohr's theory of compound nuclear?
41. On what factors range of α -particle depend. Explain how range of α -particle can be measured experimentally?
42. Write a short notes on Geiger nuttal law?
43. Explain Gamow's theory of α -decay. How is Geiger matter law derived from it?
44. Short notes Fermi's theorem of β -delay?
45. Explain working of Wilson cloud chamber?
46. Short notes on solid state detector?
47. Describe the working of GM counter & explain?
48. Explain working of proportional counter?
49. Explain working of scintillation detector
50. Define unit cell and space lattice, co-ordinator number atomic reduces?
51. Explain bravis space lattice?
52. Mention seven crystal systems?
53. What are miller indices?
54. Discuss elements of symmetry?
55. Crystals structures (NaCl, CsCl, diamond)?
56. Problems on lattice constant?
57. Deduce Bragg's law (or) State and explain Bragg's law?
58. Describe and explain Bragg's x-ray spectrometer method for determining the wavelength of X-Rays?
59. Give on account on powder method of crystal structure (or) Debye – Schrrer method?
60. Explain Crystallography by lave method?
61. Problems compulsory on Bragg's law?
62. Define Nano science and nano technology?
63. Carbon nanotubes & uses?
64. Application of nano technology?
65. Born HARBER cycle?
66. Madelung constant & explain it resfeet to sodium chloride lattice?
67. Give brief account on (i) Ionic (ii) Covalent (iii) Metallic crystals.
68. Explain lattice energy of ioric crystal?

69. Give the properties of para, dia, and ferromagnetic materials?
70. a) What are ferrites? Mention their application.
b) Anti ferromagnetism.
71. What are magnetic domains? Explain Weiss theory of ferromagnetism?
72. What is super conductivity. Survey of super conductivity?
73. Type-I & Type-II superconductor?
74. What is Meissner effect? Experimental arrangement of Meissner effect?
75. Applications of superconductor?
76. Salient features of BCS theory?
77. Short notes on tunneling phenomenon?
78. Problems on super conductivity?