Question Paper Code: U1Y04										
B.E. / B.Tech. DEGREE EXAMINATION, MAY 2024										
First Semester										
Mechanical Engineering										
21UCY104 - ENGINEERING CHEMISTRY										
(Common to Chemical Engineering)										
(Regulation 2021)										
Dura	ation: Three hours	Answer A	/laximum: 100 Marks							
PART A - (10 x 1 = 10 Marks)										
1.	Which one of the following pair of atoms most likely to form an ionic bond? CO1-R									
	(a) Na & F	(b) C & C	(c) N & F	(d) F & F						
2.	Which among the following is weakest bond? CO1									
	(a) Covalent bond	d (b) Ionic bond	(c) Metallic bond	(d) Hydrogen bond						
3	The electronic co	nfiguration of an atom	with atomic number 8 is	CO1-R						
	(a) $1s^2 2s^2 2p^3 3s^1$	(b) $1s^2 2s^2 2p^1 3s^2$	$3p^1$ (c) $1s^2 2s^1 2p^6 3s^1$	(d) $1s^2 2s^2 2p^4$						
4.	The unit of rate constant for a second order reaction is CO2-									
	(a) mol / S	(b) mol / l^2 / S	(c) mol / 1 / S	(d) lit / mole / S						
5.	What type of reaction takes place when an acid dissolves in CO2-R water?									
	(a) Exothermic	(b) Endothermic	(c) Substitution (d) D	Displacement Reaction						
6.	Temporary Hardr	ness of water can be rea	moved by	CO3-R						
	(a) Boiling	(b) Sedimentation	(c) Solvent Extraction	(d) Filtration						
7.	Hardness in water	r expressed in terms of	equivalent of	CO3-R						
	(a) CaCl ₂	(b) MgCl ₂	(c) CaCO ₃	(d) MgCO ₃						
8.	During the galvanic corrosion the noble metal act as									
	(a) Anode	(b) Cathode	(c) Catalyst (d) C	corroding metal						

Iron corrodes faster in						4- R					
(a) I	Hard water	(b) Soft water	(c) Demineralized water	(d) D	Distilled wa	ıter					
In electro plating the article to be plated is subjected to pickling, this is to CO4- R											
(a) Remove grease			(b) Increase the rate of plating								
(c) I	(c) Remove the oxide scale		(d) Get a bright deposit								
$PART - B (5 \times 2 = 10 Marks)$											
			CO3- Ana								
					CO3- R						
*					CO4- R						
5. Define Dry corrosion CO4- R PART – C (5 x 16= 80Marks)											
(a)	(a) (i) Describe the characteristic properties of covalent compound				CO1- U	(8)					
	(ii) Discuss hydrogen bonding with its consequences.				CO1- U	(8)					
Or											
(b)	(b) (i) Write the basic postulates and limitations of valance bond theory.				CO1- U	(8)					
	· · ·	•	volved and predict the shape	for (CO1- U	(8)					
	(a) CH ₄										
	(b) C ₂ H ₄										
(a)		• •		tion (CO2- U	(8)					
	(ii) Write a n	otes on Redox reac	tion with an example.	(CO2- U	(8)					
Or											
(b)	(i)Deduce th reaction.	ne expression for	the rate constant of first or	der (CO2- U	(8)					
			tion, Discuss various factors	that (CO2- U	(8)					
	 (a) I In e. (a) I (c) I State Defi Calg List Defi (a) (b) 	 (a) Hard water In electro plating to a Remove grease (c) Remove the ox State Paulis exclue Define Order of reconstruction List out the salts reconstruction (a) (i) Describe to (ii) Discuss for (ii) Discuss for (iii) Discuss for (iii) Discuss for (iii) Explain the following (a) CH4 (b) (i) Write the theory. (ii) Derive the where the reading (iii) Write a next (iii) Write a next (iii) Define the reading. 	(a) Hard water (b) Soft water In electro plating the article to be plating (a) Remove grease (c) Remove the oxide scale PART - B State Paulis exclusion principle Define Order of reaction Calgon conditioning is better than physical List out the salts responsible for the hysical Define Dry corrosion PART - C (a) (i) Describe the characteristic principle (ii) Discuss hydrogen bonding was the order of the order of the characteristic principle (ii) Discuss hydrogen bonding was the order of the	(a) Hard water (b) Soft water (c) Demineralized water In electro plating the article to be plated is subjected to pickling, the (a) Remove grease (b) Increase the rate of plate (c) Remove the oxide scale (d) Get a bright deposit PART – B (5 x 2= 10Marks) State Paulis exclusion principle Define Order of reaction Calgon conditioning is better than phosphate conditioning - Justify List out the salts responsible for the hardness of water Define Dry corrosion PART – C (5 x 16= 80Marks) (a) (i) Describe the characteristic properties of covalent compound (ii) Discuss hydrogen bonding with its consequences. Or (b) (i) Write the basic postulates and limitations of valance bond theory. (ii) Explain the hybridization involved and predict the shape of the following molecule (a) CH ₄ (b) C ₂ H ₄ (a) (i) Derive the integrated rate equation for a second order react where the reactants are same concentration. (ii) Write a notes on Redox reaction with an example. Or (b) (i)Deduce the expression for the rate constant of first or reaction. (ii) Define the term rate of reaction, Discuss various factors	(a) Hard water(b) Soft water(c) Demineralized water(d) DIn electro plating the article to be plated is subjected to pickling, this is to (a) Remove grease(b) Increase the rate of plating(c) Remove the oxide scale(d) Get a bright depositPART – B (5 x 2= 10Marks)State Paulis exclusion principleDefine Order of reactionCalgon conditioning is better than phosphate conditioning - JustifyList out the salts responsible for the hardness of waterDefine Dry corrosionPART – C (5 x 16= 80Marks)(a) (i) Describe the characteristic properties of covalent compounds. (ii) Discuss hydrogen bonding with its consequences. Or(b) (i) Write the basic postulates and limitations of valance bond theory.(a) (ii) Explain the hybridization involved and predict the shape for the following molecule(a) (i) Derive the integrated rate equation for a second order reaction (ii) Write a notes on Redox reaction with an example.Or(b) (i)Deduce the expression for the rate constant of first order reaction.(ii) Define the term rate of reaction, Discuss various factors that of reaction.	(a) Hard water(b) Soft water(c) Demineralized water(d) Distilled waterIn electro plating the article to be plated is subjected to pickling, this is toCO(a) Remove grease(b) Increase the rate of plating(c) Remove the oxide scale(d) Get a bright depositPART – B (5 x 2= 10Marks)CO1- FCO1- FDefine Order of reactionCO2- FCalgon conditioning is better than phosphate conditioning - JustifyCO1- FOrder of reactionCO4- FCO4- FPART – C (5 x 16= 80Marks)CO1- UOr(b)(i) Write the basic postulates and limitations of valance bond the following molecule <td colspan<="" td=""></td>					

18. (a) How is hardness of water determined by the complexomteric CO3- U (16) method? Write the necessary calculation

Or

- (b) (i) Explain the process of scale and sludge formation in boilers. CO3- U (8)
 (ii) With the help of a neat diagram, explain the reverse osmosis CO3- U (8) method for desalination of brackish water
- 19. (a) (i) Calculate the temporary, permanent and total hardness of a CO3- U (8) sample water containing $Mg(HCO_3)_2=73mg/lit$, $Ca(HCO_3)_2 = 162 mg/lit$, $MgCl_2 = 95 mg/lit$, $CaSO_4 = 136 mg/lit$, Atomic weight: Ca = 40, Mg = 24, C = 12, S = 32, O = 16, H = 1, Cl = 35.5.

(ii) Describe the demineralization of water by an ion exchange CO3- U (8) process in detail.

Or

- (b) Give Principal of Zeolite process ? Write advantages , CO3- U (16) disadvantages, and limitation of Zeolite process.
- 20. (a) (i) Explain the rusting of iron on the basis of electrochemical CO4-U (8) theory of corrosion (ii) Briefly describe various components of paint and their CO4-U (8) functions.
 Or
 - (b) (i) Write a short notes on
 (a) Concentration cell corrosion
 (b) Wire fence corrosion
 (ii) Discuss the mechanism of dry corrosion
 CO4- U (8)

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