JHARKHAND Rai University
RANCHI

PRACTICE SET
End Semester Examination, December, 2025

Program: Diploma (Mining/ CSE)
Semester: I
Subject: Basic Chemistry
Subject Code: 8DBSC102&3DBSC102

UNIT I

SECTION A (5 marks)

1. a) What is (n+l) rule? Which out of 4s and 3d sub-shells has lower energy?
   b) Write down the electronic configurations of the following:
   a) Al b) F c) P d) Cu e) Ar
2. Distinguish between Electrovalent and Covalent compounds with suitable examples.
3. How many neutrons, electrons and protons are there in the following nuclei?
   a) $AlCl_3$ b) NH_3 c) H_3O^+ d) N e) Mg
4. Why an atom is electrically neutral?
5. Define – Isotopes, Isobar, Isotones with examples.

SECTION B (10 marks)

6. Write short notes on: a) Pauli's exclusion principle b) Hund's rule c) Aufbau's principle On the basis of above rule draw electronic configuration of 1) $^{39}K_{19}$ 2) $^{32}S_{16}$
7. Two elements X and Y have electronic configuration 2, 8, 2 and 2, 8, 7, what is the formula of ionic compound they form? With the help of figure, explain the formation of that compound.
8. Explain a) Valency and its types b) Variable valency c) Electropositive and electronegative element d) Valency electron
9. Elaborate water is a covalent compounds, which elements are most likely to form covalent compounds?

SECTION C (20 marks)

10. a) Lithium exists in nature in the form of two isotopes, Li-6 and Li-7 with atomic masses 6.0151u and 7.0160u and the percentages 8.24 and 91.76 respectively. Calculate average atomic mass.
    b) An element Z contains two naturally occurring isotopes $^{35}Z_{17}$ and $^{37}Z_{17}$. If the average atomic mass of this element be 35.5 u, calculate the percentage of two isotopes.

11. How did Bohr overcome Rutherford's atomic model? Write Bohr's postulate and investigate drawback in his theory.

12. With the help of figure justify the formation of a) $MgCl_2$ b) NH_3 c) H_2O d) C_2H_6 e) C_2H_4

UNIT II

SECTION A (5 marks)

13. Define and explain the following terms:
    a) Conductor b)Insulator c) electrolyte
14. Distinguish between :
    a) Atoms & Ions
    b) Electrolyte and non-electrolyte
15. What are application of electroplating?
16. Define oxidation and reduction reactions with examples.
17. What are the types of electrodes? Explain with examples.

SECTION B (10 marks)

18. a) Explain the mechanism of electrolysis of aqueous copper sulphate Solution using carbon electrodes.
    b) Distinguish between the electrolytic cell and the electrochemical cell.
19. Explain and derive Faraday's First and second laws of electrolysis.
20. Define and explain
    a) Electrochemical equivalent(E.C.E) b) Equivalent weight (C.E) (c)Relation between E.C.E and C.E
21. a) Calculate the weight of metallic chromium deposited from a solution of chromium chloride ($CrCl_3$) by a current of 0.2 ampere passing for 100 minutes.(At. Wt. of Cr=52)
    b) Calculate the time in seconds in which 0.3g of copper is liberated from copper sulphate solution, when a current of 0.5 ampere is passed. (Eq.wt.of Cu=31.6)

SECTION C (20 marks)

22. a) Define electrolysis. Design and explain the mechanism of electrolysis by drawing a suitable diagram.
    b) A current of 1.5 amperes was passed through a solution of a salt of a metal for 15minutes when 0.783 g of the metal was deposited. Calculated the equivalent weight of the metal.
23. Elaborate the following:
    a) Electro refining of metal, b) Electroplating c) Electrotyping

24. Differentiate the terms 1) primary cell 2) secondary cell. Explain with figure the working of a dry cell.

UNIT III

SECTION A (5 marks)

25. Name the metal having:
    a) Highest melting and boiling point
    b) Lowest melting point
    c) Lightest metal
    d) Heaviest metal
    e) Very good conductivity

26. Name the following:

a) The process of extracting metal from ore.
b) A mineral from which the metal can be extracted economically.
c) The process of removal of gangue or impurities from the ore.
d) The process of heating ore in absence of air below its melting point
e) The process of concentration of oxide and hydroxide ore.

27. Write physical properties and application of Aluminium and Nickel.
28. What is an alloy? What are the purposes of making alloys?
29. Write composition and application of
a) Duralumin b) Babbit metal

SECTION B (10 marks)

30. Investigate the difference between:
a) Calcination and roasting.
b) Gravity and electromagnetic separation.
31. What is smelting? Where is it useful? Explain the term gangue and flux are complimentary to each other.
32. With respect to their principles elaborate about following:
a) Froth flotation process
b) Electrolytic refining

SECTION C (20 marks)

33. a) Explain the extraction of Fe or Al metal from its ore in details.
b) Give flow chart of extraction process of metal.
34. Classify alloy and elaborate different method of preparation of alloy.

UNIT IV

SECTION A (5 marks)

35. What is natural rubber? Describe the processing of natural rubber.
36. What are plastic? Give their importance.
37. Discuss any four engineering uses of plastics depending upon their properties
38. Write short notes on-a)Plasticizers b) Fillers

SECTION B (10 marks)

39. What do you mean by polymerization and its type? Explain the mechanism of polymerization.
40. Bring out the difference between thermosetting and thermo softening plastic.

SECTION C (20 marks)

7. Distinguish between natural and synthetic rubber. Describe the process of vulcanization of rubber.

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