GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022
CHEMISTRY-II
CH(FT)301

TIME ALLOTTED: 3HR **FULL MARKS:70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any *ten* from the following, choosing the correct alternative of each question: **10×1=10**

			Marks	CO No
1.	(i)	$[Co(NH_3)_5Br]SO_4$ and $[Co(NH_3)_5SO_4]$ Br are the example of (a) Coordination isomer (b) Ionization isomer (c) Linkage isomer (d) Hydration isomer	1	CO5
	(ii)	pH of salt solution from weak acid and weak base (a) depends on initial salt concentration only (b) depends on initial salt concentration and K_w (c) does not depend on initial salt concentration (d) none of the above	1	CO1
	(iii)	Carbocation is associated with which of the following reaction? (a) E2 (b) S_N1 (c) S_N2 (d) Addition reaction	1	CO4
	(iv)	*cis*-stilbene absorps high energy radiation in UV-Vis region compare to *trans*-stilbene due to (a) high magnetic moment (b) steric hindrance (c) less solubility in polar solvent (d) low reduced mass	1	CO2
	(v)	Which one has highest dipole moment? (a) CH_3I (b) CH_3Br (c) CH_3F (d) CH_3Cl	1	CO4
	(vi)	Ionic product of water K_W depends on (a) concentration (b) volume (c) temperature (d) density	1	CO1

(vii)	Coordination compounds are mostly formed by (a) s-block elements (b) p-block elements (c) d-block elements (d) f-block elements	1	CO5
(viii)	Ethylenediamine is an example of (a) Monodentate ligand (b) Bidentate ligand (c) Hexadentate ligand (d) Tetradentate ligand	1	CO5
(ix)	In the Friedel-craft reaction the catalyst used is a (a) Lewis base (b) Lewis acid (c) Metal oxide (d) Organometallic compound	1	CO4
(x)	Inversion of configuration is associated with which of the following reaction? (a) E1 (b) S_N1 (c) S_N2 (d) Free radical halogenations	1	CO5
(xi)	Range of IR light for functional group region is (a) 1500-400 cm^{-1} (b) 4000-1500 cm^{-1} (c) 4000-400 cm^{-1} (d) 1000-2000 cm^{-1}	1	CO2
(xii)	Milk is the emulsion of (a) Oil in water (b) Water in oil (c) Solid in water (d) Water in solid	1	CO3

GROUP – B

(Short Answer Type Questions)

Answer any ***three*** from the following: **3×5=15**

		Marks	CO No
2.	Prove that the pH of the salt solution from Weak acid and Strong base is pH= $1/2pK_w+1/2pK_a+1/2\log c$.	5	CO1
3.	Write the possible products with reaction mechanism when acetone is treated with Zn/Hg in acidic medium	5	CO4
4.	Deduce an expression for the pH of buffer solution.	5	CO1
5.	What do you mean by a colloid system? Classify the colloid system and define their characteristics.	5	CO1
6.	Compare acidity acetic acid chloro acetic acid, dichloro acetic acid and trichloro acetic acid.	5	CO4

GROUP – C
(Long Answer Type Questions)

Answer any ***three*** from the following: **3×15=45**

			Marks	CO No
7.	(a)	$[CoF_6]^{3-}$ is paramagnetic but $[Co(NH_3)_6]^{3+}$ is diamagnetic. Explain.	5	CO5
	(b)	What are colligative properties? Write Van't Hoff equation for Osmotic pressure.	5	CO3
	(c)	Compare the basicity of 2,6-dimethyl-4-nitroaniline and N,N-2,6-tetramethyl-4-nitroaniline.	5	CO4
8.	(a)	Explain the splitting of *d* orbitals in tetrahedral field with proper diagrams.	4	CO5
	(b)	Write down the formula of Potassium dicyanoargentate(I). What is the oxidation number of Fe in $K_3[Fe(C_2O_4)_3]$. Give the IUPAC name of the compound.	3	CO5
	(c)	Inversion of configuration takes place in case of S_N2 reaction, whereas racemization takes place in case of S_N1 reaction. Explain with mechanism.	5	CO4
	(d)	What is hemolytic and heterolytic cleavage of a sigma bond? Give examples.	3	CO4
9.	(a)	Explain tetragonal elongation and compression in light of John-teller theorem.	5	CO5
	(b)	Draw and level all types of fundamental vibrations present in polyatomic molecule. What is the significance of fingerprint region in IR spectroscopy?	5	CO2
	(c)	What is Chemical Shift? How can you differentiate between C_2H_5OH and CH_3CHO with the help of NMR spectroscopy?	5	CO2
10.	(a)	Benzene undergoes substitution reaction rather than addition reaction. Justify.	5	CO4
	(b)	What is aldol condensation? Describe with mechanism.	5	CO4
	(c)	Write the expression for rate constant of first order reaction. Show that the half-life period of a first order reaction is independent of the initial concentration of the reactant.	5	CO4
11.		Write short notes on (any three)	3×5=15	
	(a)	Friedel-Craft reaction	5	CO4
	(b)	Elimination reaction	5	CO4
	(c)	Spin-spin splitting in NMR spectroscopy	5	CO2
	(d)	Fluroscence and Phosphoroscence	5	CO2
	(e)	Solvent effect in UV-Vis spectroscopy	5	CO2