II-PUC CHEMISTRY

BLUE PRINT FOR MODEL QUESTION PAPER - 4

Group	Unit	Title	Hours	Marks	Part-A I 10x1 mark	Part B II 8x2 mark	Part C III 8x3 mark	Part D IV & V 11x5 mark	Total
Group-I Physical	1	The Solid state	8	7		11		27	7
	2	Solution	9	8	1,2			28	7
	3	Electrochemistry	9	8	3	12		29	8
	4	Chemical kinetics	9	8	4	13		30	8
	5	Surface chemistry	6	5	5			31	6
		Total of Group-I	**41**	**36**					**36**
Group-II Inorganic	6	General principles and processes of isolation of elements	5	4	6		19		4
	7	The p-block elements	11	10	7		20,21,22		10
	8	The d and f-block elements	9	8		14	23,24		8
	9	Coordination compounds	7	6			25,26		6
		Total of Group-II	**32**	**28**					**28**
Group-III Organic	10	Haloalkanes and haloarenes	7	6	8			32	6
	11	Alcohols, phenols and ethers	8	7		15		33	7

	12	Aldehydes, ketones and carboxylic acids	9	8	9	16		34	8
	13	Amines	6	5				35	5
	14	Biomolecules	7	6	10			36	6
	15	Polymers	5	5				37	5
	16	Chemistry in everyday life	5	4		17,18			4
		Total of Group-III	**47**	**41**					**41**
		TOTAL	**120**	**105**	**10**	**10**	**15**	**35**	**105**

CHEMISTRY (34) NEW SCHEME

MODEL QUESTION PAPER NO.4

TIME 3HOURS 15 MINUTES **MAX.MARKS.70**

Instructions :

i. The question paper has four parts. All the four parts are compulsory

ii. PART –A carries 10 marks , each question carries one marks.

PART-B carries 10 marks . each question carries two marks

PARRT –C carries 15 marks . each question carries three marks

PART-D carries 35 marks . each question carries five marks

iii) write balanced chemical equations and draw diagrams wherever necessary

iv) use log table and simple calculators if necessary

(use of scientific calculator is not allowed)

PART-A

I ANSWER ALL THE QUESTIONS. EACH QUESTION CARRIES ONE MARK 1X10=10

1. Define VantHaff's factor.
2. What are isotonic solutions ?
3. Mention the S.I unit for molar conductivity.
4. For the reaction A+B →products .the rate becomes doubled when concentra□on of only A is increased by two times, the rate is increased by four times, when the concentration of B alone is doubled what is the order of the reaction?
5. Name the enzyme used in the inversion of cane sugar
6. Name the method used for refining of Zirconium.
7. Complete the reaction $XeF_4+O_2F_2 \rightarrow A+O_2$ Identify A
8. What is a Recemic mixture-?
9. Name the product obtained when acetaldehyde reacts with Hydroxyl amine.
10. Name the nitrogenous base present in RNA only.

PART-B

II ANSWER ANY FIVE OF THE FOLLOWING EACH QUESTION CARRIES TWO MARKS. 5X2=10 MARKS

11. Silver forms CCP lattice and x-ray studies of its crystals show that the edge length of its unit cell is 408.6 pm . calculate the density of silver (Atomic mass of Ag= 107.9u)
12. What is corrosion? Mention a general method to prevent it.
13. Write the Arrhenius equation and mention what each term stands for.
14. Any two differences between lanthanides and Actinides.

15. How does Acetyl chloride react with Anisol in presence of anhydrous aluminum chloride catalyst. Write the chemical equation of the reaction.
16. What are the effects of the electron withdrawing and electron donating groups on acidity of carboxylic acids
17. What are antacids? Give an example.
18. What are food preservatives ? Give one example

PART –C

III ANSWER ANY FIVE OF THE FOLLOWING EACH QUESTION CARRIES THREE MARKS 5X3= 15

19. How is pure alumina obtained from Bauxite by leaching process?
20. Write the reactions that takes place during the manufacture of nitric acid by Ostwald's process.
21. i) what happens when potassium chlorate is heated in presence of MnO_2, write the equation for the reaction also
    ii) draw the structure of sulphuric acid.
22. i) How is chlorine prepared by using MnO_2 ?
    ii) complete the reaction
    NH_3+Cl_2(excess) →
23. d-block elements form co-ordination compounds . Give reasons.
24. How is potassium dichromate prepared from the chromite ore?
25. Mention the geometry, magnetic property and type of hybridization in $[Ni(cn)_4]^{2-}$ complex.
26. Write any three postulates of Werner's theory of complexes.

PART-D

IV ANSWER ANY THREE OF THE FOLLOWING . EACH QUESTION CARRIES FIVE MARKS 3X5= 15

27. a. calculate the packing efficiency in body centered cubic crystals (3)
    b. calculate the number of particles per unit cells in f.c.c. (2)
28. a. the boiling point of benzene is 353.23K .when 1.80 g of a non volatile , non electrolytic solute was dissolved in 90 g of benzene , the boiling point was raised to 354.11 K calculate the molar mass of the solute [K_b for benzene =2.53K.kg mol^{-1}] (3)

    b. write two differences between ideal and non ideal solutions of two liquids (2)
29. a). calculate the standard free energy change for the following reaction occurring in the galvanic cell at 298K

$3Mg(s) + 2Al^{3+}(aq) \rightarrow 3Mg^{2+}(aq) + 2Al(s)$

Given $E°_{Mg2+/Mg}$ = - 2.37 V and $E°_{Al3+/Al}$=-1.66V (4)

b. what is primary battery?

30. a. Derive the integrated rate equation for the rate constant of a first order reaction (4)

b. what is pseudo first order reaction ? (1)

31. a. complete and balance the following reactions

SO_2 + H_2S oxidation →

$FeCl_3$ + H_2O hydrolysis → (2)

b. Mention two characteristics of enzyme catalysis (2)

c. What is the sign of ΔS for the adsorption of gas on solids ?

V ANSWER ANY FOUR OF THE FOLLOWING . EACH QUESTION CARRIES FIVE MARKS

4X5=20

32. a. Explain SN^1 mechanism by taking tertiary butyl bromide as an example (3)

b. What is Wurtz Fitting's reaction ? Give an example (2)

33. a. How is phenol manufactured by cumene process. Give the chemical equations of the reaction involved . (3)

b. How do you prepare ethanol by using the Grignard Reagent? (2)

34. a. How is Benzol chloride converted into benzaldehyde ? Name the reaction (3)

b. Write the chemical equation for the reaction between dilute NaOH and acetalhyde, mention the name of the product formed .
(2)

35. a. Explain how is Hinberg's reagent is used to distinguish the primary, secondary and tertiary amines

b. Write the chemical reactions involved in the conversion of aniline into phenol (2)

36. a. What are carbohydrates ?and how are they classified ? (3)

b. What is a peptide bond ? How many peptide bonds are present

in a tetra peptide ? (2)

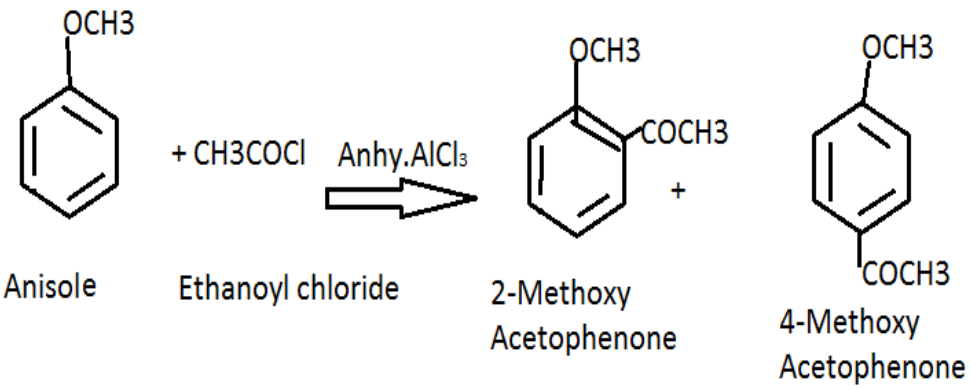
37. a. i) what are condensation polymers ? Give an example.

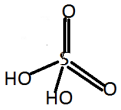
ii)Give the IUPAC name of the monomer of natural rubber. (3)

b. What are Biodegradable polymers ? Give an example (2)

Scheme of Valuation

Q.NO	VALUE POINT	MARKS
1	$i = \frac{\text{Normal molar mass}}{\text{Abnormal molar mass}}$ $= \frac{\text{Observed colligative property}}{\text{Calculated colligative property}}$ $i = \frac{\text{Total number of moles of particles after association/dissociation}}{\text{Number of moles of particles before association/dissociation}}$	1
2	Two solutions having same osmotic pressure at a given temperature	1
3	$Sm^2\ mol^{-1}$ or $Scm^2\ mol^{-1}$	1
4	Two	1
5	Invertase	1
6	Van Arkel method	1
7	A=XeF_6 or Xenonhexaflouride	1
8	A mixture containing two enantiomers in equal proportions will have zero optical rotation.	1
9	Acetaldoxime	1
10	Uracil	1
	PART -B	
11	Formula $d=\frac{zM}{a^3 N_A}$ substitution with correct answer($10.5 \times 10^3\ kgm^{-3}$) OR $10.5\ g\ cm^{-3}$	1 1
12	A metal is oxidized by loss of e^-s and formation of oxides Any one method of prevention of corrosion (coating, painting, tinning, cathodic	1

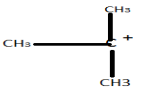
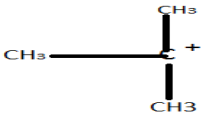
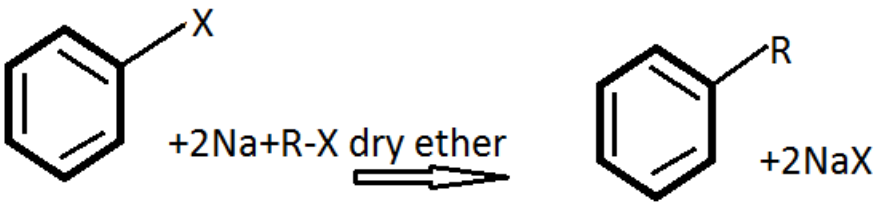
	protection)	1
13	Arrhenins Equation $k=A.e^{-Ea/RT}$ OR $\log_e k=\log_e A - \frac{Ea}{RT}$ Where k= rate constant, A=Arrhenius constant Ea= Activation energy, T= temperature, R= gas constant (any one)	1 1
14	Lanthanides 1.Binding energies of 4f e⁻s are higher 2. They do not form complexes easily ANY ONE SUITABLE ANSWER Actinides 1. Binding energies of 5f e⁻s are Lower 2. They have tendency to form complexes	1 1
15		2
16	Electron with drawing group increases acidic strength Electron donating group decreases acidic strength	1 1
17	Chemical substances which are used in the treatment of acidity Ranitidine((Zantac) OR ANY OTHER EXAMPLE	1 1
18	Chemical substances which prevent spoilage of food due to microbial growth	1

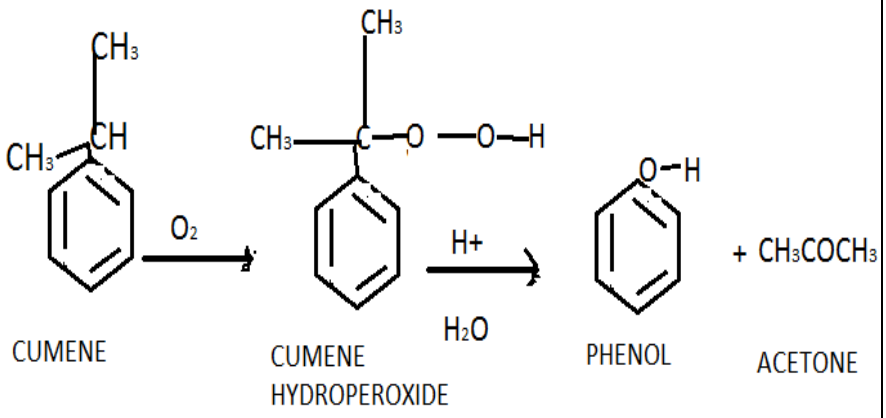
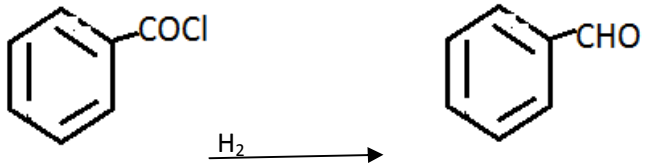
	Ex: Table salt, sugar, vegetable oils, OR any other suitable example	1
	PART-C	
19	$Al_2O_3 + 2\ NaOH + 3H_2O \rightarrow 2Na\ [\ Al\ (OH)_4]$ $2Na[Al(OH)_4 + CO_2 \rightarrow Al_2O_3.\ x\ H_2O + 2NaHCO_3$ $Al_2O_3.\ x\ H_2O \xrightarrow{1470k} Al_2O_3.\ +x\ H_2O.$ Each equation carries one mark OR COMPLETE EXPLANATION IN THREE STEPS	3
20	$4NH_3 + 5O_2 \xrightarrow[500k,9bar]{Pt/Rh} 4NO + 6H_2O$ $2NO + O_2 \rightleftharpoons 2NO_2$ $3NO_2 + H_2O \rightarrow 2HNO_3 + NO$ OR COMPLETE EXPLANATION IN THREE STEPS	1 1 1
21	(i) Statement $2KClO_3 \xrightarrow[\Delta]{Mno_2} 2KCl + 3O_2$ OR SELF EXPLANATION ON REACTION 	1 1 1
22	(i) Heating MnO_2 with conc. HCl $MnO_2 + 4\ HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$ OR Self explanation on reaction\	1 1

	(ii) $NH_3 + Cl_{2(excess)} \rightarrow NCl_3 + 3HCl$	2 1
23	Small size of metal ions High ionic charges Availability of d- orbitals	1 1 1
24	$4FeCr_2O_4 + 8Na_2CO_3\,7O_2 \rightarrow 8\ Na_2CrO_4 + 2Fe_2O_3 + 8CO_2$ $2Na_2CrO_4 + 2H^+ \rightarrow Na_2CrO_7 + 2Na^+ + H_2O$ $Na_2CrO_7 + 2KCl \rightarrow K_2Cr_2O_7 + 2NaCl$ OR COMPLETE EXPLANATION IN THREE STEPS	1 1 1
25	Square planner complex Diamagnetic dsp^2 Hybridisation	1 1 1
26	(i) Coordination compounds metals show two types of valencies – primary and secondary (ii) Primary valencies are ionisable (iii) Secondary valencies are non-ionisable OR ANY OTHER POSTULATES	1 1 1
	PART -D	
27	(a) Up to a = $4\square/\sqrt{3}$ OR r= $\frac{\sqrt{\square}}{\square}\square$ Packaing efficiency= volume offupied by 2 spheres x 100 % Total volume of unit cell Substitution and correct answer (68%) (b) Total no. of particles due to corners 1/8x8=1 Total no.of particles due to faces 6x½ = 3 & Total no.of particles per unit cell 3+1 = 4	1 1

		1
28	(a) Formula : $M_2 = \frac{1000x\ W_2\ x\ Kb}{\Delta\ \ \ \ _1}$ Substitution: $M_2 = \frac{1000 \times 1.8 \times 2.53}{0.88 \times 90}$ $M_2 = 58\ g\ mol^{-1}$ [NO UNIT DEDUCT ONE MARK] (c) Ideal solution — non ideal solution $\Delta H_{mix} = 0$ — $\Delta H_{mix} \neq O$ $\Delta V_{mix} = 0$ — $\Delta V_{mix} \neq O$ OR ANY OTHER DIFFERENCES	1 1
29	(a) E cell = E°_R --- E°_L = -- 1.66+ 2.37 = 0.71 V ΔG° = -- nF E° cell = -- 6x96500x 0.71 = - 411090 J OR - 411.09kJ (b) Battery can not be reused	1 1 1 1
30	(a) R→P Rate = $-\frac{d[R]}{dt} = k[R]$ OR $\frac{d[R]}{[R]} = -kdt$ Integrating euation Ln[R] = -kt+I ----------(1) To calculate I : T=o, R=$[R]_0$	

	$\ln[R]_o = -kxo + I$ OR $\ln[R]_0 = I$ substitutionequation (1) $\ln [R] = -kt + \ln [R]_0$ Rearranging $\frac{Ln[R]}{[R]_0} = - kt$ OR $K = 1/t . \ln \frac{[R]_0}{[R]}$ OR $K = \frac{2.303}{t} \log_{10} \frac{[R]_0}{[R]}$ (b) Order of reaction is one and molecularity is two or more than two	1 1 1 1 1 1
31	(a) i. $SO_2 + 2H_2S \xrightarrow{\text{doubel decomposition}} AS_2S_3 + 3H_2O$ $FeCl_3 + 3H_2O \xrightarrow{\text{Hydrolysis}} Fe(OH)_3 + 3HCl.$ (b) Characteristics are (i) Highly efficient (ii) Highly specific in nature OR ANY OTHER REVELENT CHARACTERISTIC (FOR EACH ONE MARK) (c) Δ S decreases OR Δ S is negative	1 1 1

		1
	PART-V	
32	(a) Step-1  $(CH_3)_3$ CBr slow + Br^- ⇌ Step-2  +OH^- fast $(CH_3)_3$ COH Mentioning first order kinetics (b) Alkylhalide reacts with anyl halide gives alkylarenes when treated with sodium indry ether  OR self-explanation with equation	1 1 1 1 1

		2
33	(a) Explanation  OR Step wise reaction carries (b) $HCHO + CH_3MgBr \rightarrow CH_3CH_2OBr$ Methanal $CH_3CH_2OMgBr + HOH \rightarrow CH_3CH_2OH + Mg(OH)Br$ Ethanol	2 3
34	(a)  Benzoyl chloride Benzaldehyde Rosenmund reduction (b) $2CH_3CHO \rightleftharpoons CH_3\text{-}CH(OH)\text{-}CH_2CHO \xrightarrow{\text{dil NaOH}, \Delta} CH_3\text{-}CH{=}CH\text{-}CHO$ Ethanal 3-Hydroxybutanal But-2 enal (ALDOL)	2 1

		2
35	(a) Hinsberg'd reagent reacts with 1˚ amine gives a product which is soluble in alkali (b) Hinsberg's reagent reacts with 2˚ amine gives a product which is insoluble in alkali Hinsberg's reagemt doesnot react with 3˚ amine $C_6H_5NH_2 + NaNO_2+2HCl$ 273-278 k $C_6H_5N_2^+Cl^- + NaCl + 2H_2O$ $C_6H_5N_2^+Cl^- + H_2O \rightarrow C_6H_5OH + N_2 + HCl$	1 1 1 1 1
36	(a) Optically active polyhydroxy aldehydes or ketones or the compounds which produce such units on hydrolysis Classified as monosaccharides, oligo saccharides, polysaccharides (b) Elimination of a water molecule from two molecules of similar or different amino acids and formation of –CONH- bond 3 peptide bond	1 2 1 1
37	(a) i. condensation reaction between two different bifunctional or trifunctional monomeric units Nylon6,6 or Any other example ii. isoperene or 2-methyl-1,3-butadiene (b) polymers cause acute environmental problems and remain undegraded for long time Nylon-2-nylon-6 or any other example	1 1 1 1