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Siddaganga Institute of Technology, Tumakuru-572 103

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

First Semester Bachelor of Engineering Examinations April-May 2023

Chemistry for Electrical and Electronics Engineering 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)	Derive the Nernst equation for the following electrode reaction: $M^{n+} + ne^- \rightleftharpoons M$.	5	3	1	1	
	b)	What are reference electrodes? Explain the construction and electrode reactions of calomel electrode.	5	2	1	1	
	c)	Discuss in brief the determination of pH of a solution using glass electrode.	5	3	1	1	
	d)	What voltage will be generated by a cell that consists of a rod of iron immersed in a 1.0M solution of $FeSo_4$ and a rod of manganese immersed in a 0.2M solution of M_nSo_4 at STP. Given $E^{\circ}_{Fe^{++}/fe} = -0.44V$ and $E^{\circ}_{mn^{++}/mn} = -1.18V$	5	3	1	1	
		OR					
2	a)	Discuss the construction and working of calomel electrode.	5	3	1	1	
	b)	Define concentration cell. Evaluate the EMF of a concentration cell. $Cu\|CuSO_4$ (0.1m) $\|\|$ $CuSO_4$ (1.5m)$\|Cu$	5	4	1	1	
	c)	Define the following: i) Standard electrode potential ii) Electromotive force	5	1	1	1	
	d)	Explain the origin of single electrode potential when the concentration of M^{n+} is high with neat labeled diagram.	5	2	1	1	
		Unit - II					
3	a)	Explain the classification of batteries with examples.	5	2	2	2	
	b)	Discuss the principle and applications of conductometric titration of strong base against strong acid with graph.	5	3	2	2	
	c)	Summarize the construction, cell reactions and applications of Ni-Cd battery.	5	4	2	2	
	d)	Explain the construction and working of Na-ion battery.	5	2	2	2	
		OR					
4	a)	Discuss the principle and applications of potentiometric titration of FAS against $K_2Cr_2O_7$.	5	3	2	2	
	b)	Derive the mathematical derivation for Beer-Lambert's law.	5	3	2	2	
	c)	Discuss with construction, cell reactions and applications of Li-M_nO_2 battery.	5	3	2	2	
	d)	Explain the reaction the operation of a battery during charging.	5	2	2	2	
		Unit - III					
5	a)	Outline the synthesis of TiO_2 using hydrothermal method.	5	4	3	2	
	b)	Explain the construction, working and applications of Methanol-Oxygen-Fuel cell.	5	2	3	2	
	c)	Define nanomaterial. List out the classification of nanomaterial based on dimension with ex.	5	1	3	2	

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	d)	Discuss the synthesis and applications of bio-ethanol.	5	3	3	2
		OR				
6	a)	Define the following: i) Green chemistry ii) Fuel cell	5	1	3	2
	b)	Discuss the synthesis of carbon nanotubes by arc discharge method.	5	3	3	2
	c)	List out the various advantaged of the following: i) Bio-diesel ii) Power alcohol	5	4	3	2
	d)	Mention the techniques used for characterization of nanomaterials.	5	3	3	2
		Unit - IV				
7	a)	What is meant by cathodic protection? Discuss the sacrificial anode method of corrosion.	5	3	4	1
	b)	Define corrosion. Explain the electrochemical theory of corrosion by taking Iron as an example.	5	2	4	1
	c)	Illustrate the process of anodization of aluminum articles.	5	2	4	1
	d)	Define e-waste. Discuss the steps involved in the extraction of gold from e-waste.	5	1	4	1
		OR				
8	a)	Discuss the following: i) Pitting corrosion ii) Differential metal corrosion	5	2	4	1
	b)	Explain the impact of e-waste on environment and human health.	5	2	4	1
	c)	Discuss the following factors which influence the rate of corrosion. i) Temperature ii) Nature of corrosion product	5	2	4	1
	d)	List out any five advantages of disposal and recycling of e-waste.	5	4	4	1
		Unit - V				
9	a)	What are conducting polymers? Explain the mechanism of conduction in polyacetylene by reductive doping.	5	2	5	2
	b)	List out the important applications of liquid crystals in display system.	5	4	5	2
	c)	Derive the following with example: i) Thermoplastic polymer ii) Thermosetting polymer	5	1	5	2
	d)	Discuss the working, properties and applications of light emitting diodes.	5	3	5	2
		OR				
10	a)	Explain the synthesis of the following: i) Teflon ii) PMMA	5	2	5	2
	b)	What are liquid crystals? Mention various types of liquid crystals.	5	1	5	2
	c)	Explain the classification of polymer with examples.	5	2	5	2
	d)	List out the important differences between LCD and LED.	5	4	5	2