Zagdu Singh Charitable Trust (Regd.)
THAKUR COLLEGE OF ENGINEERING & TECHNOLOGY
Autonomous College Affiliated to University of Mumbai
Approved by All India Council for Technical Education(AICTE) and Government of Maharashtra(GoM)
Conferred Autonomous Status by University Grants Commission (UGC) for 10 years w.e.f. AY 2019-20
Amongst Top 200 Colleges in the Country, Ranked 193 in NIRF India Ranking 2019 in Engineering College category
• ISO 9001:2015 Certified • Programmes Accredited by National Board of Accreditation (NBA) New Delhi
• Institute Accredited by National Assessment and Accreditation Council (NAAC) Bangalore
Estd. in 2001
Website : www.tcetmumbai.in

IN-SEMESTER EXAMINATION (ISE-I) April, 2023
FE/FT (Semester-II) CBCGS-HME 2020
Chemistry

Branch: Comp, Civil, CSE ,IOT E&CS, AI&DS
Div.: A, B & C
Duration: 60 Minutes
Instructions –

Date: 3 / 04 /2023
Timing: 10:00 PM to 11:00 PM
Maximum Marks: 20

1. All questions are compulsory.
2. Diagrams / sketches should be given wherever necessary.
3. Use of and non-programmable calculators is permitted.
4. Figures to the right indicate full marks.
5. At. Wt.: C = 12, H = 1, O = 16, Ca = 40, Mg = 24, Cl = 35.5, S = 32, Na = 23, N= 14.

Q.1		Solve any 5 Questions.	Marks	CO	Learning Level
	a.	What is Rf value? Give significance of it.	02	2	U
	b.	State the principle involved in determination of total hardness	02	1	A
	c.	Justify the statement "Prevention is better than cure."	02	3	U
	d.	Distinguish between carbonate & non-carbonate hardness of water.	02	1	U
	e.	Give reaction involved during softening of hard water using Zeolite process.	02	2	R
	f.	State any four principle of Green Chemistry	02	2	R
	g.	Define the terms Stationary phase and Mobile phase.	02	1	U
Q.2.	a.	Calculate the quantity of pure lime (80% pure) and soda (90% pure) required for softening of 10,000 litres of water containing the following impurities in ppm $Ca(HCO_3)_2$ = 16.2, $CaSO_4$= 6.8,$Mg(HCO_3)_2$ = 20.8, $CaCl_2$ = 11.1, $MgCl_2$ = 8.78, $CaSO_4$ = 35, $MgSO_4$ = 6.7, SiO_2 = 17.9.	05	1	A
		OR			
	b.	Give the principle of HPLC and Describe basic components and working of a High Performance Liquid chromatography (HPLC) with proper neat labelled diagram.	05	2	R
Q.3	a.	Give principle of Gas Chromatography (GC) & Draw a Schematic diagram of (GC) unit and describe briefly functions of each part along with working of GC.	05	2	R
		OR			
	b.	15 gm of $CaCO_3$ was dissolved in HCl and the solution made up to 1000 ml with distilled water. 50 ml of the solution required 25 ml of EDTA solution for titration. 50 ml of hard water sample required 18 ml of EDTA and the same sample after boiling and filtering required 12 ml of EDTA solution. Calculate each type of hardness of water	05	1	AN

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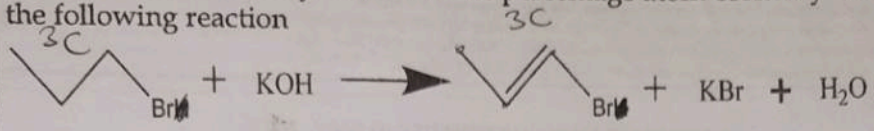
IN-SEMESTER EXAMINATION (ISE-II) MAY, 2023
FE/FT (Semester-II) CBCGS-HME 2020
Chemistry

Branch: Comp, Civil, AI&DS, CS&E, E&CS, IOT
Div.: A, B & C
Duration: 60 Minutes
Instructions –

Date: 22 / 05/2022
Timing: 10:00 PM to 11:00 PM
Maximum Marks: 20

1. All questions are compulsory.
2. Diagrams / sketches should be given wherever necessary.
3. Use of and non-programmable calculators is permitted.
4. Figures to the right indicate full marks.

Q.1		Solve any 5 Questions.	Marks	CO	Learning Level
	a.	Why is it essential to avoid derivatisation in reaction	02	3	U
	b.	Explain Ag, Au and Pt do not undergo corrosion	02	4	A
	c.	What are the energy level changes will take place if molecule is absorb radiation in UV-Visible region, Draw diagram if necessary	02	5	U
	d.	Distinguish between Anodic coating and cathodic coating	02	4	A
	e.	What makes double beam spectrophotometer best choice over single beam spectrophotometer	02	5	R
	f.	Define Chirality and give example of the same	02	6	R
	g.	Why Zinc coating gives better protection for iron than Tin	02	4	U
Q.2.	a.	(i) When 0.05M solution is placed in 4cm length cell showing an absorbance 0.25 what will be the absorbance of solution if it is placed in 1cmm path length cell (ii) A solution of $K_2Cr_2O_7$ of concentration $3.8X10^{-5}$ shows an absorbance of 2.1 at its wavelength of maximum absorbance. Calculate the concentration of unknown $K_2Cr_2O_7$ solution which shows an absorbance of 0.92 in the same cuvette	05	5	A
		OR			
	b.	Give the synthesis of Indigo by conventional as well as greener route	05	4	A
Q.3	a.	Explain the principle of cathodic protection? Explain Sacrificial anode method with diagram.	05	3	R
		OR			

	b.	What is Atom Economy. Calculate the percentage atom economy for the following reaction  C_2H_4 + Cl_2 + H_2O ⟶ CH_2ClCH_2OH + KBr	05	1	A

C - 12

H - 1

Br - 79.9

K - 40

O - 16

Cl - 35.5

Laxmi Singh Charitable Trust's (Regd.)
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END SEMESTER EXAMINATION, JUNE 2023
F. E. /F.T. SEMESTER II (CBCGS-HME 2020)

Branch:	CIVIL, CSE, COMP, AIDS, ECS & IOT	Q.P. Code:	E121G1001-3
Subject:	CHEMISTRY	Duration:	2 hours
Subject Code:	BSC102	Max. Marks:	60

Instructions:
1. All sections are compulsory
2. Figures to the right indicate full marks.
3. Assume suitable data if necessary and state the assumptions clearly.

At. Wt.: C = 12, H = 1, O = 16, Ca = 40, Mg = 24, Cl = 35.5, S = 32, Na = 23, N= 14, Al = 27, Si = 28.

Section-I Short Answer Question (Answer any 05 questions out of 06) (Fundamental, Core Types) (10 Marks)

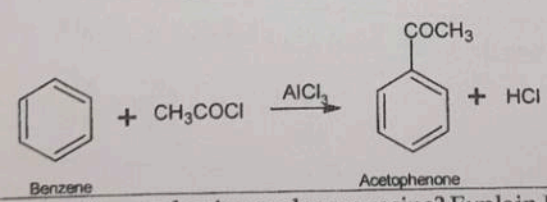
Q. No.		Marks	CO	RBT Level	PI
1	"Silver shows better resistance to oxidation corrosion as compared to Mg" justify it with suitable explanation.	2	4	A	1.2.1
2	Give an example to explain why it is beneficial to prevent waste formation in chemical processes rather than treat waste?	2	1	U	1.1.1
3	Calculate the temporary and Total hardness of a water sample, having following analysis in mg/liter: $Mg(HCO_3)_2$ = 14.6, $Ca((HCO_3)_2$ = 8.1, $Mg(NO_3)_2$ = 29.6, $MgCl_2$ = 19, NaCl = 10, $MgSO_4$= 24.	2	1	AN	1.1.1
4	What do you mean by chirality? Explain it with various examples.	2	6	R	1.3.1
5	Iron does not rust even if the zinc coating is broken in a galvanized iron pipe. Give reasons.	2	4	U	1.3.1
6	A solution of $K_2Cr_2O_7$ of concentration 4.5 x10^{-5} M shows an absorbance of 1.2 at its wavelength of maximum absorption. Calculate the concentration of an unknown $K_2Cr_2O_7$ solution which shows an absorbance of 1.4 in the same cuvette.	2	5	AN	2.2.2

Section-II Descriptive Answer Questions (Answer any 04 out of 06) (Descriptive, Comprehension Types) (20 Marks)

1	One of the chemist is using Thin layer chromatography technique, for separation of mixture of xylene, aniline	5	2	A	1.3.1

5 → m
① 100
② 1000

	and benzoic acid by using silica plate as stationary phase and n hexane as a mobile phase. In this regard, i) Give the principle of TLC. ii) Give the order of migration of these solutes from the baseline along with proper justification. iii) enlist the various detecting agents used in TLC.				
2	If a molecule is irradiated with UV-VIS, what are possible transitions will take place at molecular energy levels? Explain each of them with suitable energy level diagram.	5	5	R	2.2.2
3	0.75 gm of $CaCO_3$ was dissolved in dilute HCl and solution made to 500 ml distilled water. 50 ml of solution requires 32 ml of EDTA solution for titration. 50 ml of hard water sample require 16 ml of EDTA and after boiling and filtering 100 ml of this solution require 14 ml of EDTA solution. Calculate Temporary, permanent, and total hardness of water.	5	1	AN	1.1.1
4	Designing of non-hazardous chemical synthesis is of utmost importance by considering hazardous impacts of chemicals on environment. With the help of suitable examples and routes explain it in detail.	5	3	U	1.1.1
5	A zinc rod is partially immersed in aqueous solution. Predict the type of corrosion and explain it in detail with suitable diagram and chemical reactions.	5	4	U	1.2.1
6	Explain with a neat diagram the zeolite process of water softening including the following points. (i) Principle, (ii) Process, (iii) Softening and regeneration reactions, (iv) advantages and limitations.	5	1	R	1.1.1
Section-III	**Long Answer Question (Answer any 03 out of 05) (Application, Analytical, Evaluation, Design Type)**				**(30 Marks)**
1	a) How do following factors affect the rate of corrosion? i) Passive Character of metal ii) Purity of metal iii) Nature of ions present b) Explain, how corrosion can have prevented by using proper designing approach?	10	4	R	1.2.1
2	i) Calculate the amount of lime (95%) pure) and soda (90% pure) required to soften 1 million liters of water containing following impurities in mg/lit.	10	1	AN	

	$Mg(HCO_3)_2$ = 73, H_2SO_4 = 14.7, $Ca(HCO_3)_2$ = 81, $MgCl_2$ = 95, NaCl =3.6, SiO_2 = 26.2, $CaSO_4$ = 68, $Mg(NO_3)_2$ = 14.8. ii) 800 liters of hard water was passed through a zeolite softener. The exhausted zeolite required 40 liters of NaCl having strength of 110 g/l of NaCl. Calculate the hardness of water.				
3	A volatile organic sample received for analysis is mixture of three different components with varied degree of volatility in it. Which method of chromatography separation (TLC/ GC/ HPLC) will be more suitable for its resolution? Explain selected method with help of neat labeled diagram. Also comment on rough estimate of retention time (RT Value) in its chromatogram assuming suitable boiling point value for all three components.	10	2	A	1.3.1
4	i) Less hazardous chemical synthesis is of utmost important while designing any chemical process, in this regard with the help of suitable chemical reactions explain this principle of green chemistry. ii) Calculate % atom economy for the following reaction with respect to acetophenone.  	10	3	A	1.1.1
5	What are cation and anion exchange resins? Explain Ion exchange process for softening of hard water with giving its advantages and disadvantages?	10	1	R	1.1.1