U.G. 4th Semester Examination - 2022

CHEMISTRY

[PROGRAMME]

Course Code : CHEM-G-CC-T-4

Full Marks : 40 Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **five** questions: 2×5=10

   a) Write the conditions of non-ideal solution.

   b) What is the importance of Ostwald's dilution law?

   c) What is meant by electrode potential and standard electrode potential?

   d) Write the ground state electronic configurations of Hg^0 and Hg^{2+} (Atomic Number 80).

   e) Define the phase and component of a system.

   f) Why aqueous solution of $[Co(Cl)_4]^{2-}$ exhibit deep blue colour?

   g) Calculate the spin-only magnetic moment of high and low spin $[Cr(en)_3]Br_2$ complex.

   h) Write the IUPAC name of $[Co(NH_3)_6]Cl_3$ and $[Ni(PPh_3)_4]$.

2. Answer any **two** questions: 5×2=10

   a) Explain the phase diagram of a two component liquid-liquid system-Phenol water system. State the Kohlrausch's law of independent migration of ions. 3+2

   b) What is liquid junction potential and how is it eliminated? Find the number of degrees of freedom at the triple point of water. 3+2

   c) What is John-Teller effect? What distortion is expected for octahedral high spin d^4 ion? 3+2

   d) Write a short note on lanthanide contraction. 5

3. Answer any **two** questions: 10×2=20

   a) Give the phase diagram for Sulphur system and discuss the importance of various points, lines and areas in the diagram.

   The resistance of a decinormal solution of a salt occupying a volume between two platinum electrodes 1.8 cm apart 5.4 sq.cm in area was found to be 32 ohm. Calculate the equivalent conductance of the solution. 6+4

b) Write a short note on quinhydrone electrode. Discuss the curve obtained in conductometric titration of a weak acid with a strong base. 5+5

c) Write short notes on the following (any **two**): 5×2=10

i) Werner's coordination theory.

ii) Separation of lanthanides by ion exchange method.

iii) Valence Bond Theory (VBT).

d) Why transition elements show variable oxidation states? Why compound of transition elements are mostly coloured? 5+5

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