2021/TDC/CBCS/ODD/
CHMSEC-301T/292

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

CHEMISTRY

(3rd Semester)

Course No. : CHMSEC-301T

(Analytical Clinical Biochemistry)

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* of the following as directed : 1×15=15

1. Give one example of monosaccharide.

2. Write the full form of NADH.

3. Name one non-reducing disaccharide.

4. What is the end product of aerobic glycolysis?

5. What is the function of enzyme urease?

6. Give one example of coenzyme.

7. What is prosthetic group?

8. What information we may get from the primary structure of protein?

9. Simple lipids on hydrolysis with dilute acids give _____ and _____.

(Fill in the blanks)

10. Give one characteristic of hormone.

11. What are lipoproteins?

12. Give one example of carbohydrate containing lipid.

13. Name few electrolytes present in normal human blood.

14. What are the types of cells found in normal human blood?

15. Name one anticoagulant used for sampling of blood.

16. Give one important function of blood.

17. What is blood serum?

18. Determination of blood urea is the diagnostic indication for which organ of human being?

19. Which disease may cause due to high cholesterol level in blood?

20. Hyperglycemia can be detected by what analysis of blood?

SECTION—B

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

21. Write the steps of carbohydrate metabolism.

22. Write the names of the end product formed during anaerobic glycolysis process in human body.

23. Discuss briefly the denaturation of protein.

24. Why are enzymes important for proper growth of human body?

25. What are lipids? How are they classified?

26. Mention two properties of hormone.

27. Mention two important functions of blood.

28. How are urine samples preserved for pathological analysis?

29. Write the functions of RBC and WBC.

30. What are the causes and treatment of anaemia?

SECTION—C

Answer any *five* of the following questions : 5×5=25

31. Outline the reaction sequences occurred in the anaerobic glycolysis process. 5

32. Why is ATP considered as the universal currency of energy? Write the structure of ATP molecule. 3+2=5

33. Discuss briefly the biological importance of protein. How are proteins classified? 3+2=5

34. What do you understand by stereospecificity of enzyme? Discuss the 'lock and key' model of enzyme action with the help of schematic diagram. 2+3=5

35. Discuss the biological importance of phosphoglycerides. What is rancidity of fats and oils? 3+2=5

36. What are hormones? Discuss briefly the disorders due to imbalance of specific hormones in human being. 1+4=5

37. Discuss briefly the composition of normal blood. 5

38. Discuss different methods of collection of blood sample for pathological purpose. 5

39. Discuss how the blood sugar data be interpreted for a healthy and unhealthy human being. 5

40. Discuss how the urea and creatinine levels in blood help in diagnosis of kidney disease. 5

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CHMDSC/GE-301T/291

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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 : 1×15=15

1. Write the Nernst distribution law.

2. Explain the term 'phase' with an example.

3. What is 'metastable' equilibrium?

4. Fill in the blanks :

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

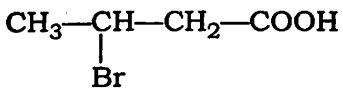
5. How does equivalent conductivity vary with dilution?

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.

13. Give an example of an amine which produces effervescence with HNO_2.

14. Write the product of the following :

$$R—NH_2 + CHCl_3 + KOH\,(alc) \rightarrow ?$$

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.

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

(a) $CaCl_2 \cdot 6H_2O$, Ca^{2+}, Cl^-, H_2O

(b) $CaCO_3$, CaO, CO_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 :

$$CH_3—CHO + H—CHO \xrightarrow{\text{dil. } OH^{\ominus}} A + B$$

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 $\Omega^{-1}\,cm^2\,mol^{-1}$ and 149·9 $\Omega^{-1}\,cm^2\,mol^{-1}$ respectively. The ionic conductance of Na^+ at infinite dilution is 50·1 $\Omega^{-1}\,cm^2\,mol^{-1}$. 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 :

$$Fe|Fe^{2+}||H^+|H_2|Pt \text{ with}$$

$$E^\circ_{Fe^{2+}|Fe} = -0{\cdot}44\ V$$

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

$$CH_3CHO + H_2NNHC_6H_5 \rightarrow ?$$ 1

(c) Write the product of

$$R'—COCl + R_2Cd \xrightarrow{\text{dry ether}} ?$$ 1

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

(b) Write the product of

$$Ph—COCl + H_2 \xrightarrow[\text{boiling xylene}]{Pd,\ BaSO_4,\ S} ?$$ 1

(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

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