22BAI1076

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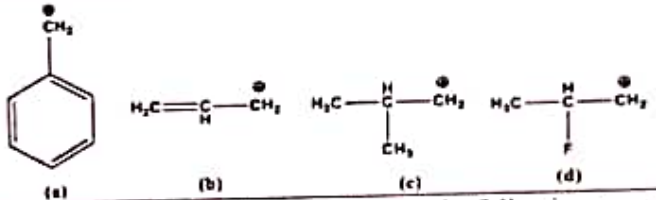
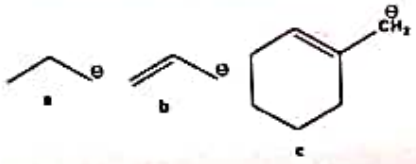
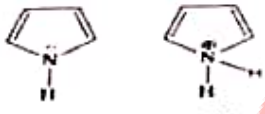
Name of Examination	**Continuous Assessment Test – II, FALL 2022-23 Semester, December 2022**			
Slot: C2+TC2	**Course Mode**: Classroom Based		**Class Number(s)**: CH2022231700903	
Course Code:	BCHY101L	**Course Title:**	Engineering Chemistry	**School**: SAS
Emp. No.:	52805	**Faculty Name:**	Dr. Lakkoji Satish	
Contact No.:	8895446990	**Email:**	lakkoji.satish@vit.ac.in	

General Instructions (if any): 1. OPEN BOOK Examinations

Q No	Sub-division	Questions	Marks
		Answer All the Questions, Total Marks: 5 X 10 Marks = 50	
1.		Identify the stabilizing/destabilizing effects acting in each carbocation and explain. Draw the hyper conjugation/resonance structures wherever applicable. Also, arrange the following carbocations in their order of increasing stability.  (a) (b) (c) (d)	10
2	(a)	Explain the stabilising factors acting on the following compounds and draw the resonance or hyper conjugation structures wherever applicable. Also arrange the following carbanions in their increasing order of stability.  a b c d	6+4
	(b)	Apply the rules of aromaticity to identify the most stable compound between (a) and (b) and offer your explanation by give out the resonance structures.  (a) (b)	
3	(a)	Give out the preparation, properties and mechanism of formation of (a) Paracetamol and (b) Aspirin.	5+5
	(b)	From the following data, identify which super capacitor can store more energy and why? and explain the working by drawing the necessary diagram. *Capacitor A*: Area of porous electrode = $60m^2/g$; distance between electrodes = 6mm *Capacitor B*: Area of porous electrode = $30m^2/g$; distance between electrodes = 15mm	
	(a)	The anodic and cathodic reactions are given below, $Ca \longrightarrow Ca^{2+} + 2e^-$ ($E^\circ = -2.87V$, $Ca^{2+} = 0.04$ M) $Cu^{2+} + 2e^- \longrightarrow Cu$ ($E^\circ = 0.35V$, $Cu^{2+} = 0.1$ M) Construct the cell and explain the working, give out the cell representation, net cell reaction and calculate the emf using Nernst's equation.	5+5
	(b)	Construct and demonstrate the functioning of lithium-ion battery with necessary anodic and cathodic chemical reactions from the given materials. Given materials: $LiCoO_2$, Graphite, $LiPF_6$, Ethylene carbonate, H_2O, H_2SO_4.	
	(a)	Can hydrogen be an alternate fuel to fossil fuels? Construct and demonstrate a fuel cell who's by product can be used in space for producing water by giving out the necessary chemical reactions involved in it.	5+5
	(b)	Explain the construction and working of Dye-sensitised solar cell. Highlight the conditions for the selection Dye molecules.	

*****All the very best*****

Name:
Reg. No:

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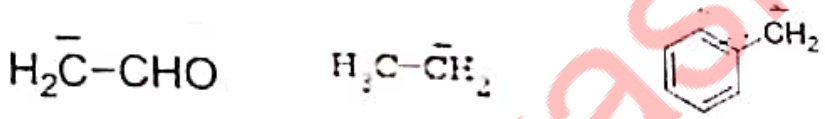
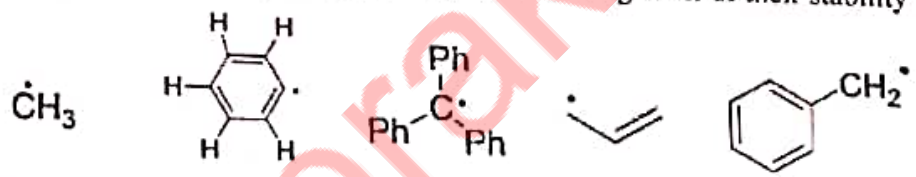
Programme	:B.Tech	Semester	:	Fall 2022
Course	:Engineering Chemistry	Code	:	BCHY101L
Faculty	: Dr Pritam Ghosh	Slot	:	C1 + TC1
		Class Nbr	:	CH2022231700917
Time	1 ½ Hours	Max. Marks	:	50

Continuous Assessment Test 2 (CAT 2) – December 2022

Answer ALL the Questions **5 x 10 = 50 Marks**

1.	i)	Arrange the following anions in the increasing order of stability and Explain. 	5
	ii)	Arrange the following free-radicals in the increasing order of their stability and explain. 	5
2		All cyclic, planar and conjugated compounds need not be aromatic. Explain this statement citing one example for the following cases; *i) Cyclic but not planar; ii) Cyclic, planar but not conjugated; iii) Cyclic, planar, conjugated but not aromatic*	10
3.	i)	Identify and explain the differences between Paracetamol and Aspirin in terms of their structure, synthesis and hydrolysis.	5
	ii)	Rechargeable batteries can act both as a voltaic and electrolytic cell – Explain using an example.	5
4.	i)	What is the need for doping in a semiconducting material? Explain using relevant examples.	5
	ii)	Lithium is the best known anode for energy storage devices. Justify the statement with proper reasoning and a device	5
5.	i)	State whether the following statements are 'True' or 'False'. a) *Fuel cells are more environmental friendly than batteries* b) *Solid oxide fuel cells need ultrapure hydrogen gas*	2
	ii)	Relate Silicon based solar cells with the dye sensitized solar cells specific to the materials and chemistry involved.	8

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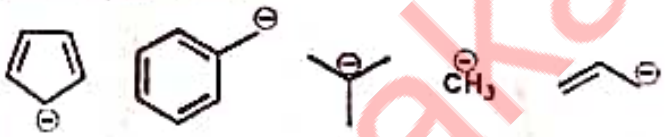
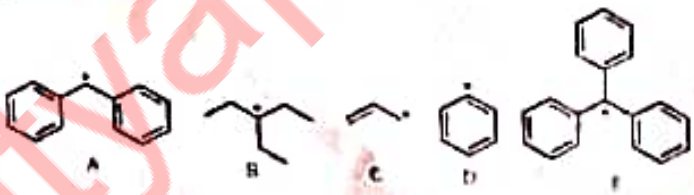
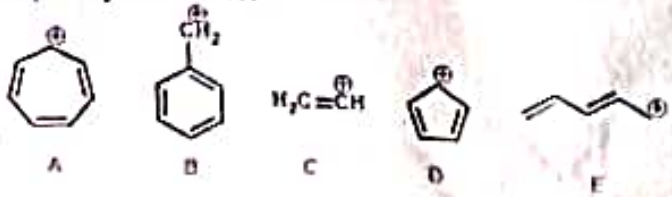
Name of Examination	Continuous Assessment Test-II (CAT-II), Fall 2022-23 Semester, (December 2022)			
Slot: F1+TF1	Course Mode : CBL		Class Number (s): CH2022231700657	
Course Code:	BCHY101L	Course Title:	Engineering Chemistry	
Emp. No.:	52846	Faculty Name:	Shyamapada Nandi	School: SAS, Chemistry
Contact No.:	9735436601	Email:	shyamapada.nandi@vit.ac.in	

General Instructions (if any): ***1. OPEN BOOK Examination*** ***Marks: 5 X 10 = 50***

Answer all the questions : Total marks (5 X 10 = 50)

1.		Differentiate aromatic, anti-aromatic and non-aromatic compounds (in tabular form) and explain why lone pair of nitrogen in pyrrole participates in resonance whereas lone pair of nitrogen in pyridine doesn't participate in resonance?	10
2.	a.	Arrange the given series of carbanion in the order of decreasing stability and explain your choice.  A B C D E	5+5
	b.	Arrange the given series of radicals in the order of decreasing stability and explain your choice.  A B C D E	
3.		Arrange the given series of carbocations in the order of decreasing stability and explain your choice.  A B C D E Lithium-ion secondary batteries delivery high power, doesn't use water as an electrolyte solvent and usually thin. Explain.	5+5

4.		Why n-type semiconductor and p-type semiconductor have to be combined to get measurable output voltage in voltaic cell. Also, reason out why high pure and mono-crystalline silicon is required for higher efficiency.	10
5.	a.	Differentiate super capacitor from a capacitor and explain the reason for its high charge storage capacity.	5 + 5
	b.	Given is the components of battery: Li-Graphite, Ni-Yttria-stabilized Zirconia, Ni-Pt catalyst, H_2, Ni-Pd, solid ß–Alumina, $LiCoO_2$, Nafion, $LiAsF_6$, O_2, H_2O, Yttria (Y_2O_3) stabilized Zirconia (ZrO_2), propylene carbonate, $LaMnO_3$, n-l2polyvinylpyridine (PVP), $LiClO_4$, H_2+ CO, Ag-catalyst. Pick up suitable components from the above list and construct an energy conversion device which should have the following characteristics: Operates with high efficiency (60-83%), electrolyte is a solid, operates only at very high temperature, and doesn't require noble metals as electrode or catalyst. Explain with energy conversion with suitable chemical equation.	