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III Semester B.Sc. Degree Examination, April-2022

CHEMISTRY

(CBCS New Scheme - Freshers 2021-22 onwards)

Paper : III



Time : 3 Hours

Maximum Marks : 70

Instructions to candidates :

- 1) Question paper has two sections, Answer both the sections.
- 2) Write chemical equations and diagrams wherever necessary.

SECTION - A

Answer any **Five** of the following questions. Each question carries 7 Marks. (5×7=35)

1.
 - a) Construct the Phase diagram of sulphur system and explain its salient features.
 - b) What are eutectic mixtures? Give an example.
 - c) Define component of a system. (4+2+1)
2.
 - a) Derive Gibb's phase rule.
 - b) Mention the number of phases in the following systems.:
 - i) $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$
 - ii) $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$
 - iii) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ (4+3)
3.
 - a) Draw a neat plot and explain the variation of molar conductance of a strong and weak electrolyte with dilution.
 - b) Define specific conductance and mention its SI unit.
 - c) State Kohlrausch's law. (4+2+1)
4.
 - a) How is EMF of a cell determined experimentally by Poggendorff's compensation method?
 - b) Define standard electrode potential.
 - c) What is transport number of an ion? (4+2+1)

[P.T.O.]



5. a) Define Nernst equation for a single electrode system.
b) How is P^H of a solution determined using standard hydrogen electrode? (4+3)
6. a) What is miscibility solution temperature? Discuss the effect of impurity on partial miscibility of liquids.
b) What are azeotropic mixtures? Give an example for low boiling azeotrope. (4+3)
7. a) What are ideal and non-ideal solutions? Explain negative and positive deviation from Raoult's law in the case of non-ideal solutions.
b) State Nernst distribution law. Give its applications. (4+3)

SECTION - B

Answer any Five of the following questions. Each question carries 7 Marks. (5×7=35)

8. a) Give the mechanism of aldol condensation with an example.
b) How is 2-propanone prepared from acetyl chloride?
c) Give the IUPAC name of $H_3C - \underset{\substack{| \\ CH_3}}{C}H - CH_2 - CHO$ (4+2+1)
9. a) Explain the mechanism of wolf-kishner reduction with an example.
b) Explain clemmensen reduction with an example. (4+3)
10. a) Explain Hell-Volhard - Zelensky reaction with an example.
b) How does citric acid react with Hydroiodic acid? Give equation.
c) Compare the acidic strength of p-nitrobenzoic acid with benzoic acid. (3+2+2)
11. a) Explain the effect of electron withdrawing and electron releasing groups on the acidic strength of aliphatic carboxylic acids.
b) Give the mechanism of knoevanagel condensation with an example. (4+3)
12. a) Explain Hoffmann's bromamide reaction with an example.
b) How benzene diazonium chloride is converted to p-hydroxy azobenzene?
c) What is the action of heat on tartaric acid? (3+2+2)



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13. a) Explain Gabriel's phthalimide synthesis with an example.
b) Why is methyl amine a stronger base than ammonia? Explain.
c) How does ethyl amine react with acetyl chloride? (3+2+2)
14. a) Explain the following with reference to D-glucose
i) mutarotation
ii) anomeric effect
b) How is glucose converted to fructose? (4+3)
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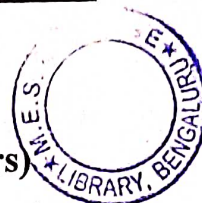
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III Semester B.Sc. Degree Examination, April -2022

CHEMISTRY

(CBCS Semester Scheme 2018-19 onwards prior to 2021-22 Repeaters)

Paper : III



Time : 3 Hours

Maximum Marks : 70

Instructions to candidates :

- 1) The question paper carries two parts. Answer both the parts.
- 2) Draw diagrams and write chemical equations wherever necessary.

PART - A

Answer any **Eight** questions. Each question carries 2 marks.

(8×2=16)

1. Define temperature coefficient of reaction.
2. State second law of thermodynamics.
3. Calculate the thermodynamic efficiency of a steam engine working between temperatures 393k and 298k.
4. Define residual entropy.
5. What are Ellingham's diagrams?
6. Write any two uses of Bleaching powder.
7. What are thermosetting plastics? Give two examples.
8. Give the reaction of an alcohol with metallic sodium.
9. What are Grignard reagents? Give an example.
10. Give the preparation of diethyl ether from ethanol.
11. How are fertilizer's classified?
12. Give two differences between physisorption and chemisorption.

PART - B

Answer any **Nine** questions. Each question carries 6 marks.

(9×6=54)

13. a) Derive an expression for the rate constant of a second order reaction $A + B \rightarrow$ products where the concentration of the reactants A and B are same.
b) Write Arrhenius equation and indicate the terms involved in it. (4+2)
14. a) Explain half life method for determining the order of a reaction.
b) The half life period for a second order reaction is 30mins. Calculate the velocity constant when the initial concentration of the reactant is 0.02 mol/dm^3 . (4+2)

[P.T.O.]



15. a) Derive an expression for work done in an isothermal reversible expansion of a gas.
b) Define entropy of a substance. Mention its unit. (4+2)
16. a) Derive an expression for thermodynamic efficiency of a heat engine.
b) Define irreversible process. (4+2)
17. a) What is Spontaneous process? Give an example. What is the criteria for the spontaneity of a process in terms of free energy change?
b) State Nearest heat theorem. (4+2)
18. a) What are Homogenous and Heterogeneous catalysis? Give one example for each.
b) Write BET equation. Explain the terms involved. (4+2)
19. a) Explain addition and condensation polymerisation with an example for each.
b) Define the term weight average molecular weight of a polymer. (4+2)
20. a) Explain Mond's process of refining Nickel.
b) What are Silicones? Mention its uses.
c) Mention the monomers used in the synthesis of Nylon-6,6. (2+2+2)
21. a) Describe the extraction of uranium from pitch blende.
b) Write the partial structure of Teflon. (4+2)
22. a) Explain the Luca's test to distinguish between primary secondary and tertiary alcohol.
b) What happens when glycerol is heated with potassium hydrogen Sulphate. (4+2)
23. a) How is primary alcohol prepared from
i) Alkene and
ii) Aldehyde
b) Give one method of preparation of Glycol from ethylene. (4+2)
24. a) Explain the mechanism of Reimer-Tiemann reaction.
b) How is methyl lithium converted to ethanoic acid? (4+2)
25. a) What is Williamson's ether synthesis.
b) What are epoxides? Give an example.
c) Give the role of phosphorus as an essential plant nutrient. (2+2+2)
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