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| Bon Secours College for Women Nationally Accredited with “A” Grade by NAAC (Affiliated to Bharathidasan University, Trichy-24) Recognized by UGC Under Section 2(f) & 12 (B)    Vilar Bypass, Thanjavur-613 006. |

**DEPARTMENT OF PHYSICS**

ATOMIC AND NUCLEAR PHYSICS

**Unit – I**

**2 Marks**

1. What are the properties of cathode rays?
2. Define critical potential?
3. Write the principle of Aston’s Bain’s bridge experiment?
4. Define e/m ratio?
5. Write any two properties of positive rays?
6. What is the principal of Davis’s and goucher method?
7. Describe what happens when the pressure in a discharge tube is gradually decreased from atmospheric pressure to .01mm of mercury?
8. Give the two methods that Aston used for determining the unknown masses?
9. Write the range alpha particle?
10. What is the function velocity selector?
11. How positive rays are are generated?
12. Mention the uses of mass spectrograph?
13. What are the limitations of Thomson’s Parabola method?
14. Why the Astons mass spectrograph?
15. Write the limitation of mass spectrograph?
16. What is accelerating potential?
17. How the cathode rays are discovered?
18. What is retarding potential?
19. Mention the advantages of Franck and Hertz experiment?
20. What are the parts involved in Milliken’s oil drop method?

**5 Marks**

1. Compare the properties of cathode and positive rays?
2. Write short note on e/m of cathode ratio?
3. Give the construction details of Milliken’s oil drop method?
4. Give the properties of cathode rays?
5. List out the properties of positive rays?
6. Give the action electric field in Thomson’s parabola method?
7. Give the action magnetic field in Thomson’s parabola method?
8. Describe the theory of Bain Bridge’s mass spectrograph?
9. Discuss the experimental procedure of Millikan’s oil- drop method
10. Discuss the principle of Davi’s and goucher method?

**10 Marks**

1. Explain Davis and Goucher’s method of determining the critical potential of a gas?
2. Explain Millikan’s oil-drop method of determining the electronic charge?
3. Explain how to determine the charge to mass ratio of positive rays using Thomson’s parabola method?
4. Discuss how to determine the masses of isotopes using Aston’s mass spectrograph/
5. Explain the Bain bridge mass spectrograph method?
6. How to determine the critical potential by using Franck and hertz’s experiment?
7. Explain about cathode and positive rays?

**Unit – II**

**2 Marks**

1. State vector atom model?
2. Define coupling scheme?
3. Why j-j coupling prefer in heavy element?
4. Define Pauli’s exclusion principle?
5. What is the consequence of periodic table?
6. Write the electron configuration for sodium potassium?
7. What is quantum numbers?
8. Mention the use of quantum numbers?
9. What is meant by atom models?
10. Write the merit of Bohr atom model?
11. What is the merit of Sommerfeld atom model over to Bohr atom model?
12. Why introduce the vector atom model?
13. What are the quantum numbers introduced because of vector atom model?
14. What is block elements?
15. Why sodium called S block element?
16. Write the features of vector atom model?
17. What is spatial quantization?
18. Define spinning of electron?
19. Give the example for P block elements?
20. What is Bohr Magnetron and write the value of it’s?
21. What is dipole moment?
22. Write the value of magnetic dipole moment of electron due to orbital motion?
23. What is the importance of Stern Gerlach Experiment?
24. What is the value of magnetic dipole moment of electron due to spin motion?
25. What are the S block elements?
26. What is the value of electron spin?
27. Define spatial quantization?
28. What is intrinsic spin?
29. What is extrinsic spin?
30. What is uniform magnetic field &non uniform magnetic field?

**5 Marks**

1. Explain L-S coupling?
2. Derive an expression for magnetic dipole moment due to orbital motion of an electron?
3. Write a short on Pauli’s exclusion principle?
4. Give an electronic configuration for alkali elements?
5. Discuss about the features of vector atom model?
6. What is the importance of vector atom model?
7. Explain the quantum numbers which introduce due to vector atom model?
8. Explain J-J coupling?
9. What is the relation between L-S J-J couplings?
10. State periodic table? Explain it?
11. Deduce the Bohr magnetron value?
12. What is the importance of Stern Gerlah experiment?
13. Give the experimental arrangement of Stern and gerlach experiment?
14. Write a short note on “S” block elements?
15. Give the properties of “d” block elements?

**10 Marks**

1. Explain about the various quantum numbers?
2. Why Pauli’s exclusion principle? Explain its importance?
3. Explain about the Stern Gerlach experiment?
4. Deduce the magnetic dipole moment of an electron?
5. How Pauli’s exclusion principle related to electronic configuration?
6. Explain about periodic table?
7. Discuss about the Coupling scheme?
8. Explain about the Bohr magnetron?
9. Explain about spin orbit coupling?
10. Write the electronic configuration for following elements and explain it? 6 c12,38sr88,19K39,36Kr84,49Sn115.

**Unit – III**

**2 Marks**

1. What are the spectral terms used to notate spectral lines?
2. Define the selection rules?
3. What is the importance of selection rule?
4. What is meant by intensity and interval rule?
5. What is an optical spectrum?
6. What is the role of valence electron in an optical spectrum?
7. Define Fine Structure?
8. What is meant by alkali elements?
9. Write any two features of alkali spectra?
10. What are the cases involved in In Helium spectrum?
11. State Larmor’s theorem?
12. What is Larmor prcession?
13. What is the difference in Zeeman effect & Stark effect?
14. Write the difference between the normal Zeeman effect and anomalous Zeeman effect?
15. Define Lande’s g factor?
16. What are the series involved in alkali spectra?
17. What is meant by singlet line?
18. Write the selection rule for orbital quantum number?
19. Compare D1 & D2 lines.
20. What is spectroscopy?
21. Define diffuse and sharp series?
22. What is singlet and doublet?
23. Write the selection rule for orbital angular momentum?

**5 Marks**

1. Write a short note on Fine structure of sodium Dlines?
2. What are the series involved in alkali spectra?
3. State and explain Larmor theorem?
4. Write a short note on Zeeman effect?
5. What is anomalous Zeeman effect explain it?
6. Deduce the value of shift in Zeeman lines?
7. Differentiate the intensity and interval rule?
8. What are the spectral terms involved in spectrum?
9. Write the features of alkali spectra?
10. What is the difference between D1and D2 lines explain it?

**Unit – IV**

**2 Marks**

1. Define Nucleus?
2. What are the properties of nucleus?
3. Write the formula to find the radius of the nucleus?
4. What is meant by mass defect?
5. What is binding energy?
6. Write the relation between mass defect and binding energy?
7. Define isotope?
8. Define isobar?
9. Write the importance of counter?
10. What is the function of cyclotron and betatron?
11. Why we use Geiger Muller counter?
12. What is the Principle of cloud chamber?
13. Write the Q – Value energy equation for nuclear reaction?
14. Compare the endothermic and Exothermic in energy equation?
15. What are the elementary particles in nucleus?
16. What is meant by elementary particle and subatomic particle?
17. Who discover a particle neutron?
18. What is the antiparticle of electron?
19. Name the scientist who discovered the particle neutron?
20. What are the radioactive elements?
21. What is natural radioactivity?
22. What is artificial radioactivity?
23. The particle which is accelerates using Betatron?
24. Define elastic nuclear reaction?
25. What is Disintegration?
26. What is the principle of cloud chamber?
27. What is the classification cyclotron?
28. What is atomic number?
29. Find the number of neutron for given a element K

**5 Marks**

1. Write a short note on binding energy?
2. How to find the radius of the nucleus explain it?

**Unit – V**

**2 Marks**

1. What are the models involved to compare the nucleus?
2. What is Liquid drop model?
3. Write any two similarities between liquid drop and nucleus?
4. Who describe the liquid drop model?
5. What is nuclear fission?
6. What is nuclear fusion?
7. What is meant by controlled chain reaction
8. Based on which principle the atom bomb explores?
9. What is the principle used in nuclear reactor?
10. How the neutron important in nuclear fission?
11. Write a note on mesons?
12. What are mesons?
13. Write the fissionable material?
14. Give the function of moderator in nuclear reactor?
15. Why boron or cadmium used as control rod in nuclear reactor?
16. State the application of nuclear reactor?
17. What is mass value for photons?
18. What is the source of stellar energy?
19. What is thermonuclear function?
20. Write the two demerits of liquid drop model?
21. What are the parts involved in nuclear reactor?
22. What is the material used for reflector in nuclear reactor?
23. What is the purpose of control rods in nuclear reactor?
24. What is Shell model?
25. What is the role magic numbers in shell model?
26. Define magic numbers?
27. What are the magic numbers?
28. Write a note on hydrogen atom bomb?
29. In which principle used in hydrogen bomb?
30. Write nitrogen cycle for nuclear fusion?
31. What is spin orbit coupling?