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Reg. No. : .....

Name : .....

L – 1620

Sixth Semester B.Sc. Degree Examination, March 2021

First Degree Programme Under CBCSS

Chemistry

Elective Course

CH 1661.4 — BIOCHEMISTRY

(2018 Admission Regular)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Marks **1** for **each**.

1. Which blood cells secrets antibody?
2. Absence of which clotting factor leads to Hemophilia-A?
3. What is catabolic process?
4. In which part of the respiratory system, gaseous exchange takes place?
5. What happens if the proximal convoluted tubule is removed from nephron?
6. What is the activity of Atrial Natriuretic peptide (ANP)?
7. How many servings of vegetables do we need each day?

P.T.O.

8. Which is a water-soluble vitamin?

9. What is the enzyme that breaks down lactose?

10. In which paper chromatography does the mobile phase move horizontally over a circular sheet of paper?

(10 × 1 = 10 Marks)

SECTION – B

Answer **any eight** questions. Marks **2** for **each**.

11. What are the different types of hemoglobin?

12. Give the constituents of blood cells.

13. Give the functions of lipoproteins.

14. Discuss about Myo-inositol trispyrophosphate.

15. With an increased level of carbon monoxide, a person can suffer from severe tissue hypoxia. Explain the reasons.

16. What is Root effect?

17. What is the importance of Plasma osmolality?

18. What is Diuresis?

19. What is renal threshold?

20. What are the factors which determine the amount of energy required by a person?

21. What are the causes of obesity?

22. Define ADIME.

23. What are bile acids?

24. What is Biliverdin?

25. Differentiate between primary and secondary bile acids.

26. Differentiate cataphoresis and anaphoresis.

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six** questions. Marks **4** for **each**.

27. What is coagulation? Discuss different coagulation factors.

28. Discuss the oxygen dissociation curve of hemoglobin.

29. What are plasma proteins? What are the functions?

30. Discuss about the influence of CO_2 in the hemoglobin saturation curve.

31. Discuss the physiology of the formation of urine.

32. Write a note on the constituents of urine.

33. Discuss the functions of Antidiuretic hormone.

34. Discuss about calorific value of food.

35. Discuss the digestion process of fats.

36. What are bile pigments? Explain their functions.

37. What are ion exchange resins? Discuss the principle of ion exchange chromatography.

38. Write a note on ultracentrifugation.

(6 × 4 = 24 Marks)

SECTION – D

Answer **any two** questions. Marks **15** for **each**.

39. Discuss in detail the mechanism of cloating.

40. Discuss the mechanism of diffusion on CO_2 and O_2 during respiration. What are the factors affect on this?

41. Write a note on :

(a) body water balance and

(b) buffers in blood.

42. What is Specific dynamic action of food? Discuss the factors that affect the thermic effect of food.

43. Discuss about the digestion and absorption of carbohydrates and proteins.

44. Discuss about the principle, procedure and applications of gas-liquid chromatography.

(2 × 15 = 30 Marks)

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Reg. No. : .....

Name : .....

Sixth Semester B.Sc. Degree Examination, March 2021

First Degree Programme Under CBCSS

Chemistry

Core Course X

CH 1641 – ORGANIC CHEMISTRY – II

(2015-2016 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

(Very short answer type questions)

Answer **all** questions. **Each** question carries **1** mark.

1. What is a depeptide?
2. What are grignard reagents?
3. What happens when tartaric acid is heated?
4. Give the Haworth furanose structure of α- D fructose.
5. What is blasting gelatin?
6. Define isoelectric point.
7. Give the name and structure of an acidic amino acid.
8. What happens when an α- amino acid is treated with nitrous acid?
9. Define iodine value.
10. Give the structure of ascorbic acid.

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

(Short answer questions)

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

11. How is benzene converted into picric acid?
12. Explain the acidic behaviour of phenol.
13. How is phenol converted into salicylaldehyde. Name the reaction.
14. How is acetone and propanal distinguished?
15. How does formic acid react with ammoniacal silver nitrate solution?
16. How is acetaldehyde converted into lactic acid?
17. What is meant by anomer? Give examples.
18. $NaHSO_3$ does not react with glucose. Why?
19. What are zwitter ions?
20. Give the action of benzoyl chloride on glycine.
21. State and illustrate special isoprene rule.
22. Give the structures of nicotine and Vitamin A.

(8 × 2 = 16 Marks)

SECTION – C

(Short Essay Questions)

Answer any **six** questions. **Each** question carries **4** marks.

23. Explain Reimer Tiemann reaction with an example. Give the mechanism.
24. How is methoxy group estimated?
25. Explain benzoin condensation. Give the mechanism.
26. Discuss the mechanism of Cannizzaro's reaction.

27. Explain H.V.Z. reaction.

28. What is meant by epimerization? Illustrate it with an example showing the mechanism.

29. How will you convert glucose into fructose?

30. Explain the colour tests of proteins.

31. Write briefly on chemistry of vision.

(6 × 4 = 24 Marks)

SECTION – D

(Long Essay Questions)

Answer any **two** questions. **Each** question carries **15** marks.

32. What are alkaloids? How are they extracted? Establish the structure of conline. (15)

33. (a) Discuss the solid phase synthesis of proteins. (7)

    (b) Give an account of the structure of proteins. (8)

34. (a) Explain the term mutarotation with mechanism (5)

    (b) How is a keto hexose converted into an aldo hexose. (5)

    (c) How does fructose react with phenyl hydrazine? Give equation. (5)

35. (a) Discuss the uses of Lithium aluminium hydride and sodium borohydride as reducing agents highlighting the differences between the two. (5)

    (b) Give the mechanism of the reactions. (10)

(2 × 15 = 30 Marks)

L – 1605

(Pages : 4)

Reg. No. : .....

Name : .....

Sixth Semester B.Sc. Degree Examination, March 2021

First Degree Programme under CBCSS

Chemistry

Core Course XI

CH 1642 : ORGANIC CHEMISTRY III

(2018 Admission Regular)

Time : 3 Hours Max. Marks : 80

PART – A

Answer **all** questions. Answer in **one** word to maximum **two** sentences. Each question carries **1** mark.

1. What is the monomer of Teflon?
2. Draw the structure of aspirin.
3. Define saponification value of an oil.
4. Draw the structure of quinoline.
5. What is the disease caused by the deficiency of vitamin C?
6. Give the monomer of nylon - 6.
7. Draw the structures of $\beta - D$ - fructofuranose.

P.T.O.

8. What are essential oils?

9. What will be the product formed when methyl lithium reacts with CO_2 followed by acid hydrolysis?

10. Define isoelectric point.

(10 × 1 = 10 Marks)

PART – B

Short answer type. Answer **any eight** questions from the following. Each question carries **2** marks.

11. What are nitrile rubbers? What are its merits over SBR?

12. What are the heterocyclic bases present in RNA?

13. Explain the preparation of Nylon-6,6.

14. What are the advantages of detergents over soaps?

15. What is meant by vulcanization? Explain.

16. What is the structure of geraniol? What are its uses?

17. Define the term degree of polydispersity.

18. What are anomers?

19. What is meant by translation in protein synthesis?

20. What are non-essential amino acids? Give an example.

21. What is Reformatsky reaction?

22. What is Pal-Knor synthesis of pyrrole?

23. Draw the structure of chloroquine. What are its uses?

24. Define the term number average molecular mass of a polymer.

25. Explain the hydrogenation of oils. What is its significance?

26. What is rancidity? Explain.

(8 × 2 = 16 Marks)

PART – C

Short answer type. Answer **any six** questions from the following. Each question carries **4** marks.

27. Explain the replication of DNA.

28. What is a protecting groups used in peptide synthesis? Give any two examples.

29. Discuss about the interconversion of glucose and fructose.

30. Discuss about the classification of amino acids.

31. Explain the preparation and uses of (a) Phenol-formaldehyde resin and (b) Teflon.

32. What are sulpha drugs? Explain the mode of action of sulpha drugs.

33. Discuss about the preparation and properties of pyridine.

34. Explain the cleansing action of soaps.

35. Explain the classification of drugs.

36. Write short note on biodegradable polymers.

37. Explain Skraup synthesis of quinoline.

38. What is Gilman reagent? How it is prepared? Explain the reactions of Gilman reagent.

(6 × 4 = 24 Marks)

PART – D

Answer **any two** questions. Each question carries **15** marks.

39. Write an essay on classification of polymers.

40. Write a note on

(a) Classification of carbohydrates

(b) Mutarotation

(c) Chain lengthening of aldoses.

41. Elucidate the structure of nicotine.

42. Discuss about

(a) Preparation and reactions of Grignard reagent.

(b) Preparation and synthetic applications of ethyl acetoacetate.

(c) Synthetic applications of SeO_2.

43. Write a brief note on :

(a) Aromaticity of heterocyclic compounds

(b) Give the structure and functions of DNA.

44. Write a brief note on :

(a) Classification of terpenes.

(b) Strecker synthesis of amino acids.

(c) Biological functions of oils and fats.

(2 × 15 = 30 Marks)

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Reg. No. : .....

Name : .....

Sixth Semester B.Sc. Degree Examination, March 2021.

First Degree Programme under CBCSS

Chemistry

Core Course – X

CH 1641 – PHYSICAL CHEMISTRY – II

(2017 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions. Each question carries **1** mark:

1. Give one example for liquid-in-liquid colloid system
2. What is the selection rule for heterodiatomic molecule in rotational spectroscopy?
3. Name two properties of Colloids.
4. Give one example for ensembles.
5. What is BET equation?
6. What is the SI unit of energy?
7. What is the condition for a molecule to show vibrational spectroscopy?

P.T.O.

8. What are overtones?

9. Define Hardy-Schulz rule.

10. Give the expansion of STM.

(10 × 1 = 10 Marks)

SECTION – B

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

11. What is chemical shift?

12. Give two applications of ESR spectroscopy.

13. What do you mean by optical exaltation?

14. What is Morse equation?

15. What is mean by partition function?

16. Define mutual exclusion principle.

17. Explain Lande splitting factor.

18. What is the term gold number?

19. Define photoelectric effect.

20. What are ensembles?

21. Explain Freundlich adsorption isotherm.

22. What is critical micelle concentration?

(8 × 2 = 16 Marks)

SECTION – C

Shod essay, Each question carries **4** marks, Answer **any six** questions

23. Describe the applications of NMR Spectroscopy.

24. Explain Nernst heat theorem.

25. Describe how surface area measured by BET equation.

26. Discuss quantum mechanical treatment for particle in 3D box.

27. Briefly describe application of rotational spectroscopy.

28. Describe one method for the measurement of dipole moment.

29. Compare physical adsorption and chemical adsorption.

30. Explain singlet and triplet state using suitable example.

31. Briefly describe different types of operators in quantum mechanics.

(6 × 4 = 24 Marks)

SECTION – D

Long essay (**15** Marks each) Answer **any two** question

32. (a) Briefly describe the properties of colloids.

    (b) Describe the application of colloids.

33. (a) Discuss the various rotational energy levels and selection rule for diatomic molecule.

    (b) Explain the shielding and deshielding mechanism in NMR.

    (c) Differentiate diamagnetic and paramagnetic substance using suitable example.

    (d) Explain Born- Oppenheimer approximations.

34. Give a short note on

(a) ESR Spectroscopy

(b) Mossbauer spectroscopy

(c) Parachor

35. Describe

(a) Boltzmann distribution

(b) Schrodinger wave equation

(c) Partition functions

(2 × 15 = 30 Marks)

L – 1602

(Pages : 6)

Reg. No. : .....

Name : .....

Sixth Semester B.Sc. Degree Examination, March 2021

First Degree Programme Under CBCSS

Chemistry

Core Course X

CH 1641 – PHYSICAL CHEMISTRY II

(2018 Admission, Regular)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** the questions. **Each** question carries **1** mark.

1. What is Parachor?

2. State third law of thermodynamics.

3. Explain the term adsorbent and adsorbate.

4. What is Zeta potential?

5. What are quantum numbers?

6. Pick out, from among the following, those which would give microwave spectrum:

   N_2, HCl, CCl_4, CH_3Cl

P.T.O.

7. What is the selection rule for anharmonic oscillator?

8. Define dipole moment.

9. Arrange the following electromagnetic waves in increasing order of their energy? U.V, IR, microwave, visible.

10. Write the expression for work function A, in terms of partition function.

(10 × 1 = 10 Marks)

SECTION – B

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

11. What is meant by residual entropy, Give one example?

12. State Heisenberg uncertainty Principle, and write its mathematical representation.

13. Calculate the wave number in $meter^{-1}$ for a radiation of wavelength 200nm.

14. State Hardy-Schulze rule.

15. State rule of mutual exclusion.

16. What is referred to as a fundamental band in vibrational spectrum of a molecule?

17. What is partition function?

18. What is chromophore? Give two examples.

19. Explain the term distortion polarization?

20. What is Lande splitting factor?

21. Write Clausius-Mosotti equation.

22. What is meant by optical exaltation? Explain with one example.

23. Define Molar refraction, Write the equation.

24. What is streaming potential?

25. What is meant by an operator in quantum mechanics?

26. What is black body radiation?

(8 × 2 = 16 Marks)

SECTION – C

Each question carries **4** marks (short essay). Answer **any six** questions.

27. What is thermodynamic probability?

28. What are ensembles? Discuss the different types of ensembles?

29. Distinguish between physisorption and chemisorption?

30. Explain Nernst Heat theorem.

31. Explain the terms micelles and critical micelle concentration.

32. Discuss Compton effect.

33. Derive an expression for moment of inertia of a rigid diatomic molecule.

34. Explain the terms bathochromic and hypsochromic shifts with suitable examples Shifts in absorption maximum and peak intensity.

35. Dipole moment of ammonia is 1.47D, whereas dipole moment of BF_3 is zero. Explain.

36. A compound shows a proton NMR peak at 240 Hz downfield from the TMS peak in a spectrometer operating at 60MHz. Calculate the values of the chemical shifts δ or τ to in ppm relative to TMS?

37. Differentiate between Stoke's and Antistoke's lines.

38. The fundamental frequency of HCl is $2890cm^{-1}$. Calculate the force constant of this molecule. The atomic masses are

$^{1}H = 1.673 \times 10^{-27}$ kg $^{35}Cl = 58.06 \times 10^{-27}$ kg.

(6 × 4 = 24 Marks)

SECTION – D

Each question carries **15** marks (essay). Answer **any two** questions.

39. (a) How are dipole moment used to distinguish between cis and trans isomers in dichloroethylene?

(b) What are quantum numbers? Discuss the significance of each quantum numbers.

(c) Discuss the BET equation and its utility in determination of surface area of an adsorbent.

(3 × 5 = 15 Marks)

40. (a) Derive the expression for internal energy in terms of partition function.

(b) Derive Langmuir adsorption isotherm.

(c) What is spin-spin coupling? Illustrate it by using NMR spectrum of CH_3-CH_2-Br.

(3 × 5 = 15 Marks)

41. (a) How will you determine absolute entropy of gases?

(b) How are colloidal solutions purified? Discuss two methods.

(c) Explain Photoelectric effect.

(3 × 5 = 15 Marks)

42. (a) Explain the term shielding and desheilding in NMR.

(b) Solve Schrodinger wave equation for particle in one dimensional box.

(c) How can measure magnetic susceptibility by Gouy's method.

(3 × 5 = 15 Marks)

43. (a) Discuss the postulates of quantum mechanics.

(b) Discuss the difference between lyophilic and lyophobic colloids.

(c) State and derive de Broglie relation.

(3 × 5 = 15 Marks)

44. (a) The IR and Raman spectroscopies are complementary Explain.

(b) Discuss what is meant by Tyndall effect and Brownian movement.

(c) Discuss the hyperfine splitting of methyl radical.

(3 × 5 = 15 Marks)

(2 × 15 = 30 Marks)

(Pages : 4) **L – 1608**

Reg. No. : .....

Name : .....

Sixth Semester B.Sc. Degree Examination, March 2021

First Degree Programme under CBCSS

Chemistry

Core Course XII

CH 1643 : PHYSICAL CHEMISTRY — III

(2018 Admission Regular)

Time : 3 Hours Max. Marks : 80

PART – A

Answer **all** questions. Each question carries **1** mark.

1. Define ionic product of water.
2. Write van't Hoff reaction isotherm and explain the terms.
3. The $t_{1/2}$ of a reaction is doubled as the initial concentration of the reactant is doubled. What is the order of the reaction?
4. What are consecutive reactions? Give one example.
5. Define degree of freedom.
6. What are conjugate layers?
7. Write Nernst equation. Explain the terms in it.

P.T.O.

8. What are fuel cells? Give one example.

9. What is meant by consolute temperature? Give one example for systems having both upper and lower consolute temperature.

10. Mention the limitation of quinhydrone electrode.

(10 × 1 = 10 Marks)

PART – B (Short answer type)

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

11. Show that for a first order reaction, the time required for 99.9% completion of the reaction is 10 times that required for 50% completion.

12. Derive the integrated rate equation for a zero order reaction.

13. What would be the pH of a solution obtained by mixing 5 g of acetic acid and 7.5 g of sodium acetate and making the volume equal to 1 litre? Dissociation constant of acetic acid at 25 °C is 1.75×10^{-5}.

14. Explain common ion effect with an example.

15. Prove that an invariant system has no degree of freedom by taking water as an example.

16. What is meant by chemiluminescence? Give one example.

17. Explain the construction of hydrogen electrode.

18. What type of molecules will show large negative deviation from ideal behaviour? Give one example.

19. What is meant by over voltage?

20. Differentiate primary and secondary cells with one example each.

21. Calculate the solubility of $Al(OH)_3$ in water at 25°C if Ksp = 8.5×10^{-32}.

22. Explain Grothus-Draper law.

23. Explain levelling effect.

24. Draw the vapour pressure-composition curves of completely miscible liquid systems.

25. What are reference electrodes?

26. What are photosensitized reactions?

(8 × 2 = 16 Marks)

PART – C (Short essay)

Answer **any six** questions. Each question carries **4** marks.

27. The rate constant of a second order reaction is 5.7×10^{-5} dm^3 mol^{-1} s^{-1} at 25°C and 1.64×10^{-4} dm^3 mol^{-1} s^{-1} at 40°C. Calculate the activation energy.

28. Derive an expression for the rate constant of a bimolecular reaction based on intermediate compound formation theory.

29. Calculate the Kc and Kx for the reaction

$N_2O_4(g) \rightleftharpoons 2\,NO_2$ (g) for which K_p =0.157 atm at 25°C and 1 atm pressure.

30. Discuss the phase diagram of water system.

31. Define quantum yield. Discuss the reasons for very low and very high quantum yields with examples.

32. Write a note on potentiometric titrations involving redox reactions.

33. The molar conductance at infinite dilution of NH_4Cl, NaOH and NaCl are $149.7\Omega^{-1}$ cm^2 mol^{-1}, $248.1\Omega^{-1}cm^2$ mol^{-1}, $126.5\Omega^{-1}$ cm^2 mol^{-1} respectively. Calculate the molar conductance at infinite dilution of NH_4OH?

34. Explain Deby-Falkenhagen effect.

35. Discuss the effect of solvents on ionic strength.

36. Write a note on corrosion and its prevention.

37. Write a short note on conductometric titrations involving strong acid-strong base and weak acid-strong base.

38. Explain the law of mass action.

(6 × 4 = 24 Marks)

PART – D (Long essay)

Answer **any two** questions. Each question carries **15** marks.

39. (a) Discuss the collision theory and derive the rate equation for a 2^{nd} order reaction based on collision theory. **7**

(b) Derive the Nernst equation for electrode potential. **8**

40. Discuss the hydrolysis of four different types of salts and derive the hydrolysis constant in each case.

41. (a) Discuss the phase diagram of $FeCl_3$-Water system. **7**

(b) Describe the moving boundary method for the determination of transport number. **8**

42. Write an essay on Nernst distribution law, its derivation and applications.

43. Write an essay on enzyme catalysis.

44. (a) What are the different types of electrodes? Explain their electrode reactions. **8**

(b) Explain the terms fluorescence, phosphorescence and eutectic point. **7**

(2 × 15 = 30 Marks)
