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MOBILE PHONES PROHIBITED

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Siddaganga Institute of Technology, Tumakuru-572 103

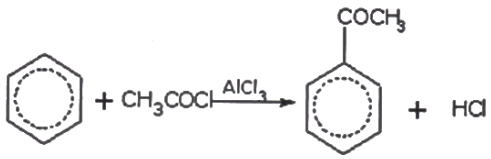
(An Autonomous Institution affiliated to VTU, Belagavi, Approved by AICTE, New Delhi)

Supplementary Semester Bachelor of Electrical and Electronics Engineering Examinations Sep. 2024

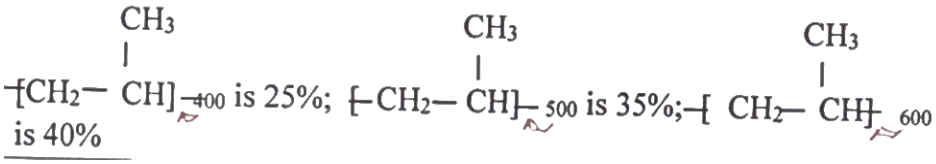
Chemistry for EEE Stream

Time: 3 Hours **Max. Marks: 100**

Note : 1. Revealing of Identity in any form in the answer book will be treated as malpractice.
2. Answer any five questions choosing one full question from each unit.

			M	BL	CO	PO	PSO
		Unit - I					
1	a)	What is single electrode potential? Explain the origin of single electrode potential when the concentration of ions in solution is low.	5	2	1	1	
	b)	Explain the construction and working of Ag-AgCl electrode.	5	2	1	1	
	c)	Describe the experimental details and give the mathematical derivation for determination of pH of a solution using glass electrode.	5	2	1	1	
	d)	For the cell, $Fe\|Fe^{++}(0.01M)\|\|Ag^{+}(0.1M)\|Ag$, write the cell reaction and evaluate the emf of the cell at 298K, if $E°_{Fe^{2+}\|Fe}$ and $E°_{Ag^{+}\|Ag}$ are -0.44V and 0.8V respectively.	5	5	1	1	
		OR					
2	a)	Derive Nernst equation for single electrode potential.	5	4	1	1	
	b)	With a neat diagram, explain the construction and working of Calomel electrode.	5	2	1	1	
	c)	What is a concentration cell? Derive an expression for the emf of concentration cell.	5	4	1	1	
	d)	A voltaic cell consists of a rod of copper immersed in a 10.0M solution of $CuSO_4$ and a rod of iron immersed in a 0.1M solution of $FeSO_4$. Evaluate the voltage for the cell at STP. Given , $E°_{Cu^{++}/Cu}$ =0.34 V and $E°_{Fe^{++}/Fe}$ =-0.44 V	5	5	1	1	
		Unit - II					
3	a)	State and derive Beer-Lambert's law.	5	4	2	2	
	b)	A compound has a molar absorptivity of 6.74×10^{3} $Lmol^{-1}cm^{-1}$. What concentration of the compound would be required to produce a solution having a transmittance of 7.77% in a 2.5 cm cell?	5	1	2	2	
	c)	Describe the construction and working of lead-acid battery.	5	2	2	2	
	d)	Explain the operation of a battery during discharging and charging process.	5	2	2	2	
		OR					
4	a)	Explain the variation in conductance for the titration of mixture of strong acid and weak acid against strong base with graphs.	5	2	2	2	
	b)	With the principle and explain the potentimetric titration of FAS against $K_2Cr_2O_7$.	5	2	2	2	
	c)	Identify the anode, cathode materials and write he electrode reactions during discharging and charging of Ni-Cd battery.	5	3	2	2	
	d)	Discuss the construction and working of Lithium-ion battery.	5	4	2	2	
		Unit - III					
5	a)	Outline the synthesis of nano TiO_2 by hydrothermal method.	5	2	3	2	
	b)	Explain the synthesis of carbon nanotubes by arc discharge method.	5	2	3	2	
	c)	Define % of atom economy. Evaluate the percentage atom economy for the product, acetophenone from the following chemical reaction. (Given At. Wt. of C=12, H=1, O=16, Cl=35.5)  	5	4	3	2	

Please Turn Over

	d)	Describe the construction and working of CH_3OH-O_2 fuel cell. Mention its uses.	5	2	3	2
		OR				
6	a)	Explain the top down and bottom up process for the synthesis of nanomaterials.	5	2	3	2
	b)	Discuss the synthesis of nano ZnO by combustion method.	5	2	3	2
	c)	How is bio-ethanol produced? Mention its uses.	5	2	3	2
	d)	With suitable reaction, explain the synthesis of bio-diesel and give its applications.	5	2	3	2
		Unit - IV				
7	a)	Explain the type of corrosion occurring in each of the following cases: i) Presence of small particles of dust on iron surface for a long time. ii) Bolt and nut made from different metals are in contact with each other.	5	2	4	1
	b)	With a neat diagram, describe the corrosion control by sacrificial anode method.	5	2	4	1
	c)	Discuss the experimental methodology for the extraction of gold from e-waste.	5	4	4	1
	d)	An iron metal lost 3.1×10^{-3} g of weight when it is immersed in deareated acidic solution for 3 hrs. Evaluate the corrosion penetration rate (CPR) for the exposed area of 4 cm^2. Given k=534 and the density of metal = 5.37 g cm^{-3}. Express the CPR in terms of meter per second.	5	2	4	1
		OR				
8	a)	Explain the electrochemical theory of corrosion with reactions during the rusting of iron in presence of air and moisture.	5	2	4	1
	b)	What is anodizing? Explain anodizing of aluminum.	5	2	4	1
	c)	Explain the effect of the following factors on the rate of metallic corrosion: i) pH ii) Temperature	5	3	4	1
	d)	What are the sources of e-waste? Discuss the impact of e-waste on environment.	5	3	4	1
		Unit - V				
9	a)	Outline the synthesis of Teflon and PMMA.	5	3	5	1
	b)	Evaluate the number average and weight average molecular masses of a polymer with the following composition.  $-[CH_2-CH(CH_3)]_{400}$ is 25%; $-[CH_2-CH(CH_3)]_{500}$ is 35%; $-[CH_2-CH(CH_3)]_{600}$ is 40%	5	4	5	1
	c)	Explain the molecular ordering in the following liquid crystal phases: i) Chiral nematic phase ii) Smectic phase.	5	2	5	1
	d)	Distinguish between LCD's and LEDs.	5	4	5	1
		OR				
10	a)	What are conducting polymers? Explain the mechanism of conduction in polyacetylene by oxidative doping.	5	2	5	1
	b)	What are liquid crystals? Distinguish between thermo tropic and lyotropic liquid crystals.	5	3	5	1
	c)	Describe the working principle of light emitting diodes (LEDs).	5	2	5	1
	d)	What are conductors? Explain the mechanism of conduction in solids.	5	2	5	1

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