

Roll No.

Total No. of Questions : 09]

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Paper ID [CH101]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 1st/2nd)

ENGINEERING CHEMISTRY (CH - 101)

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Five** questions from Section - B & C.
- 3) Select at least **Two** questions from Section - B & C.

Section - A

Q1)

(Marks: 2 Each)

- a) Define and explain degree of freedom.
- b) Reference used in NMR spectroscopy.
- c) Parameters for checking water quality for domestic use.
- d) Reduction potential.
- e) Two photosensitized reactions observed in daily life.
- f) Basic Principle of PES.
- g) Passivity.
- h) BOD and COD or two method of softening of hard water.
- i) Solubility product of water.
- j) Why alloys are more resistant to corrosion than pure metals?

Section - B

(Marks: 8 Each)

- Q2) (a) What are disinfectants? What are the main requirements in a good disinfectant? Name few disinfectants (at least three) used in our daily life with use and principle of working.
- (b) Aluminium is a highly corrosive metal, even though it is used freely in electrical lines for long time. Justify?

- Q3)** (a) What is corrosion of metals? Explain electro-chemical corrosion with its mechanism.
- (b) How does sacrificial anode method helps in prevention of submerged oil pipe lines in sea? Explain with mechanism.
- Q4)** (a) A silver rod is dipped in a solution at 25°C which is 0.1 M in Ferric ion. Calculate the equilibrium concentration of all the ions in the solution.
 $E^{\circ}(\text{Fe}^{3+}, \text{Fe}^{2+}) = 0.771\text{ V}$ and
 $E^{\circ}(\text{Ag}^{+}, \text{Ag}) = 0.799\text{ V}$
- (b) Draw a neat diagram of a standard hydrogen electrode. How does SHE helps in determination of standard electrode potential?
- Q5)** (a) Calculate the concentration of NO_2 present at equilibrium in a chloroform solution which contained 0.129 mole/litre of N_2O_4 . K_c for dissociation of $\text{N}_2\text{O}_4 = 1.07 \times 10^{-5}$.
- (b) Differentiate between Ionic product and solubility product.

Section - C

(Marks: 8 Each)

- Q6)** (a) Explain stark Einstein law of photochemical equivalence?
- (b) Label various photophysical processes in electronically excited molecule in a Jablonski diagram. Explain.
- Q7)** (a) Explain processes which contribute to the finite width of a spectral line.
- (b) What are different kinds of electronic transitions? Explain with examples. (molecules that show these transitions).
- Q8)** Write notes on:
- (a) Shielding and deshielding.
- (b) Solvents used in NMR.
- (c) Chemical shift in NMR.
- (d) Spin spin coupling.
- Q9)** (a) What is an azeotrope? Azeotrope although distills unchanged in composition at given pressure yet it is not a chemical compound explain?
- (b) Draw a phase diagram of CO_2 system. In what respect does the system differ from water system?