(c) Zero-order reaction (d) Third order reaction

154. The unit of rate constant is the same as that of the rate of reaction in:

(a) First order reaction (b) Second order reaction

(c) Zero-order reaction (d) Third order reaction

155. In zero order reaction, the rate is independent of:

(a)Temperature of reaction (b) Concentration of reactants

(c) Concentration of products (d) None of these

156. If the rate equation of a reaction $2A+B \rightarrow$ products is, rate = K[A]2 [B], and A is present in large excess, then order of reaction is:

(a) 1 (b) 2 (c) 3 (d) none of these

157. The rate of reaction _____as the reaction proceeds.

(a) Increases (b) Decreases

(c) Remains the same (d) May decrease

158. With increase in 10○C temperature, the rate of reaction doubles. This increase in rate of reaction is due to:

(a) Decrease in activation energy of reaction

(b) Decrease in the number of collisions between reactant molecules.

(c) Increase in activation energy of reactants

(d) increase in number of effective collisions.

159. Unit of rate constant is the same as that of the rate of reaction in:

(a) Zero order reaction (b) 1^{st} order Reaction

(c) 2^{nd} order Reaction (d) 3^{rd} order reaction.

160. Glucose can be converted into ethanol by an enzyme:

(a) Lipase (b) Zymase (c) Sucrose (d) Urease

(SUBJECTIVE PART)

68/68 Marks Challenge

SECTION-I

SHORT QUESTIONS (SQs)

1. Define molecular ion, write its uses.
2. Why we use the term relative atomic mass?
3. Calculate the percentage of Nitrogen in urea.
4. What are isotopes? Why they have same chemical but different physical properties?
5. Define isotopes why they have same chemical properties?
6. Explain mathematical relationship of m/e of an ion in mass spectrometry.
7. How does no individual neon atom in the sample of the element has mass 20.18 amu?
8. Write functions of $Mg(ClO_4)_2$ and KOH in combustion analysis.
9. Why oxygen cannot be determined directly in combustion analysis?
10. Differentiate between empirical and molecular formula.
11. A compound may have same molecular and empirical formula, Justify.
12. Define molecular formula. How is it related with empirical formula?
13. Define limiting reactant. Give an example.
14. Many chemical reactions taking place in our surrounding involve limiting reactants. Give reason
15. Define actual yield. Write formula for the calculation of % age yield.
16. Why actual yield is always less than theoretical yield?

17. Why we calculate %age yield?
18. Law of conservation of mass has to be obeyed during stoichiometric calculations. Explain?
19. Define empirical formula and molecular formula with examples.
20. Give assumptions of stoichiometry.
21. Magnesium atom is twice heavier than carbon atom. Comment.
22. How one mg of K_2CrO_4 has thrice the number of ions than the number of formula units when ionized.
23. How 4.9 g of H_2SO_4 when completely ionized in water have equal number of +ve and –ve charges but the number of positively charged ions are twice the number of negatively charged ions.
24. 23 g of sodium and 39 g of potassium have equal number of atoms in them. Justify.
25. What is Avogadro's number? Give equation to relate the Avogadro's number and mass of element
26. How N_2 and CO have same number of electrons, protons and neutrons.
27. Why do 2 g of H_2, 16g of CH_4, 44g of CO_2 occupy separately the volume of 22.414 dm^3 although the sizes and masses of molecules of three gases are very different from each other?
28. Write any four properties of liquids.
29. Give two statements of Boyle's Law.
30. Define absolute zero. What is its value?
31. Define atmospheric pressure. Give its two units.
32. Calculate the value of gas constant "R" in S.I. units.
33. Prove that $d=\frac{PM}{RT}$
34. Derive Avogadro's Law from kinetic molecular theory of gases.
35. Derive an expression to find out the partial pressure of gas.
36. Regular air cannot be used in diver's tank. Give reasons.
37. Why pilots feel uncomfortable breathing in unpressurised cabin?
38. Lighter gases diffuse more rapidly than heavier gases. Give reason.
39. Derive Boyle's law from KMT.
40. Give general principle of Liquefaction of gases.
41. What is plasma? Write its one / four application.
a. Justify that SO_2 is comparatively non-ideal at 273K but behaves ideally at 327°C.
42. Define Slow Neutron and Fast Neutron.
43. Calculate mass of an electron when e/m = 1.758×10^{11} C. Kg^{-1}
44. How charge to mass (e/m) ratio of electron in measured?
45. What is Planck's quantum theory?
46. Differentiate between frequency and wave number.
47. Write postulates of Bohr's atomic model
48. Why the electrons move faster in an orbit of smaller radius?
49. Why the potential energy of an electron is negative in an orbit of atom?
50. Differentiate between continuous and line spectrum.
51. What is the origin of Line Spectrum?
52. Differentiate between atomic emission spectrum and atomic absorption spectrum.
53. What is atomic emission spectrum?
54. Why the radius of an atom cannot be determined precisely?
55. Write names of spectral series of hydrogen spectrum.
56. What is meant by fine structure of Hydrogen Spectrum?
57. Differentiate between Zeeman effect and stark effect.
58. Mention two defects of Bohr's model.
59. State Moseley's writes its mathematical equation.
60. How the dual nature of an electron was verified?
61. state Heisenberg un-certainty principle and give its mathematical form / equation.
62. What is un-certainty principle?
63. Define Heisenberg's principle of uncertainty.
64. What is azimuthal quantum number? Give its significance.
65. Define Pauli's exclusion principle. Give one example.
66. Give the postulates of Bohr's atomic model.

67. What is spectrum? Differentiate between continuous spectrum and line spectrum.
68. What is thermochemical equation? Give example.
69. What is the difference between heat and temperature? 1
70. Differentiate between endothermic and exothermic reactions. Give one example of each
71. Differentiate between spontaneous and non-spontaneous reactions.
72. Spontaneous reactions are exothermic in nature explain.
73. Describe that burning of candle is a spontaneous process. Justify.
74. Define system and surrounding. Show by diagram of any one example.
75. Differentiate between system and surroundings.
76. Define with example system and state function.
77. Differentiate between spontaneous and non-spontaneous reactions.
78. What do you know about internal energy of system?
79. Define heat of solution. Give one example.
80. Explain the term enthalpy.
81. Define enthalpy of formation with one example.
82. Define standard enthalpy of atomization with an example.
83. ΔH neutralization of strong acid with strong base always remains constant.
84. With the help of an example, explain enthalpy of neutralization.
85. Define standard enthalpy of combustion. Give one example.
86. Define enthalpy of solution with an example .
87. Define Born-Haber cycle and Lattice energy.
88. What do you know about internal energy of system?
89. Define standard enthalpy of atomization with an example.
90. What is standard enthalpy of solution? Give one example.
91. State first law of thermodynamics. Give its mathematical formula.

SECTION-II

SHORT QUESTIONS (SQs)

1. What is difference between Gooch's crucible and Sintered glass crucible?
2. Why sintered glass crucible is preferred over Gooch crucible?
3. Explain filtration through Gooch Crucible?
4. Define Crystallization. What is basic principle of crystallization?
5. Write four Properties of metallic crystal?
6. What are liquid crystals? Why are they so called?
7. Write down any two methods of drying of the crystals.
8. Define sublimation with an example.
9. Define sublimation what type of a substance can be purified by this technique.
10. Define distribution law. How it is helpful in solvent extraction?
11. What is solvent extraction? Give its importance.
12. Define chromatography. Give its two uses.
13. What is difference between adsorption and partition chromatography?
14. What is mobile phase and stationary phase?
15. Write down the uses of chromatography.
16. What is R_f value? Why it has no units?
17. What are dipole-dipole forces of attraction? Explain with an example.
18. What are Debye forces? Explain.
19. Define hydrogen bonding. Show hydrogen bonding in ammonia molecule.
20. Describe cleaning action of soaps and detergents on the basis of H- bonding.
21. Ethyl alcohol can dissolve in water but- hydrocarbons are not soluble in water. Justify it
22. Lower alcohols are soluble in water but hydrocarbons are insoluble. Give reason.
23. One feels sense of cooling under the fan after bath. Why?

24. Define Evaporation and name the factors which affect evaporation.
25. Why the boiling points of noble gases increase down the group?
26. What are liquid Crystals? Why are they so called?
27. How the liquid crystals, help in the detection of the blockage in Veins and arteries?
28. Write four properties of solids.
29. Define crystalline solids and crystallites.
30. Amorphous solid like glass is also called super cooled liquid. Explain
31. Define Polymorphims and Anisotorpy. Give one example of each.
32. Differentiate between isomorphism and polymorphism.
33. Define symmetry and habit of a crystal.
34. Write four properties of Metallic crystals.
35. The Electrical Conductivity of metals decreases conductivity of a metal with the rise of temperature.
36. Define rate of a chemical reaction and give its units.
37. Define specific rate constant. Give equation to support your answer.
38. What is order of reaction? Give two examples.
39. What is zero order of reaction? Give one example.
40. The radioactive decay is always a first order reaction. Give reason.
41. Define with example 2nd order reaction?
42. What is specific rate constant or velocity constant?
43. What is half life period? Give example.
44. What do you mean by rate determining step? Give example.
45. How surface area affects the rate of reaction? Give one example.
46. Define activation energy and activated complex.
47. How does a catalyst affect a reversible reaction?
48. What is the effect of temperature on the rate of a reaction?
49. How enthalpy change of a reaction and energy of activation are distinguished?
50. Define homogeneous catalysis. Give two examples.
51. What is catalytic poisoning? Give two examples.
52. What are enzymes? How they act as catalysts?
53. Write down any two characteristics of enzyme catalysis.
54. Enzymes are specific in action. Justify.
55. What is auto catalysis? Give example to support answer.
56. What is molarity? Calculate the molarity of a solution containing 9g of glucose in 250 cm^3 of solution.
57. How molality is independent of temperature, but molarity depends on temperature?
58. One molal solution of glucose is dilute as compared to one molar solution of glucose. Justify it?
59. Why 1 molal solution of NaOH is dilute as compared to one molar solution?
60. One molal solution of urea is dilute as compared to one molar solution of urea. Justify it?
61. Define Ebullioscopic constant with example.
62. How will you justify that lowering of vapor pressure is a colligative property?
63. Relative lowering of vapor pressure is independent of temperature. Justify it.
64. Justify that boiling points of solvents increase due to presence of non-volatile solutes.
65. Depression of freezing point is a colligative property. Justify it.
66. Give two applications of Colligative properties.
67. Why NaCl and KNO_3 are used to lower the melting points of ice?
68. Why is Beckman's thermometer used to find the depression in freezing point?
69. Differentiate between ideal and non-ideal solutions.
70. Define heat of solution.
71. What is meant by water of crystallization? Give an example.
72. What are zeotropic and azeotropic mixtures?
73. Differentiate between molarity and molality.
74. Define upper consulate temperature. Give two examples.
75. Differentiate between hydration and hydrolysis**.**
76. Why the solubility of glucose into water increases by increasing temperature?
77. State Raoult's law. Give its mathematical equation.

78. What is fractional crystallization?
79. Aqueous solution of $CuSO_4$ is acidic in nature. Justify it.
80. Aqueous solution of CH_3COONa is basic in nature.
81. What is continuous solubility curve? Which solutions give this type of curve?
82. What are discontinuous solubility curves?

SECTION-III

SHORT QUESTIONS (SQs)

1. Explain the term reversible reaction and state of equilibrium.
2. How the direction of a reversible reaction at any instant can be determined by Kc value?
3. State Le-Chatelier's principle. And discuss the effect of change in concentration of a product on reversible reaction.
4. How does change of pressure shifts the equilibrium position in the synthesis of ammonia?
5. How the equilibrium constant Kc predicts the direction of a reversible reaction?
6. The solubility of glucose in water is increased by increasing the temperature. Explain.
7. Define pH. How it is helpful to know the nature of solution?
8. Define ionic product of water and what is its value at 30^oC.
9. Define pH and pOH.
10. Calculate the pH of 10^{-4} mol.dm^{-3} solution of Ba(OH)2
11. How do the buffers act? Give example.
12. How does the catalyst affect the equilibrium constant?
13. What do you mean by Buffer capacity?
14. Write two applications of equilibrium constant?
15. Write two uses of buffer solutions.
16. Give two applications of solubility product.
17. Write Handerson's equations for acidic and basic buffers?
18. What are buffer solutions? How a basic buffer can be prepared?
19. Define solubility product. Derive solubility product expression for Ag_2CrO_4?
20. How change in volume disturbs the equilibrium position for some of the gas phase reactions but notthe equilibrium constant?
21. How does a catalyst affect a reversible reaction?
22. What is the formula to calculate the percentage ionization of weak acids?
23. Define Lowry-Bronsted concept of acids and bases?
24. Why solid ice at 0^oC can be melted by applying pressure without supply of heat from outside.
25. Write the relationship of Kp with Kc.
26. Give applications of common ion effect (any two).
27. What is difference between metallic conduction and electrolytic conduction?
28. Differentiate between electrolytic cell and galvanic cell.
29. Explain how impure copper can be purified by electrolytic process.
30. Give two applications of electrochemical series.
31. A salt bridge maintains the electrical neutrality in the cell. Explain.
32. Write down the function of salt bridge?
33. A porous plate or a salt bridge is not required in lead acid storage battery.
34. Define electrochemical series.
35. Write down two functions of salt bridge in a galvanic cell?
36. Describe Nickle-Cadmium cell.
37. What is standard electrode potential?

38. Calculate the oxidation number of Mn in $KMnO_4$.
39. Calculate the oxidation number of Mn in $KMnO_4$ and Na_2MnO_4.
40. Calculate the oxidation number of S in $Cr_2(SO_4)_3$ and SO_4^{2-}.
41. What is difference between electrolytic cell and voltaic cell?
42. How fuel cells produce electricity?
43. Write two advantages of fuel cells.
44. Give the chemistry of electrolysis of aqueous solution of sodium chloride.
45. What is electrolysis? Give example.
46. Write recharging of lead accumulator battery.
47. Lead accumulator is a chargeable battery. Justify.
48. What is Standard Hydrogen Electrode (SHE).
49. Draw diagram of Standard Hydrogen Electrode (SHE).
50. SHE acts as anode when connected with Copper but as cathode with Zinc. Support your answer with equations
51. What is alkaline battery?
52. How anodized aluminum is prepared in an electrolytic cell?
53. Define anode and cathode.
54. Why is the radius or size of a cation smaller than its parent atom?
55. Write down the two postulates of VSEPR.
56. Explain the geometry of H_2S on the basis of VSEPR.
57. Why the radius of an atom can't be determined precisely?
58. What is octet rule? Give two examples of compounds which deviate from it.
59. 75.4 pm is the compromised distance between the bonded hydrogen atoms. Justify.
60. Bond distance is the compromised distance between the two atoms. Justify.
61. Distinction between covalent and coordinate covalent bond vanishes after bond formation.
62. Why the ionic radius is greater than atomic radius?
63. State electronegativity and electron affinity.
64. Why is the radius of a cation smaller than its parent atom?
65. Differentiate between covalent bond and coordinate covalent bond.
66. Why the energy of anti-bonding molecular orbital is higher than corresponding bonding molecular orbital?
67. How does ionization energy vary in periodic table?
68. Ionization energy is an index to the metallic nature of an element. Justify.
69. What is Bond order? Give an example.
70. Draw M.O.T diagram of Hydrogen molecule showing its bonding and antibonding molecular orbitals.
71. Differentiate between atomic orbital and molecular orbital.
72. Define sigma bond and pi bond.
73. π bonds are more diffused that bonds ϭ bonds. Why?
74. Define electronegativity. Give its trend in the periodic table.
75. Why is no bond in chemistry 100% ionic?
76. Define atomic orbital hybridization.
77. State the geometry of ammonia molecule on the basis of VSEPR theory.
78. Define Dipole moment and give its S.I unit.
79. Why the dipole moment of CO_2 is zero but that of SO_2 is 1.61 D?
80. Why BF_3 is non-polar but SO_2 is polar?
81. Write two points of Valence bond theory.
82. Why ionization energy decreases down the group although nuclear charge increases. Explain.
83. Define ionization energy (potential). Give its trends in the periodic table.
84. Why it is impossible for CH_4 to make a coordinate covalent bond with H^+ ion while water and ammonia can do so?
85. Why the lone pairs of electrons occupy more space than bond pairs?
86. Why ionic compounds do not show the phenomenon of isomerism, but covalent compounds do?
87. How the type of bonding affects the solubility of compounds.

LONG QUESTIONS