Term Final Examination,
Autumn-2()24
Course code: CHEM175
Course Title: Chemistry

University of Information Technology & Sciences (UITS)

Faculty of Science and Engineering

Department of CSE/IT/CE

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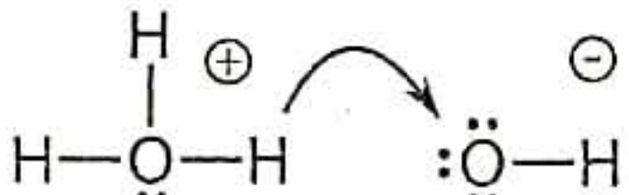
Marks: 50 Time: 3 Hours

Answer all the questions

Q.No.		Questions	Marks
1.	(a)	Is it possible to explain Arrhenius, Lewis and Bronsted-Lowry Acid-base theory with the following example? **Explain** those theories with suitable reactions. 	4
	(b)	**Identify** the pH of a 0.040 M $Al(OH)_3$ solution.	3
	(c)	**Define** buffer solution. **Show** the mechanism of action of basic buffer solution.	3
2.	(a)	**Identify** the half-life of a first-order reaction and a second-order reaction and **illustrate** which one is dependent on concentration with reason.	4
	(b)	A voltaic cell is formed from a piece of iron in a solution of $Fe(NO_3)_2$ and Ag in a solution of $AgNO_3$. **Define** the cathode and anode according to the given voltaic cell.	3
	(c)	When a copper strip is dipped into a solution of Calcium sulfate solution what would be happened? **Estimate** the standard cell potential for the following reaction: $$Ca + Cu^{2+} \rightarrow Ca^{2+} + Cu$$ Given: $E°(Ca^{2+}/Ca) = -2.87V$ and $E°(Cu/Cu^{2+}) = -0.34$ V	3

3. (a) **Explain** the difference between the hybridization and structure of NH_3 and H_2O. 4

(b) **Explain** the role of metallic bond on the electricity conductance. 3

(c) pH of neutral water is defined as 7. **Explain** this with reaction and dissociation constant. 3

4. (a) **Derive** rate equation of second order reaction with half-life. 4

(b) A first order reaction takes 10 min for 25% completion. **Determine** the rate constant and how long it takes to 70% completion. 3

(c) **Define** catalyst and **show** the function of catalyst in a reaction. 3

5. (a) **Identify** Lewis dot structure of CH_2O, PCl_3, NO_3^- and H_2O_3. 6

(b) N_2 is triple bond where O_2 is double bond. **Explain** this with the molecular orbital theory (MOT) diagram and bond order of N_2 and O_2. 4