Code No: 152AB **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year II Semester Examinations, September - 2023

CHEMISTRY

(Common to CE, ME, ECE, EIE, MCT, MMT, AE, MIE, PTM, CSBS, CSE(AI&ML), CSE(IOT), TTE, AI&DS, AI&ML)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Using crystal field theory predict the magnetic nature of the complex $[Co(NH_3)]^{+3}$.		[2]
b)	What are the salient features of crystal field theory?		[3]
c)	What is Calgon conditioning?		[2]
d)	What are the specifications of potable water?		[3]
e)	What is water line corrosion?		[2]
f)	Write the applications of emf series.		[3]
g)	What are Enantiomers and Diastereomers?		[2]
h)	What are optical activity and chirality? Give an example each.		[3]
i)	What are the selection rules for rotational and vibrational transitions?		[2]
j)	With regard to NMR spectroscopy, describe i) Chemical shift	ii) shielding and deshielding.	[3]

PART - B

(50 Marks)

2.a)	Draw the molecular orbital diagram O_2 and determine its bond order and magnetic moment.	
b)	Explain the formation of ∏-molecular orbitals in benzene.	[5+5]
	OR	
3.a)	Explain the crystal field splitting of d-orbitals in octahedral complexes.	
b)	Give the important postulates of Molecular Orbital Theory and write a note on Linear Combination of Atomic Orbitals.	[5+5]
4.a)	Explain the process of disinfection of water by chlorination and ozonisation.	
b)	Explain the desalination of water using reverse osmosis.	[5+5]
	OR	
5.a)	What is the principle involved in complexometric titration and describe the estimation of permanent hardness by EDTA method.	
b)	Calculate the temporary, permanent and total hardness of a water sample which contains the following salts per litre and express it in ppm and degree French $Ca(HCO_3)_2$=81mg, $Mg(HCO_3)_2$=14.6mg, $MgSO_4$=30mg, $CaCl_2$=11.1mg, $MgCl_2$=19mg.	[5+5]

6.a) Describe the working of a lead-acid storage batteries with the reactions involved at the electrodes during charging and discharging.

b) How do you protect the buried pipelines from corrosion? Explain. [5+5]

OR

7.a) Describe the determination of pH of a solution using quinhydrone electrode with a neat diagram.

b) Explain the mechanism of the electrochemical theory of corrosion with a diagram for rusting of iron in a slightly alkaline medium with dissolved oxygen. [5+5]

8.a) Describe the conformational analysis of n-butane.

b) Explain the following with suitable example:

i) Markownikoff's Rule ii) Anti Markownikoff's Rule. [5+5]

OR

9.a) Write and explain the mechanism of S_N1 reaction with example.

b) Write the structure, synthesis and pharmaceutical applications of Paracetamol. [5+5]

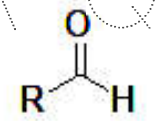
10.a) Write the applications of infrared spectroscopy.

b) Explain the Chromophore concept and Auxochrome concept in electronic spectroscopy. [5+5]

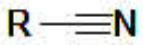
OR

11.a) How do you determine the bond length from rotational spectrum?

b) Write the stretching vibrational frequencies for the following functional groups in cm^{-1}. [5+5]

i) 

Carbonyl

ii) 

Nitrile

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