Third Semester B.Sc. Degree Examination, October/November 2019

(CBCS Scheme)

Paper III - CHEMISTRY

Time : 3 Hours]   [Max. Marks : 90

Instructions to Candidates :

1)   The question paper has Two Parts, Part A and Part B

2)   Both the Parts should be answered

3)   Write chemical equations wherever necessary.

PART – A

I.   Answer any **TEN** of the following questions. Each question carries **2 marks** :   (10 × 2 = 20)

1.   Maximum of how many phases can co-exist at equilibrium in a one component system and why?

2.   State Nernst distribution law. Write any one application of it.

3.   What is abnormal transport number?

4.   Define specific conductance. How does it vary with dilution?

5.   What are reversible cells?

6.   What is Perkin's reaction?

7.   State Blanc's rule.

8.   Write the structures of Lactic acid and Citric acid.

9.   How are nitroalkanes prepared from alkyl halides?

10. How do you convert benzene diazonium chloride to benzonitrile?

11. Convert acetamide into methyl amine.

12. Synthesis furan from furfural.
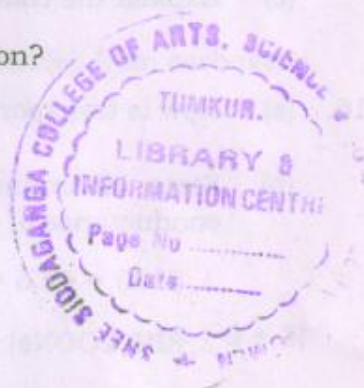
PART – B

II. Answer any **SEVEN** of the following questions. Each question carries **10** marks :

(7 × 10 = 70)

13. (a) What are partially miscible liquid mixtures? Explain the variation of mutual solubility of phenol and water with temperature with the help of a graph.

(b) Write a note on azeotropes.

(c) Write the principle of steam distillation. What are its advantages?

(4 + 3 + 3)

14. (a) Draw the phase diagram of sulphur system and explain the curves and triple points in it.

(b) Describe the distillation of a binary mixture which shows a minimum in boiling point curves.

(c) Write the phase rule equation for two component systems. How does it differ from one component system?

(4 + 3 + 3)

15. (a) (i) Define phase and degrees of freedom.

(ii) Write Clausius – Clapeyron equation and what is its importance in phase equilibria?

(b) Define the terms eutectic temperature and eutectic composition by taking Ag – Pb system as an example.

(c) Explain the conductometric titration of a strong acid versus a weak base.

(4 + 3 + 3)

16. (a) How is transport number determined by Moving Boundary method?

(b) State Kohlrausch's Law of ionic conductances. Calculate the molar conductance of acetic acid at infinite dilution at 298 K given,

$\lambda_\circ (HCl) = 42.6 \times 10^{-3} \Omega^{-1} m^2 mol^{-1}$

$\lambda_\circ (CH_3COONa) = 9.1 \times 10^{-3} \Omega^{-1} m^2 mol^{-1}$

$\lambda_\circ (NaCl) = 12.65 \times 10^{-3} \Omega^{-1} m^2 mol^{-1}$.

(c) Write a note on

(i) asymmetric effect

(ii) electrophoretic effect

(4 + 3 + 3)

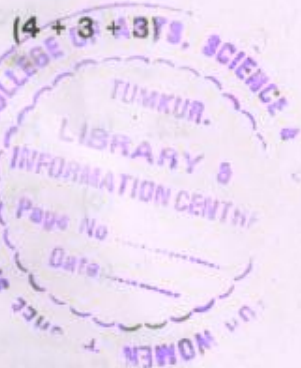17. (a) Calculate the equilibrium constant for the reaction

$$Cu_{(s)} + 2Ag^+_{(aq)} \rightleftharpoons Cu^{2+}_{(aq)} + 2Ag_{(s)},$$
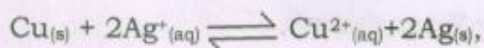
given that $E^0_{Ag^+/Ag} = 0.80V$ and $E^0_{Cu^{2+}/Cu} = 0.34V$

(b) (i) What is electrochemical series?

(ii) What are concentration cells and mention different types of concentration cells?

(c) Describe the construction and working of glass electrode.   (4 + 3 + 3)

18. (a) Explain the mechanism of Cannizzaro's reaction.

(b) How does acetaldehyde react with the following?

(i) $NaHSO_3$

(ii) Hydroxylamine.

(c) Write the general reactions for the preparation of Ketones from

(i) Nitriles

(ii) Grignard reagents.   (4 + 3 + 3)

19. (a) Discuss the effect of substituents on the acidity of aromatic carboxylic acids.

(b) Write the preparation of acid chlorides and acid anhydrides from carboxylic acids.

(c) Write the reactions for

(i) Alkaline hydrolysis of an ester.

(ii) Action of heat on oxalic acid.   (4 + 3 + 3)

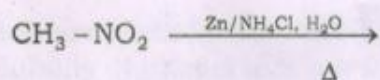20. (a) Write the reactions of methyl amine and aniline with nitrous acid.

(b) What is coupling reaction? Give an example.

(c) How do you distinguish primary, secondary and tertiary amines by Hofmann's method?   (4 + 3 + 3)

21. (a) Complete the following reactions :

$R - NH_2 + CHCl_3 + KOH \rightarrow$

$CH_3 - NO_2 \xrightarrow[\Delta]{Zn/NH_4Cl, H_2O}$

(b) Write any one method of preparation of diazomethane and any one synthetic application of diazomethane.

(c) Aromatic amines are weaker bases than aliphatic amines. Explain.

(4 + 3 + 3)

22. (a) How do thiophene and indole undergo nitration? Discuss.

(b) Discuss the aromaticity of Pyrrole.

(c) How is quinoline synthesized by Skraup method? (4 + 3 + 3)

_____