Total No. of pages...

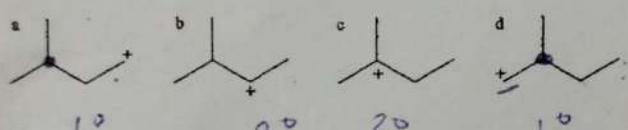
UG- 2nd SEMESTER
MID-SEMESTER EXAMINATION, MAY 2023

Course Code. .. FCCH008
Course Title ... Environmental and Green Chemistry

Time...**1.5 hours**

Max. Marks.....**15**.....

Note:- **Attempt all the five questions.** Missing data/ information if any may be suitably assumed & mentioned in the answer.

Q. No	Question	Marks	Course Outcome (CO)
1a	Among $CuCl_2$ and KCl which has higher melting point and why? KCl ionic-	1	CO-1
1b	Arrange the following in increasing order of stability. Give reason(s) in support of your answer. < > b > d > a  1° 2° 3° 1° 3° > 2° > 1°	2	CO-1
2a	Calculate pH of the resulting mixture: 10^{-2} M H_2SO_4 (2L) + 10^{-3} M NaOH (1L) 2	2	CO-1
2b	Find the pH of 0.002 N acetic acid if it is 2% ionised.	1	CO-1
3a	For an enzyme catalyzed reaction, under what condition will the reaction rate follow first-order kinetics? Also write down the expression for maximum rate of such reaction.	2	CO-1
3b	Define induced catalysis? Give the reaction involved?	1	CO-1
4a	Explain 3 natural causes of air pollution? Write one case study of air pollution? volcanic eruptions, windblown dust, forest fires, microbial decay process (CH_4)	2	CO-1
4b	What are the natural and anthropogenic pollutants that cause air pollution? man made	1	CO-1
5a	Explain three ways in which water pollution can affect the	2	CO-2

Global warming - volcanic, green house gases, solar activity

	human body?		
5b	What is the greenhouse effect?	1	CO-2

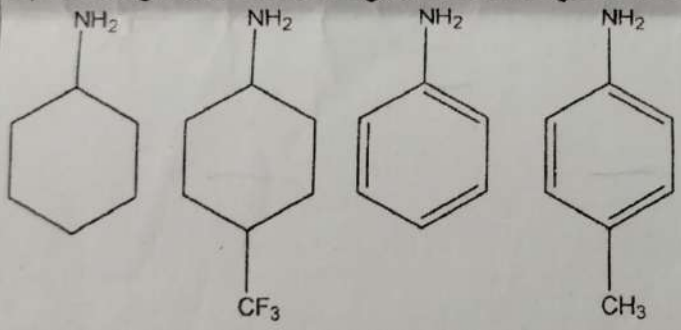
UG- 2nd SEMESTER
END-SEMESTER EXAMINATION, JULY 2023

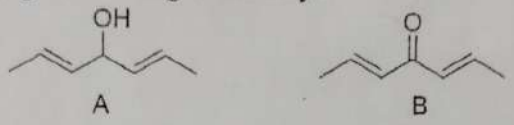
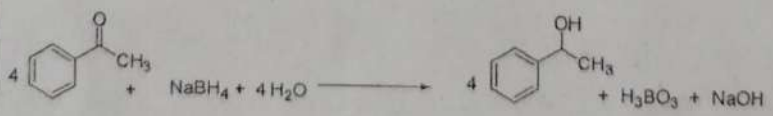
Course Code. .. FCCH008
Course Title ... Environmental and Green Chemistry

Time...3.0 hours

Max. Marks.....40.....

Attempt all the five questions. Attempt any two parts of each question.

Q. No	Questions	Marks	Course Outcome (CO)
1a	i) Generally, solids sink into water but ice floats on water. Explain why? ii) Ionic compounds are soluble in water whereas covalent compounds are mostly insoluble in water. Why?	2+2	CO-1
1b	i) Why haloalkanes undergo nucleophilic substitution whereas haloarenes undergo electrophilic substitution? ii) Arrange the following to increase pKa values. 	2+2	CO-1
1c	Calculate the pH of the resulting solution i) 100 mL M/10 HCl + 100 mL M/10 NaOH ii) 10^{-3} M HCl (2L) + 2 x 10^{-3} M H_2SO_4 (1L)	2+2	CO-1
2a	Give the adverse effects of air pollution. Enumerate various methods for control of air pollution.	2+2	CO-1
2b	Write a short note on: i) Minamata Disease ii) Biomagnification	2+2	CO-2
2c	i) What are the disadvantages of ozone in the atmosphere? What is photochemical smog and how does it affect the plant kingdom? ii) Why do CFCs release chlorine atoms rather than fluorine into the stratosphere?	2+2	CO-3

3a	i) Why is the oxygen molecule IR inactive? Predict the relative positions of stretching vibrations for C–C, C–N, and C–O bonds in an IR spectrum if their force constant is approximately the same. ii) The value of the force constant is the same for $^{1}H^{35}Cl$ and $^{2}D^{35}Cl$. If the fundamental frequency of $^{1}H^{35}Cl$ is 2890 cm^{-1}. Calculate the fundamental frequency of $^{2}D^{35}Cl$.	2+2	CO-4
3b	i) What are the possible excitations observed in UV-Vis spectroscopy? Arrange them in ascending order. ii) Among the given molecules, which molecule will absorb UV light at a longer wavelength and why?  A B	2+2	CO-4
3c	i) Explain the TGA curve for $AgNO_3$. ii) Discuss the Instrumentation/Block Diagram of DSC. Mention atleast 3 point of difference b/w DTA and DSC?	1+3	CO-4
4a	i) Differentiate between alkaline and non-alkaline hardness of water. ii) Why two anions HCO_3^- and OH^- can not co-exist together.	2+2	CO-5
4b	Calculate the total, temporary and permanent hardness of water sample having the following constituents per liter: $Ca(HCO_3)_2$ = 16.2 mg, $Mg(HCO_3)_2$ = 7.3 mg, $MgCl_2$ = 9.5 mg, NaCl = 585 mg, Urea = 48 mg, $CaSO_4$ = 13.6 mg, Report the temporary and permanent and total hardness in ppm. Atomic weight in g/mol: C = 12, H = 1, O = 16, N = 14, S = 32, Cl = 35.5, Ca = 40, Mg = 24, K = 39.	4	CO-5
4c	i) Give the details of EDTA method to determine the hardness of water with chemical equations. ii) Explain why hard water does not form lathers with soaps?	3+1	CO-5
5a	Following is an example of reduction of ketone to alcohol. Calculate the atom economy of major product 1-phenylethanol?  Which reaction will have better atom economy: an addition reaction or a substitution reaction?	3+1	CO-6
5b	i) Explain the green chemistry principle "design for safer solvents and auxiliaries". Write two examples of green solvents. ii) "Use catalysts, not stoichiometric reagents" Which principle of green chemistry states so and why?	2+2	CO-6
5c	Describe the minimization of energy consumption techniques with examples.	4	CO-6