Reg. No.										

प्रज्ञानं ब्रह्म

Manipal

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INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

II SEMESTER B.S. DEGREE EXAMINATION – JUNE 2016

SUBJECT: CHEMISTRY (CH 121)

(NEW SCHEME)

(COMMON TO ALL BRANCHES)

FRIDAY, 10th JUNE, 2016

Time: 3 Hours **Max. Marks: 100**

- ✓ **Answer ANY FIVE FULL Questions.**
- ✓ **Draw a neat labeled diagram and equations wherever necessary.**

1A.i) Define Equlibrium constant.The gaseous reaction A+B ⟷ C+D is studied in a one litre vessel at 25°C. The initial concentration of A is three times the initial concentration of B. After equilibrium is attained, the concentration of C is found to be equal to the concentration of B. Calculate the equilibrium constant of the reaction.

ii) What is a standard cell? Explain the consruction and working of Weston cadmium cell

1B. i)Define Corrosion. Explain electrochemical theory of corrosion
ii) With a neat diagram explain electrophoresis in colloidal solution

1C. Explain the band theory of conductors, semiconductors and Insulators.

(8+8+4)

2A. i) Define heat capacity of a system. Derive relationship between C_P and C_v

ii) Describe the poggendrofs method of determination of emf of cell.

2B. i) Define rate law of a reaction. Derive an expression for a first order rate constant of a reaction.

ii) What are the main postulates of Valence shell electron pair repulsion theory? Explain the structure of ammonia molecule.

2C. The standard reduction potential, E° of copper is 0.34V and the concentration of Cu^{+2} ion is 0.015M. Find the
a) Reduction electrode potential,E of copper
b)Free energy change of electrode reaction

(8+8+4)

3A. i) Explain the types of hydrogen bonding with an example.

ii) Explain the construction and working of Calomel electrode. Write any two of its limitations.

3B.i) What is meant by degree of hydrolysis and hydrolysis constant? Deduce the relation between them for a salt of strong acid and weak base.

ii) Define the following.
a) Gold number b) Flocculation value c) Triple point d) Eutectic point

3C. Give reason for the followings;

i. Standard hydrogen electrode is known as theoretical reference electrode

ii. Phenaphthalein is not a good indicator in the titration of sodium carbonate and hydrochloric acid.

(8+8+4)

4A. i) Explain the three types of overlapping between s and p orbitals with example.

ii) How will you purify colloidal solution by electrodialysis.

4B.i) State second law of thermodynamics. What are the limitations of first law of thermodynamics?

ii) What is solubility product principle? When the Calcium sulphate ($K_{sp}=2.4\times10^{-5}$) will be precipitated from the hard water containing 0.01mol/liter of Calcium chloride by the addition of

a) 0.001mol/litre of dilute sulphuric acid

b) 0.02mol/litre of dilute sulphuric acid.

4C. Discuss the buffer action of ammonium acetate solution. Derive an expression for calculation of its pH. **(8+8+4)**

5A.i) What are main postulates of Arrhenius theory of electrolytic dissociation

ii) Write the conjugate base of the following

a) The HSO_4^-

b) The HCO_3^-

c) The H_2O

d) The NH_3

5B.i) Define Ionic product of water. If hydrochloric acid is added to water until the H+ ion concentration of the solution becomes 1.0×10-5M, what is the OH^- concentration and pH of the solution that time ?

ii) Draw and explain the phase diagram of lead silver system.

5C. Define Hess's law. Explain with example one of its application.

(8+8+4)

6A. i) What is meant by corrosion inhibitors. Explain the functions of cathodic inhibitors in corrosion control.

ii) The emf of an electrochemical cell consists of iron electrode dipped in 0.1M $FeSO_4$ and silver electrode in $AgNO_3$(x) is 1.1926V. Write the cell reaction, cell representation and calculate the strength of$AgNO_3$.($E^\circ_{(Ag^+/Ag)}$ =0.80V and $E^\circ_{(Fe^{2+}/Fe)} = -0.41$V)

6B. Describe the followings;

a) Origin of electrode potential b) liquid junction potential

6C. Name the type of corrosion taking place in the boiler. Explain the process with suitable equations.

(8+8+4)

7A. Differentiate the following

a) Galvanic series and electrochemical series
b) Lyophobic and lyophilic sols

7B. i) The cell SCE II HCl (0.1M) I AgCl(s) I Ag gave an emf of 0.20 V and 0.23 V with a buffer having pH value 3.0 and unknown pH value respectively. Calculate the pH value of unknown buffer solution. Given E_{SCE}= 0.2422 V.

ii) Write the expression of solubility product of the silver chloride and barium sulphate.Calculate its solubility in moles/litre.(Ksp of AgCl = 1.8×10^{-10} and Ksp of $BaSO_4$ = 1.1×10^{-10})

7C. Justify the followings;

a) Calomel electrode cannot be used above 50 ˚C.
b) The colloidal particles precipitate on adding an electrolyte.

(8+8+4)

8A. What is hybridization? Explain the structure of CH_4 and BF_3

8B. i) Explain common ion effect with an example.

ii) Explain the kinetic and optical properties of colloidal system

8C. What is Ionic bond? Explain the characteristics properties of Ionic bond.

(8+8+4)