K24U 0022

Reg. No. : ....

Name : ....

**Sixth Semester B.Sc. Degree (C.B.C.S.S. – OBE – Regular/Supplementary/
Improvement) Examination, April 2024
(2019 to 2021 Admissions)
DISCIPLINE SPECIFIC ELECTIVE IN CHEMISTRY/POLYMER CHEMISTRY
6B17CHE/PCH-A : Environmental Chemistry**

Time : 3 Hours

Max. Marks : 40

Instruction : *Answer the questions in* **English only**.

SECTION – A

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

1. Give any two types of water resources on earth in the Hydrosphere.

2. Give two examples of greenhouse gases.

3. What is the expansion of COD ?

4. What is the acceptable limit of total hardness in drinking water as per BIS
   specification ?   **(4×1=4)**

SECTION – B

Answer **seven** questions out of 10. **Each** carries **2** marks :

5. Write a note on segments of the environment.

6. How SO_2 formed in atmosphere ? Give two of its effects on human.

7. What is greenhouse effect ? Give one of its consequences.

8. What is thermal pollution ? Give one of its consequences.

9. What you mean by hardness of water ? How it is formed ?

10. What is the ion exchange process in soil ? Give one example.

P.T.O.

11. Define municipal solid waste and give one example.

12. Define soil. How they formed ?

13. What is the hazard of a nuclear reactor ?

14. What are the biological effects of radiation ?   **(7×2=14)**

SECTION – C

Answer **four** questions out of 6. **Each** carries **3** marks :

15. Write one source and adverse effect of Pb, Hg and Cd heavy metal poisoning.

16. Write a brief note on Bhopal gas tragedy.

17. What is acid rain, how it formed and write one adverse effect.

18. Briefly discuss BOD and its experimental determination.

19. Discuss about source, effect and control of E waste.

20. Write a brief note on Fukushima nuclear disaster.   **(4×3=12)**

SECTION – D

Answer **two** questions out of 4. **Each** carries **5** marks :

21. Briefly discuss the following air pollution control devices with its principle-Cyclone separators, scrubbers and catalytic converters.

22. Discuss water pollution by pesticides, industrial effluents, agricultural discharge.

23. Write a note on solid waste management.

24. What is noise pollution ? Discuss about its source, effects and control.   **(2×5=10)**

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K23U 0477

Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, April 2023
(2019 and 2020 Admissions)
Discipline Specific Elective in Chemistry/Polymer Chemistry
6B17CHE/PCH-A : ENVIRONMENTAL CHEMISTRY

Time : 3 Hours   Max. Marks : 40

Instruction : *Answer the questions in **English only***.

SECTION – A

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

1. Give the full form of BIS.

2. What are the toxic effects of lead ?

3. Name the major segments of environment.

4. Mention the cause for Itai-Itai disease.   **(4×1=4)**

SECTION – B

Answer **seven** questions out of 10. **Each** carries **2** marks.

5. Explain the toxic effect of carbon monoxide.

6. How do fertilizers act as major water pollutant ?

7. Discuss the consequence of El Nino effect.

8. How can we control radiation pollution ?

9. Explain cyclone separators.

10. Mention the major sources of green house gases.

11. Discuss the cause for Bhopal tragedy.

12. Explain the biological effects of radiation.

13. Suggest any two methods for removal of hardness of water.

14. How does soil acidification affects plants ?   **(7×2=14)**

P.T.O.

SECTION – C

Answer **four** questions out of 6. **Each** carries **3** marks.

15. Explain hydrological cycle.

16. Suggest control measures to check global warming.

17. Explain the sources and effects of noise pollution.

18. Mention the major issues caused by plastic pollution.

19. Soap and detergents causes water pollution. Justify the statement.

20. Write a note on Fukushima nuclear disaster. **(4×3=12)**

SECTION – D

Answer **two** questions out of 4. **Each** carries **5** marks.

21. Explain major sources of soil pollutant and discuss its adverse effects.

22. Discuss air pollution due to oxides of carbon, nitrogen and sulphur.

23. a) Explain the acid base and ion exchange reactions in soil.
    b) Suggest control measures for E waste pollution.

24. a) Write a short note on thermal pollution.
    b) Explain biomagnifications and bioaccumulation. **(2×5=10)**

K24U 0021

Reg. No. : ....

Name : ....

Sixth Semester B.Sc. Degree (C.B.C.S.S. – OBE-Regular/Supplementary/ Improvement) Examination, April 2024
(2019 to 2021 Admissions)
CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
6B16CHE/PCH : Physical Methods in Chemistry

Time : 3 Hours   Max. Marks : 40

SECTION – A

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

1. What is central strong line in Raman spectrum called ?

2. Give an example for a molecule having centre of symmetry.

3. Give any two examples for chromophores.

4. What is the Schoenflies notation for the molecule NH_3 ?   **(4×1=4)**

SECTION – B

Answer **seven** questions out of 10. **Each** question carries **2** marks.

5. What is molar extinction coefficient ?

6. Antistokes lines are much less intense than stokes lines. Why ?

7. State Frank-Condon principle.

8. State the difference between principle axis and subsidiary axis.

9. Define moment of inertia. Write the equation for moment of inertia.

10. What is Born-Oppenheimer approximation ?

11. How the nanomaterials are classified based on dimensions ?

12. Give any two applications of carbon nanotubes.

13. Using Wood ward-Fieser rule, calculate λ_{max} for Hept-3-ene-2-one.

14. State Beer-Lamberts law.   **(7×2=14)**

SECTION – C

Answer **four** questions out of 6. **Each** question carries **3** marks.

15. Explain the intensity shift in UV spectroscopy.

16. Assign the point group for NH_3 molecule.

17. Write the Z-matrix for H_2O molecule.

18. Explain the concept of force field in computational chemistry.

19. Explain the factors influencing the vibrational frequency.

20. Explain the terms base peaks and molecular ion peaks.   **(4×3=12)**

SECTION – D

Answer **two** questions out of 4. **Each** question carries **5** marks.

21. Draw the NMR spectra of the following molecules and interpret the peaks.

    a) Ethyl bromide

    b) Acetone.

22. Explain the following terms :

    a) Fundamental bands and overtone bands

    b) Hot bands and Fermi resonance.

23. Explain the selection rules for rotational spectra.

24. Explain the following characterization techniques for nanomaterials.

    a) SEM

    b) TEM.   **(2×5=10)**

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Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (CBCSS – Supplementary) Examination, April 2023
(2017 to 2018 Admissions)
CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
6B16 CHE : Physical Methods in Chemistry

Time : 3 Hours   Max. Marks : 40

SECTION – A

(Answer **all** questions. **Each** question carries **one** mark.)

1. What are quantum dots ?

2. Expand AAS.

3. Give the point group of H_2O.

4. What is a chromophore ?   **(1×4=4)**

SECTION – B

(Answer **any seven** questions. **Each** question carries **2** marks.)

5. State and explain the rule of mutual exclusion.

6. Give the point group of NH_3 and N_2O_4.

7. Sketch the NMR spectrum of ethanol and identify the peaks.

8. What are amperometric titrations ?

9. What is surface plasmon resonance ?

10. What is meant by diffusion current ?

11. What are stokes and antistokes lines ?

P.T.O.

12. What is an inversion center ?

13. List any two applications of fullerenes.

14. What do you mean by meta stable ion ?   **(2×7=14)**

SECTION – C

(Answer **any 4** questions. **Each** question carries **3** marks.)

15. Explain the Mc Lafferty rearrangement.

16. Discuss microemulsion and chemical vapour deposition method.

17. What are the advantages of amperometric titration ?

18. What are the factors affecting chemical shift ?

19. Explain the principle and working of TEM.

20. Explain the terms proper and improper rotation with suitable example. **(3×4=12)**

SECTION – D

(Answer **any 2** questions. **Each** question carries **5** marks.)

21. a) Explain the selection rules for microwave spectroscopy.
    b) Discuss the instrumentation of microwave spectroscopy.

22. Explain the different kinds of symmetry elements and symmetry operations.

23. Describe the theory of NMR spectrophotometry. What is meant by spin spin relaxation ?

24. a) Explain the term force constant on the basis of simple harmonic oscillator model of a diatomic molecule.

    b) The force constant of HI is 283.4 Nm^{-1}. Calculate the fundamental frequency in cm^1. [H = 1.008; I = 126.9]   **(5×2=10)**

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Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (CBCSS-OBE – Regular/Supplementary/ Improvement) Examination, April 2023
(2019 and 2020 Admissions)
CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
6B16CHE/PCH : Physical Methods in Chemistry

Time : 3 Hours

Max. Marks : 40

SECTION – A

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

1. Among CO, HCl and O_2, that which will not yield a microwave spectrum is _____

2. How many normal modes of vibrations does water molecule have ?

3. Define a hypsochromic shift.

4. The number of elements in a finite group is called _____ (4×1=4)

SECTION – B

Answer **seven** questions out of **10**. **Each** carries **2** marks :

5. State Born-Oppenheimer approximation.

6. What are hot bands in a vibrational spectrum ?

7. State Franck-Condon principle.

8. Predict the number of signals in the PMR spectra of acetaldehyde and toluene.

9. Distinguish between vertical and dihedral mirror planes.

10. Name the elements of the C_{3v} point group.

11. Mention the classification of nanomaterials on the basis of dimensionality.

P.T.O.

12. What are quantum dots ? Give an example.

13. How will you distinguish three isomeric butanols on the basis of mass spectrometry ?

14. List out the main features of Ab initio methods. **(7×2=14)**

SECTION – C

Answer **four** questions out of **6**. **Each** carries **3** marks :

15. Explain Mc Lafferty rearrangement with illustrative examples.

16. Distinguish between chromophores and auxochromes with suitable examples.

17. Stokes lines are found to be more intense than antistokes lines. Why ?

18. Explain the term shielding and deshielding with regard to NMR spectroscopy.

19. Give the principle and applications of scanning electron microscopy.

20. Write a short note on semiempirical methods. **(4×3=12)**

SECTION – D

Answer **two** questions out of **4**. **Each** carries **5** marks :

21. Discuss the quantum theory of Raman effect.

22. a) Write a short note on synthesis and applications of carbon nanotubes.

    b) Explain briefly the basic principle of NMR spectroscopy.

23. a) Identify the symmetry elements present in H_2O, NH_3 and assign their point groups.

    b) Explain the Woodward-Fieser rules for the determination of λ_{max} of dienes.

24. a) Explain how rotational spectroscopy can be used to calculate the bond length in diatomic molecules.

    b) Distinguish between fundamental bands and overtones in vibrational spectra. **(2×5=10)**

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Reg. No. : ....

Name : ....

Sixth Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, April 2024
(2019 to 2021 Admissions)
CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
6B15CHE/PCH : Physical Chemistry – III

Time : 3 Hours

Max. Marks : 40

SECTION – A

(Very short answer type. **Each** carries **1** mark. Answer **all 4** questions)

1. State Faradays Law of electrolysis.

2. Define pH.

3. Define electrochemical series.

4. Define quantum yield. **(4×1=4)**

SECTION – B

(Short answer type. **Each** carries **2** marks. Answer **any 7** questions)

5. Explain activity and activity coefficient.

6. Explain Debye-Huckel limiting law.

7. What is the ionic product of water ?

8. Define Buffer capacity.

9. What is a calomel electrode ?

10. What is dropping mercury electrode ?

11. Distinguish between order and molecularity.

12. Define consecutive reaction with example.

13. What is Arrhenius equation ? Explain its terms.

14. Define photosensitization reaction with example. **(7×2=14)**

SECTION – C

(Short essay type. **Each** carries **3** marks. Answer **any 4** questions)

15. Explain the determination of transport number by Hittorf method and moving boundary methods.

16. Define Buffer index. Derive Henderson equation for the pH of basic buffer.

17. What are concentration cell ? How are they classified ?

18. Discuss the hydrocarbon-oxygen fuel cell.

19. Explain Lindemanns theory of unimolecular reactions.

20. Explain photocolorimeter. **(4×3=12)**

SECTION – D

(Long essay type. **Each** carries **5** marks. Answer **any 2** questions)

21. Explain Kohlrauschs law and its application.

22. a) Explain quinhydrone and glass electrode.

    b) What are its advantages and disadvantages ? **(2+3)**

23. What are the applications of potentiometric measurements ?

24. a) Derive integrated rate equation for second order reaction.

    b) Explain the Lindemanns mechanism of unimolecular reaction. **(3+2)**

    (2×5=10)

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K23U 0192

Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (C.B.C.S.S. – Supplementary) Examination, April 2023
(2017 to 2018 Admissions)
Core Course in Chemistry/Polymer Chemistry
6B15 CHE : PHYSICAL CHEMISTRY – III

Time : 3 Hours   Max. Marks : 40

SECTION – A

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

1. What are buffer solutions ?

2. What is unit of k for a first order reaction ?

3. Name a redox indicator.

4. Give an example for photosensitized reaction.   **(1×4=4)**

SECTION – B

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

5. Why is quantum yield of H_2–Cl_2 reaction very high ?

6. Explain the term quenching.

7. What are parallel reactions ? Give examples.

8. Differentiate between threshold energy and activation energy.

9. Explain Lewis concept of acids and bases.

10. State Faradays second law.

11. Give the electrode reaction in a calomel electrode.

12. Why is KCl used in salt bridge ?

13. What is relaxation effect ?

14. Explain why an aqueous solution of $FeCl_3$ is acidic.   **(2×7=14)**

P.T.O.

SECTION – C

Answer **any 4** questions. **Each** question carries **3** marks.

15. Discuss moving boundary method.

16. Explain the theory of acid base indicators.

17. What are fuel cells ? Give the working of hydrogen-oxygen fuel cell.

18. Explain the laws of photochemistry.

19. Derive an expression for the hydrolysis constant of a salt of weak acid and strong base.

20. Explain the temperature dependence of reaction rate.   **(3×4=12)**

SECTION – D

Answer **any 2** questions. **Each** question carries **5** marks.

21. a) Draw and discuss the Jablonski diagram.

    b) Give any two applications of lasers.

22. a) Explain the construction of quinhydron electrode.   **2**

    b) Discuss the different types of concentration cells.   **3**

23. Explain the various methods for order determination.

24. Write a note on conductometric titration. What are its advantages ?   **(5×2=10)**

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K23U 0475

Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, April 2023
(2019 and 2020 Admissions)
CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
6B15 CHE/PCH : Physical Chemistry – III

Time : 3 Hours

Max. Marks : 40

SECTION – A

(Very short answer type. **Each** carries **1** mark. Answer **all 4** questions.)

1. Define molar conductance.

2. What is meant by buffer index ?

3. What is liquid junction potential ?

4. Define the term quantum yield. **(4×1=4)**

SECTION – B

(Answer **any 7** questions. **Each** question carries **2** marks.)

5. Calculate the ionic strength of a solution containing 0.2 M NaCl and 0.2 M $BaCl_2$.

6. Define wein effect and debye-falkenhagen effect.

7. Write any two applications of buffer.

8. Calculate the ionization constant of NH_4OH at 25°C if it is 1% ionized in 0.18 M solution at 25°C.

9. What is Weston Cadmium cell ?

10. Write Ilkovic equation and explain the terms involved.

P.T.O.

11. Distinguish between order and molecularity.

12. Explain pseudo first order reaction with an example.

13. The rate constant for a first order reaction is 1.54×10^{-3} s^{-1}. Calculate its half life time.

14. Explain Beer-Lambert law. **(7×2=14)**

SECTION – C

(Answer **any 4** questions. **Each** question carries **3** marks.)

15. Discuss the conductometric titration curves obtained in the titration of (a) Strong acid with a strong base and (b) Strong acid with a weak base.

16. What is meant by buffer solution ? Derive Henderson's equation for the pH of an acidic buffer.

17. What are concentration cells ? How are they classified ?

18. Write a note on hydrogen-oxygen fuel cell.

19. Differentiate between homogeneous and heterogeneous catalysis with examples.

20. Write a note on colorimetry. **(4×3=12)**

SECTION – D

(Answer **any 2** questions. **Each** question carries **5** marks).

21. Explain the Kohlrausch's law and its applications.

22. a) Discuss the construction and working of calomel electrode.

    b) The standard EMF of the Daniel cell involving the cell reaction.

    $Zn(s) + Cu^{2+} (aq) \rightarrow Zn^{2+} (aq) + Cu(s)$, is 1.10 volts. Calculate the equilibrium constant of the cell reaction at 25°C.

23. Describe briefly any 2 types of electrodes which can be used for determining pH of a solution. Discuss their merits and demerits.

24. Discuss the kinetics of unimolecular surface reactions. **(2×5=10)**

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K24U 0019

Reg. No. : ....

Name : ....

Sixth Semester B.Sc. Degree (C.B.C.S.S. – OBE – Regular/Supplementary/ Improvement) Examination, April 2024
(2019 to 2021 Admissions)
CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
6B14CHE/PCH : Organic Chemistry – III

Time : 3 Hours

Max. Marks : 40

Instruction : *Answer the questions in* **English** *only*.

SECTION – A

(Very short answer type. **Each** carries **1** mark. Answer **all 4** questions.)

1. Draw the structure of anthranilic acid and give its IUPAC name.

2. Give two examples of psychoactive drugs.

3. How will you prepare nitrobenzene ?

4. Suggest a reaction for the synthesis of lactic acid. **(4×1=4)**

SECTION – B

(Short answer type. **Each** carries **2** marks. Answer **any 7** questions.)

5. What are the colour tests for carbohydrates ?

6. What is called denaturation of proteins ? Explain with examples.

7. How will you distinguish maleic and fumaric acid ?

8. Discuss the Strecker synthesis of amino acids.

9. Compare the basic character of pyridine and pyrrole.

10. Draw any two sulpha drugs and their uses.

11. Illustrate the ultrasound assisted reaction in esterification.

12. Explain the Mannich reaction with example.

13. Discuss 1,5 sigmatropic reactions with example.

14. How will you prepare crotonic acid and write its IUPAC name. **(7×2=14)**

SECTION – C

(Short essay type. **Each** carries **3** marks. Answer **any 4** questions.)

15. How will you convert D-arabinose to D-mannose ?

16. Explain the Watson-Crick model of DNA.

17. Explain 4n system of electrocyclic reaction with a suitable example using FMO approach.

18. Write a note on Norrish type I and II cleavage.

19. Explain Merrifield solid phase synthesis.

20. Write a note on CNS drugs and synthesize Phenobarbital.   **(4×3=12)**

SECTION – D

(Long essay type. **Each** carries **5** marks. Answer **any 2** questions.)

21. Explain the interconversion of glucose and fructose.

22. Briefly explain the structure elucidation of nicotine.

23. a) Explain the preparation, properties and structure of pyridine.

    b) Explain any five principles of green chemistry.   **(3+2)**

24. Explain the reactions a) Hoffmann bromamide reaction, b) Curtius reaction, c) Schmidth reaction.   **(2×5=10)**

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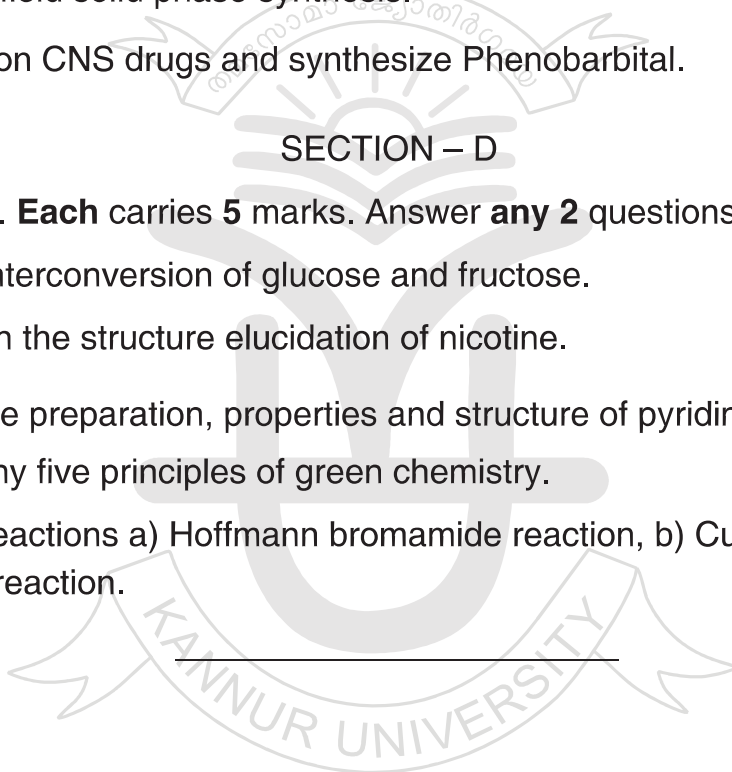
K23U 0474

Reg. No. : ....

Name : ....

VI Semester B.Sc. Degree (CBCSS – OBE – Regular/Supplementary/ Improvement) Examination, April 2023
(2019 and 2020 Admissions)
CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
6B14CHE/PCH : Organic Chemistry – III

Time : 3 Hours   Max. Marks : 40

Instruction : *Answer the questions in* **English** *only.*

SECTION – A

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

1. Draw the structure of crotonic acid and give its IUPAC nomenclature.

2. Give any two examples for psychoactive drugs.

3. Name two tests to distinguish primary and secondary amines.

4. Suggest a reaction for the synthesis of cinnamic acid.   **(4×1=4)**

SECTION – B

Answer **seven** questions out of **10**. **Each** carries **2** marks :

5. Explain epimers and anomers.

6. Draw the structure of guanine and uracil.

7. Explain Blanc's rule.

8. How will you prepare the dipeptide Gly-Ala ?

9. Explain the basic character of pyrrole and pyridine.

10. Mention any one narcotic and non-narcotic drug with their uses.

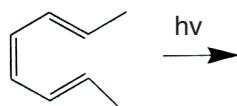11. Illustrate an example for microwave assisted reaction in water.

P.T.O.

12. How will you prepare amines from acyl azides ?

13. Give the product of the following with stereochemistry.

14. Give the synthesis of citric acid.   **(7×2=14)**

SECTION – C

Answer **four** questions out of **6**. **Each** carries **3** marks :

15. How will you convert arabinose to glucose ?

16. Suggest a method for the synthesis of adenine and thymine and explain it.

17. Explain (4 + 2) cycloaddition with suitable example using FMO approach.

18. Write a note on Norrish type I and II cleavage.

19. Discuss the role of nucleic acid in biosynthesis of protein.

20. Explain the mode of action of sulpha drugs and give the synthesis of sulphacetamide.   **(4×3=12)**

SECTION – D

Answer **two** questions out of **4**. **Each** carries **5** marks :

21. Explain the interconversion of aldohexose and ketohexose with suitable example.

22. Discuss the reduction of nitrobenzene under different conditions.

23. a) Explain the preparation, properties and structure of indole.

    b) Write a short note on atom economy.

24. Give the structure and explain the medicinal importance of the following :
    a) Nicotine   b) Quinine   c) Vitamin C   d) Citral   **(2×5=10)**

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Reg. No. : ....

Name : ....

**VI Semester B.Sc. Degree (C.B.C.S.S. – Supplementary)
Examination, April 2023
(2017 to 2018 Admissions)
CORE COURSE IN CHEMISTRY/POLYMER CHEMISTRY
6B14CHE : Organic Chemistry – III**

Time : 3 Hours   Max. Marks : 40

SECTION – A

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

1. Draw the structure of alizarin.

2. Among the following which is more basic ? Aniline, *p*-toluidine and *p*-nitro aniline.

3. What is sonochemistry ?

4. What is Tollen's reagent ?   **(4×1=4)**

SECTION – B

Answer **any 7** questions. **Each** question carries **2** marks.

5. What is Clemmensen reduction ?

6. What is MPV reduction ?

7. Explain any one method for the preparation of anthranilic acid.

8. What is a dipeptide ?

9. What do you mean by atom economy ?

10. What are antibiotics ?

11. Explain Diels-Alder reaction.

12. What are the synthetic applications of diethyl malonate ?

13. Explain Wolf rearrangement.

14. Explain the effect of heat on delta-hydroxy carboxylic acid.   **(7×2=14)**

SECTION – C

Answer **any 4** questions. **Each** question carries **3** marks.

15. Explain Norrish type-I and Norrish type-II reactions.

16. Discuss the mechanism of benzoin condensation.

17. Explain the mechanism of Reformatsky reaction.

18. Discuss the classification of dyes.

19. How will you distinguish primary, secondary and tertiary amines ? Explain.

20. What is Reimer-Tiemann reaction ? Explain the mechanism.   **(4×3=12)**

SECTION – D

Answer **any 2** questions. **Each** question carries **5** marks.

21. Explain
    i) Woodward-Hoffmann rule for pericyclic reactions.
    ii) Preparation and reactions of crotonic acid.

22. Discuss
    i) Reduction of nitrobenzene in different media.
    ii) Mechanism of Benzidine rearrangement.

23. Explain briefly the twelve principles of green chemistry.

24. Discuss about
    i) Primary, secondary and tertiary structure of proteins.
    ii) Synthetic utility of benzenediazonium chloride.   **(2×5=10)**

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