B. Sc. Chemistry Examination, 2022

(3rd Year, 5th Semester, CBCS, Supplementary)

Chemistry (Core)

Paper – Core / Chem/Th- 13

Adsorption and Colloider, Nanomaterials, Polymer, Electrochemistry - II

Time : Two hours   Full Marks : 40

(20 marks for each unit)

Use a separate answer script for each unit.

UNIT: 5131-P

Attempt all questions

1. How will you synthesize gold nanoparticle? Write down about its importance.

    2 + 2

2. Discuss about linear and branched chain polymers with examples.

    3

3. Define functionality. Give an example of a reaction where butadiene may be tetrafunctional.

    3

4. Derive the Langmuir adsorption isotherm. Under what condition can it be turned into a Freundlich isotherm?

    2½ + 1½

5. Describe Bredig's method for the preparation of a gold sol. Is it a "top-down" or a "botton-up" approach?

    2 + 1

6. What is "gold number"? Explain if it refers to the hydrophobic or hydrophilic sol.

    [Turn over

UNIT - 5152 -P

Attempt all questions

Marks

7. Mention whether following statement is correct or incorrect with brief justification.

a) In a galvanic cell, by *IUPAC* recommended convention, oxidation always takes place at right hand electrode which is negative electrode.

b) Electro Motive Force (*EMF*) of a galvanic cell depends on activities of electrode active species and temperature of the cell.

c) Salt bridge eliminates liquid junction potential by eliminating liquid junction/s.

d) The equilibrium constant value of galvanic cell reaction depends on standard cell potential of the cell only.

e) *Chemical* and *electrochemical potential* of Zn^{2+} ions at electrode-solution interface are same in unit but different in magnitude.   2×5

8. Write down the respective half cell reactions and cell reaction of the following cell.

$$Zn\ (s)\ |\ ZnCl_2\ (aq)\ |\ Hg_2Cl_2\ (s)\ |\ Hg\ (l)\ |\ Pt\ (s)$$

   i) What is the role of *Pt* here?

   ii) Is this cell '*a cell without transference*'?   5

9. Represent the galvanic cell for the cell reaction: $Fe^{3+}(aq) + Ag(s) = Fe^{2+}(aq) + Ag^{+}(aq)$. The *equilibrium constant* for the reaction is 0.531 at 298 K. Calculate $E^{o}_{Ag+(aq)/Ag(s)}$ when $E^{o}_{Fe3+(aq)/Fe2+(aq)} = 0.770$ V at 298 K.   5