TDC (CBCS) Odd Semester Exam., 2019

CHEMISTRY

(3rd Semester)

Course No. : CHMDSC/CHMGE-301 T

(Physical and Organic Chemistry)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

UNIT—I

1. Answer any *three* questions from the following : 1×3=3

(a) What will be the values of ΔV_{mix} and ΔH_{mix} of two liquids which on mixing form an ideal solution?

(b) Under what conditions of pressure and temperature Henry's law is applicable?

(c) How many phases are present in a system consisting of $CaCO_3$ (s), CaO (s) and CO_2(g)?

(d) What is critical solution temperature?

2. Answer any *one* question from the following : 2

(a) Calculate the degrees of freedom for a mixture of nitrogen and oxygen gases contained in a vessel.

(b) How does solubility of a gas in a liquid vary with temperature? Give reason for such variation.

3. Answer any *one* question from the following : 5

(a) State Raoult's law for solution of volatile liquids. Draw and explain the vapour pressure composition diagram for ideal solution. 2+3=5

(b) *(i)* State phase rule and explain the terms involved in it. 1+3=4

(ii) What do you mean by phase diagram? 1

UNIT—II

4. Answer any *three* questions from the following : 1×3=3

(a) Give the representation of Daniel cell.

(b) Which reference electrode is used in determining the standard electrode potential? How is it represented?

(c) What is meant by limiting molar conductivity?

(d) Write the expression that relates conductivity with molar conductivity of an electrolyte.

5. Answer any *one* question from the following : 2

(a) How does the molar conductivity of an weak electrolyte vary with dilution? Justify your answer. 1+1=2

(b) A solution of NH_4Cl in water is acidic. Explain. 2

6. Answer any *one* question from the following : 5

(a) *(i)* State Kohlrausch's law of independent migration of ions. 2

(ii) The resistance of a conductivity cell filled with 0·1 *M* KCl solution is 100 ohm. If the resistance of the same cell when filled with 0·02 *M* KCl solution is 520 ohm, calculate the conductivity and molar conductivity of 0·02 *M* KCl solution. Given conductivity of 0·1 *M* KCl solution is 1·29 ohm^{-1} m^{-1}. 3

(b) (i) What is meant by EMF of a cell? Discuss how can EMF of a cell be measured by potentiometric method. 1+3=4

(ii) The EMF of the cell

$$Zn(s)|Zn^{2+}(1\ M)||Cu^{2+}(1\ M)|Cu(s)$$

is 1·1 V. If the standard reduction potential of $Zn^{2+}|Zn$ is –0·76 V, what is the standard reduction potential of copper electrode? 1

UNIT—III

7. Write the structure and name of the products of the following reactions (any *three*) : 1×3=3

(i) $CH_3CH_2-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow{NaBH_4} ?$

(ii) $CH_3CH_2COOH \xrightarrow{NH_3,\ \Delta} ?$

(iii) $(CH_3COO)_2Ca \xrightarrow{\Delta} ?$

(iv) $CH_3CH_2CN \xrightarrow[H_3O^{\oplus}]{SnCl_2,\ HCl} ?$

8. Answer any *one* question from the following : 2

(a) Give reasons for the following : 1×2=2

(i) CH_3CHO does not undergo Cannizzaro reaction.

(ii) Pentan-2-one shows haloform reaction but pentan-3-one does not.

(b) Give reasons for the following observations : 1×2=2

(i) Cl_3CCHO does not undergo aldol condensation.

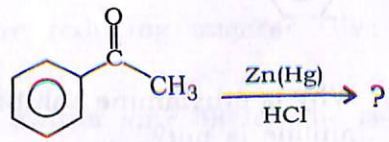
(ii) Methanoic acid reacts with Tollen's reagent.

9. Answer any *one* question from the following : 5

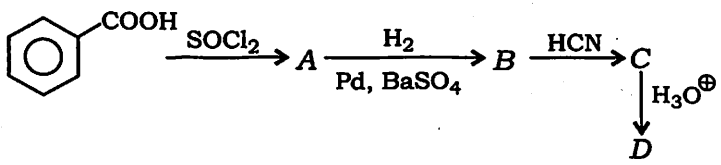
(a) (i) Taking a suitable example, explain with reasonable mechanism the hydrolysis of an ester in acidic condition. 3

(ii) Write, with reactions involve, a chemical test to distinguish between propanal and propanone. 2

(b) (i) Complete and propose a reasonable mechanism for the following reaction : 3



(ii) Identify *A*, *B*, *C* and *D* in the following reaction sequence : ½×4=2



UNIT—IV

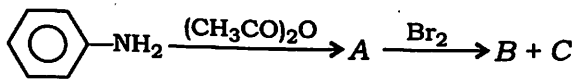
10. Answer any *three* questions from the following : 1×3=3

(a) Name the amine with molecular formula C_2H_5N which produces a yellow oily liquid by reacting with nitrous acid.

(b) Arrange the following in the increasing order of their basic strengths :

$C_2H_5NH_2$, $C_6H_5NH_2$, NH_3

(c) Identify *A*, *B* and *C* in the following reaction :



(d) Why is ethylamine soluble in water but aniline is not?

11. Answer any *one* question from the following : 2

(a) Nitration of aniline with nitrating mixture of conc. HNO_3 and conc. H_2SO_4 is not very successful. Explain with reason.

(b) Aliphatic amines are more basic than comparable alcohols. Justify.

12. Answer any *one* question from the following : 5

(a) What is carbylamine reaction? Give an example. Propose a suitable mechanism for the reaction and write one of its uses. 1+1+2+1=5

(b) *(i)* What is Hoffmann bromamide reaction? Give an example. Write one of its applications in organic synthesis. 1+1+1=3

(ii) Aniline fails to give Friedel-Crafts reaction. Explain the observation with reason. 2

UNIT—V

13. Answer any *three* questions from the following : 1×3=3

(a) What are reducing sugars? Give one example.

(b) What is zwitter ion? Sketch the zwitter ion structure of glycine.

(c) Write the name and structure of one essential amino acid.

(d) What happens when D-glucose is heated with excess of HI and red phosphorus?

14. Answer any *one* question from the following : 2

(a) What is isoelectric point of amino acid? How does it help in separation of amino acids? 1+1=2

(b) Explain, how does glucose react with excess of phenyl hydrazine.

15. Answer any *one* question from the following : 5

(a) Bring out the following conversions : 2½×2=5

(i) Glucose to fructose

(ii) Arabinose to glucose

(b) (i) Give one example each of reaction of amino acid due to —COOH gr, due to —NH_2 gr and due to both —COOH and —NH_2 gr. 3

(ii) Write the Strecker synthesis of amino acid. 2

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(3rd Semester)

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(Analytical Clinical Biochemistry)

Full Marks : 50
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Time : 3 hours

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GROUP—A

Answer **three** questions from each Unit from this Group

UNIT—I

1. "Glycolysis can take place with or without oxygen." Write true or false. 1

2. How many molecules of ATP are produced in glycolysis? 1

3. Whether the alcoholic fermentation by yeasts is an aerobic process or an anaerobic process? 1

4. What is the full form of NADH? 1

UNIT—II

5. What are the different classes of protein? 1

6. What is meant by 'active site' of an enzyme? 1

7. What is coenzyme? 1

8. What is meant by denaturation of protein? 1

UNIT—III

9. What are lipids? 1

10. Draw the structure of cholesterol. 1

11. What is lipoprotein? 1

12. Provide one example of steroid hormone. 1

UNIT—IV

13. Which vitamin is important for blood coagulation? 1

14. What are the important functions of blood? 1

15. What are major constituents of urine? 1

16. What is anaemia? 1

UNIT—V

17. What is the normal range of creatinine in blood? 1

18. What does a high level of urea in blood indicate? 1

19. What is bilirubin? 1

20. What is the normal range of cholesterol in blood? 1

GROUP—B

Answer **one** question from each Unit from this Group

UNIT—I

21. Provide the important functions of carbohydrate. 2

22. What are the microbes used in ethanol fermentation? What is/are the byproduct(s) of this process? 2

UNIT—II

23. What are the α-helix and β-pleated sheet structures of protein? 2

24. Discuss the effect of pH on enzyme activity. 2

UNIT—III

25. How are lipids classified? Provide example. 2

26. Mention the biochemical functions of steroid hormones. 2

UNIT—IV

27. What are the different methods of collection of blood sample? 2

28. How is the urine sample preserved for pathological analysis? 2

UNIT—V

29. How is the information of blood sugar (fasting and PP) clinically interpreted? 2

30. How is bilirubin in blood analyzed pathologically? 2

GROUP—C

UNIT—I

31. Discuss the process of glycolysis. 5

Or

Visualize the lactic acid fermentation process.

UNIT—II

32. How can proteins be isolated and characterized? 2+3=5

Or

How are enzymes classified? Provide an account on the mechanism of enzyme action. 2+3=5

UNIT—III

33. What is triglyceride? Provide an example (with structure). What important biological role they play? What is the effect of high level of triglyceride in the blood stream of human? 1+1+2+1=5

Or

Provide an account of important biological function played by hormones. 5

UNIT—IV

34. Discuss the composition of blood. How is blood preserved after collection? 3+2=5

Or

How is the estimation of clinically important constituents of urine performed? 5

UNIT—V

35. What are the clinically important parameters of blood analysis (routine)? Provide the method of analysis of any one of them. 2+3=5

Or

What is the need of estimation of urea in blood? What is its normal range? What does it indicate if the observed value is higher or lower than the normal range? 2+1+2=5

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