

**2021/TDC/CBCS/ODD/
CHMDSC/GE-301T/291**

**TDC (CBCS) Odd Semester Exam., 2021
held in March, 2022**

CHEMISTRY

(3rd Semester)

Course No. : CHMDSC/GE-301T

(Physical and Organic Chemistry)

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

SECTION—A

Answer any *fifteen* from the following : $1 \times 15 = 15$

1. Write the Nernst distribution law.
2. Explain the term 'phase' with an example.
3. What is 'metastable' equilibrium?

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(Turn Over)



4. Fill in the blanks :

Solutions showing positive deviations produce _____ boiling azeotrope, whereas, solutions showing negative deviations produce _____ boiling azeotrope.

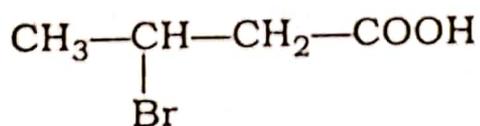
5. How does equivalent conductivity vary with dilution?

6. Explain the term 'transference number'.

7. What is standard electrode potential?

8. Write two characteristics of reversible cell.

9. Write the IUPAC name of



10. Show with an example the condition for aldol condensation.

11. What is benzoin condensation?

12. Write the structure and IUPAC name of Brady's reagent.

(3)

13. Give an example of an amine which produces effervescence with HNO_2 .
14. Write the product of the following :
$$\text{R}-\text{NH}_2 + \text{CHCl}_3 + \text{KOH (alc)} \rightarrow ?$$
15. Name the orbital in which the lone pair of electrons is present in a 2°-amine.
16. Draw the structure of N-methylaniline.
17. Give one example each of aldohexose and aldoketose.
18. What is isoelectric point?
19. What do you mean by C-terminal and N-terminal in a protein chain?
20. Write one example of a basic α -amino acid.

SECTION—B

Answer any *five* from the following : 2×5=10

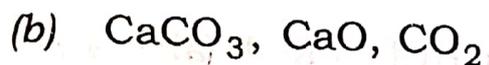
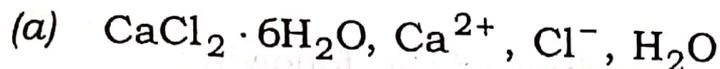
- 21: Vapour pressures of chloroform and dichloromethane are 200 mmHg and 415 mmHg respectively. Calculate the vapour pressure of the solution prepared by mixing 25.5 g of chloroform and 40 g of dichloromethane at 298 K.

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22. Calculate the number of components for the following : 1×2=2



23. Draw the curve for conductance versus volume for a conductometric titration between a strong acid and a strong base and explain it.

24. Write the thermodynamic relation between—

(a) ΔG and EMF;

(b) ΔH and EMF

and explain the terms involved.

25. Write the products and IUPAC name for the following reaction :



26. What happens when propanal reacts with—

(a) ethanol;

(b) ethane-1,2-diol ?

27. Explain Saytzeff elimination reaction with a suitable example.

28. What happens when aniline is reacted with aqueous bromine?
29. Explain the phenomena of electrophoresis.
30. Illustrate the term 'zwitterion' with an example.

SECTION—C

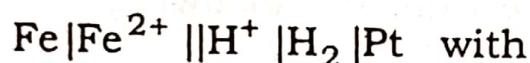
Answer any five from the following : 5×5=25

31. (a) Draw and explain the phase diagram of sulphur. 4
- (b) Explain the term 'azeotrope'. 1
32. (a) In solvent extraction, the efficiency of extraction increases by increasing the number of extraction and using only a small amount of the extracting solvents of equal volume each time. Justify. 4
- (b) What is the influence of impurity on critical solution temperature? 1

33. (a) The Λ_m° values for NaCl and KCl are $126.5 \Omega^{-1} \text{cm}^2 \text{mol}^{-1}$ and $149.9 \Omega^{-1} \text{cm}^2 \text{mol}^{-1}$ respectively. The ionic conductance of Na^+ at infinite dilution is $50.1 \Omega^{-1} \text{cm}^2 \text{mol}^{-1}$. Calculate the ionic conductance at infinite dilution for K^+ ion. 3

(b) Derive the relation between EMF and the thermodynamic property (ΔS). 2

34. (a) Write the Nernst equation and calculate the EMF for the following cell notation :



$$E_{\text{Fe}^{2+} | \text{Fe}}^\circ = -0.44 \text{ V} \quad 3$$

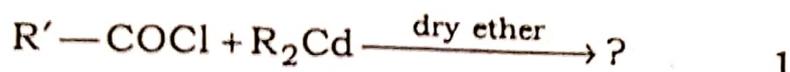
(b) Explain how conductance measurements can be used to determine the degree of ionization of a weak electrolyte. 2

35. (a) Propose a suitable mechanism for the acidic hydrolysis of an ester of your choice. 3

(b) Write the product of

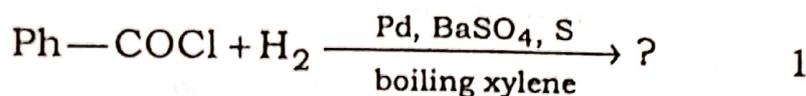


(c) Write the product of



36. (a) What is Wittig reaction? Provide the mechanism of it. 1+2=3

(b) Write the product of



(c) Draw the structure and write the IUPAC name of a molecule which does not show iodoform test. 1

37. (a) Explain why nitration of aniline with nitrating mixture gives *m*-nitroaniline in large quantity along with *p*-nitroaniline. 3

(b) Explain Schotten-Baumann reaction with a suitable example. 2

38. (a) Illustrate Hofmann bromoamide reaction with a suitable example. 3

(b) Why electron density is more at the *ortho*- and *para*-position in aniline? 2

39. (a) Mention the product obtained from ethanal when it undergoes Strecker synthesis. 2

- (b) What happens when alanine reacts with—
- (i) ethanoyl chloride;
 - (ii) ethanoic anhydride? 3
40. (a) What happens when glycine reacts with ninhydrin? 2
- (b) Illustrate the process of Ruff degradation with a suitable example. 2
- (c) Draw the Fischer projection and Haworth structure of α -D-(+) gluco-pyranose. 1
