This question paper contains **3** printed pages]

NEPRM—1001—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (NEP) (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

RESEARCH METHODOLOGY

Paper SVECRM-401

(Tuesday, 16-4-2024) **Time : 10.00 a.m. to 12.30 p.m.**

Time—2½ *Hours* *Maximum Marks*—60

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Of the remaining, attempt any *three* questions.

(*iii*) Log table and calculator is allowed.

1. Attempt any *three* of the following : 15

(*a*) Write a note on qualities of good research.

(*b*) Explain need of research design.

(*c*) Give an account on ANOCOVA.

(*d*) Explain data processing operations.

P.T.O.

2. Attempt the following :

   (*a*) What is research ? Describe types of research. 8

   (*b*) Explain objectives of research. 7

3. Attempt the following :

   (*a*) What is Sampling ? Explain the characteristics of good sampling. 8

   (*b*) Explain important concepts relating to research design. 7

4. Attempt the following :

   (*a*) Discuss questionnaire method as a technique of data collection. 8

   (*b*) Calculate the mean, median and mode of the following data : 7

CI	**F**
40	2
35	8
30	10
25	15
20	8
15	5
10	2

X301Y2B6D03X301Y2B6D03X301Y2B6D03X301Y2B6D03

5. Attempt the following :

   (*a*) What is research hypothesis ? What are the types of research hypothesis ? 8

   (*b*) Describe the procedure for hypothesis testing. 7

6. Write brief notes on : 15

   (*a*) Technique involved in defining a problem.

   (*b*) Case study method.

   (*c*) Steps in sample design.

X301Y2B6D03X301Y2B6D03X301Y2B6D03X301Y2B6D03

This question paper contains **2** printed pages]

NEPRT—06—2024

FACULTY OF SCIENCE

M.Sc. (NEP) (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

CHEMISTRY

SCHEC–401

(Inorganic Chemistry–I)

(Friday, 19-4-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (*i*) Question No. **1** is compulsory and solve any *three* from remaining five.

(*ii*) Calculator and log table is allowed.

1. (*a*) Explain outer sphere electron transfer mechanism with suitable example. 5

(*b*) How will you prepare cis and trans [Pt(PPh_3) (NH_3)Cl_2] square planar complexes ? 5

(*c*) Briefly explain the terminology and history of nanoscience. 5

(*d*) Explain metal to ligand charge transfer spectra. 5

2. (*a*) What is SN^1 and SN^2 ligand substitution mechanism ? Explain the types of intermediates formed in SN^1 and SN^2 mechanism. 10

P.T.O.

X301Y25DBFDX301Y25DBFDX301Y25DBFDX301Y25DBFD

(*b*) Describe about solution based synthesis of Gold nanoparticles and quantum dots. 10

3. (*a*) Define carbon nanotubes. Describe their classes in detail. 10

(*b*) Calculate the number of microstates for P^3 configuration and ^2D term. 10

4. (*a*) What is trans effect ? Explain π-bonding theory of trans effect. 10

(*b*) Draw and explain Orgel diagram for d^2 and d^8 configuration in octahedral complexes. 10

5. (*a*) Write the preparation of nanomaterials by Sol-Gel process. 10

(*b*) Determine the spectroscopic ground state term symbol for d^4 and d^7 configuration. 10

6. (*a*) Give the evidences for SN^1CB mechanism in octahedral complexes. 5

(*b*) Write a note on cis effect. 5

(*c*) Write a note on artificial nanomaterials. 5

(*d*) What is spin crossover ? Explain it with suitable example. 5

X301Y25DBFDX301Y25DBFDX301Y25DBFDX301Y25DBFD

This question paper contains **4** printed pages]

NEPRT—24—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (NEP) (First Semester) EXAMINATION

APRIL/MAY, 2024

CHEMISTRY

Paper SCHEC-402

(Organic Chemistry–I)

(Monday, 22-4-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—80

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Solve any *three* from remaining five questions.

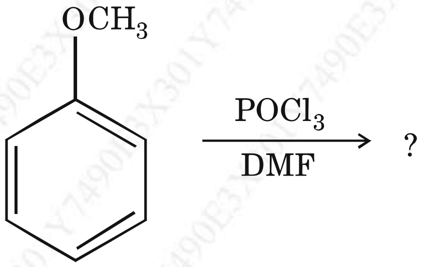
(*iii*) Simple calculator and log table is allowed.

1. Solve the following : 20

(*i*) Cyclopentadine anion is aromatic. Explain.

(*ii*) *ee* 1, 2-dimethyl cyclohexane is more stable than *ea* and *aa* dimethyl cyclohexane. Explain.

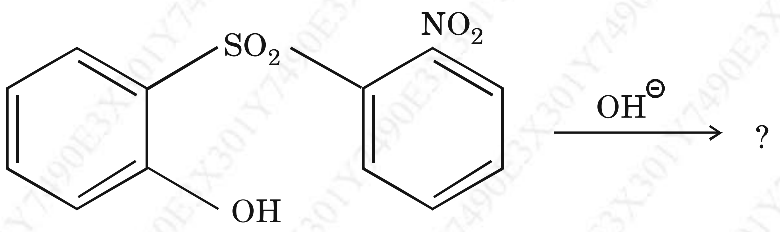
(*iii*) Predict the product with mechanism of the following :



P.T.O.

X301Y7490E3X301Y7490E3X301Y7490E3X301Y7490E3

(*iv*) Predict the product with mechanism of the following :


SO$_2$
NO$_2$
OH
OH$^\ominus$
?

2. Solve the following : 20

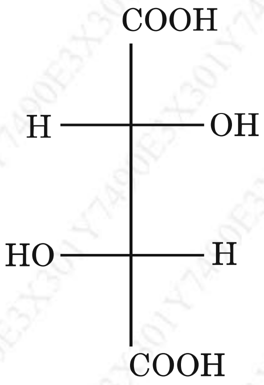
(*i*) Give the generation, structure and stability of carbon free radical and carbanion.

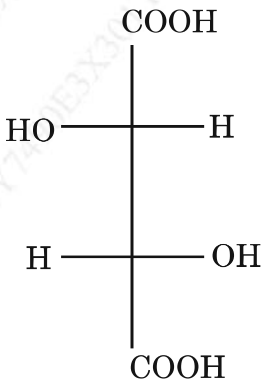
(*ii*) Discuss SN^1 reaction with mechanism and factors affecting on the rate of SN^1 reaction.

3. Answer the following : 20

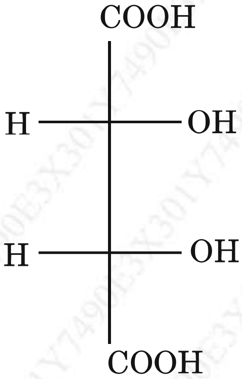
(*i*) Assign configuration and describe relationship :

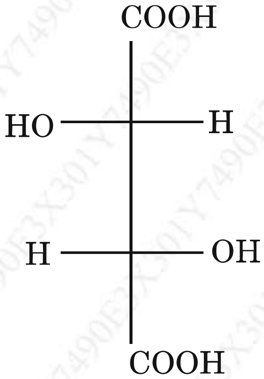
(*a*)


COOH
H
OH
HO
H
COOH

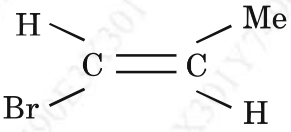

COOH
HO
H
H
OH
COOH

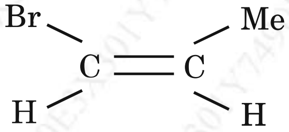
(*b*)



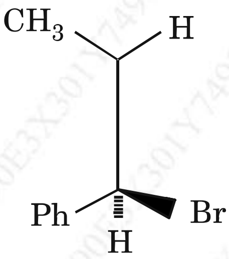


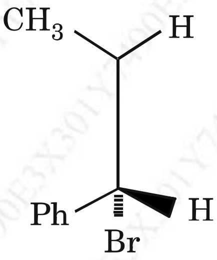
(*c*)



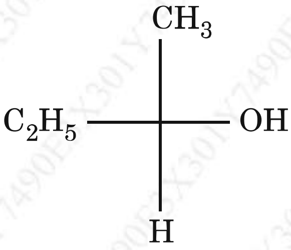


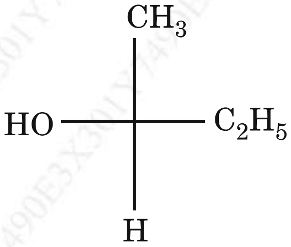
(*d*)





(*e*)





(*ii*) Explain orientation and reactivity of phenol and phenol cyanide towards electrophilic substitution reaction.

P.T.O.

X301Y7490E3X301Y7490E3X301Y7490E3X301Y7490E3

4. Explain the following : 20

   (*a*) Explain the enantiotopic, homotopic and diasteriotopic faces with suitable example.

   (*b*) Explain Hammond's postulates for transition. State structure and comment on isotopic labeling effects.

5. Discuss the following : 20

   (*i*) Explain SN^{Ar} mechanism and factors affecting on it and give the mechanism of Sommlet-Hauser reaction.

   (*ii*) Give the mechanism of SE^1, SE^2 and SE^i reaction with suitable example. Discuss effect of substrate and leaving group on this reaction.

6. Write short notes on the following : 20

   (*i*) Keto-enol tautomerism

   (*ii*) Steriochemistry of spirane and allene

   (*iii*) Phase transfer catalyst (PTC) and ambident nucleophile

   (*iv*) O/P ratio in electrophilic substitution reaction.

X301Y7490E3X301Y7490E3X301Y7490E3X301Y7490E3

This question paper contains **3** printed pages]

NEPRT—42—2024

FACULTY OF SCIENCE

M.Sc. (NEP) (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

CHEMISTRY

SCHEC-403

(Physical Chemistry)

(Wednesday, 24-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—80

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Solve any *three* questions from Q. Nos. **2** to **6**.

(*iii*) Use of log table and simple calculator is allowed.

Given :

(1) $h = 6.62 \times 10^{-34}$ Js

(2) Mass of electron, $m_e = 9.109 \times 10^{-31}$ kg

(3) Velocity of light $c = 3 \times 10^{8}$ ms^{-1}.

(4) Gas constant, R = 8.314 JK^{-1} mol^{-1}.

1. Solve the following : 20

(1) Explain the concept of orthogonality and normalization of wave functions with reference to 1s wave function of Hydrogen atom.

(2) Calculate the ionic strength of :

(*a*) 0.01 M sulphuric acid.

(*b*) A solution of 0.01 m HCl + 0.05 m $BaCl_2$.

P.T.O.

X301YF7EF8BX301YF7EF8BX301YF7EF8BX301YF7EF8B

(3) Explain Wien effect in case of strong electrolytes.

(4) Describe in detail non-stiochiometric defects in solids.

2. Solve the following : 20

(*a*) What is degeneracy of energy states ? Calculate degeneracies of particle of mass 'm' in three-dimensional cubical box of width 'a' having energies :

(*i*) 6

(*ii*) 9

(*iii*) 12

(*iv*) 14 in units of ($h^2/8\ ma^2$).

(*b*) Derive Lippmann equation for surface excess phenomenon.

3. Attempt the following : 20

(*a*) What is activity and activity coefficient ? An aqueous solution at 25°C is 0.005 molal in NaCl and 0.008 molal in K_2SO_4. Calculate the activities of Na^+ and $SO_4^{\Theta\Theta}$ ions.

(*b*) What is tie-line ? Explain a three component system involving three pairs of partially miscible liquids with suitable phase diagram.

4. Answer the following : 20

(*a*) Evaluate the commutators :

(*i*) $[\hat{L}_2, \hat{L}_x] = 0$

(*ii*) $[\hat{L}_x, \hat{L}_y] = i\hbar\hat{L}_z$.

(*b*) What is fugacity ? Explain graphical method for its determination.

X301YF7EF8BX301YF7EF8BX301YF7EF8BX301YF7EF8B

5. Solve the following : 20

(*a*) (*i*) What is electrical double layer ? Explain Stern's theory of electrical double layer in detail.

(*ii*) State phase rule and explain the terms involved in it.

(*b*) Explain representation of three component system in phase rule. Describe acetone-chloroform-water system with suitable phase diagram.

6. Write short notes on the following : 20

(*i*) Pauli's exclusion principle in quantum mechanical approach.

(*ii*) Ensemble and its types.

(*iii*) Onsager equation and its verification.

(*iv*) Born-Haber cycle for stability of ionic compounds.

X301YF7EF8BX301YF7EF8BX301YF7EF8BX301YF7EF8B

This question paper contains **3** printed pages]

NEPRT—65—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (NEP) (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

CHEMISTRY

(SCHEE-401)

(Physical Methods in Chemistry)

(Tuesday, 30-04-2024) **Time : 10.00 a.m. to 12.30 p.m.**

Time—2½ *Hours* *Maximum Marks*—60

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Attempt any *three* questions from Q. Nos. **2** to **6**.

(*iii*) Use of logarithm table and simple non-programmable calculator is allowed.

1. Answer the following questions : 15

(*a*) Explain proper axis of rotation and center of symmetry with a suitable example.

(*b*) Distinguish between accuracy and precision.

(*c*) Explain the principle of electron diffraction.

P.T.O.

X301Y5DF075X301Y5DF075X301Y5DF075X301Y5DF075

2. Answer the following questions :

(*a*) (*i*) Describe matrix representation for the symmetry elements, identity and inversion centre. 4

(*ii*) Write reducible representation for the C_{2v} and C_{3v} group based on 3N coordinates. 4

(*b*) What is sampling ? Explain the different types of sampling. 7

3. Solve the following questions :

(*a*) Explain Miller indices. When the diffraction of X-ray having wavelength 1.54 Å occur in X-ray diffractometer by the diffraction angle (2θ) equal to 21.97° and the interplanar distance is 4.04 Å, then calculate order of diffraction. (sin 10.98° = 0.1904). 8

(*b*) List the symmetry elements, show it diagrammatically and find the point groups for H_2O, C_6H_6 and $NiCl_4$. 7

4. Solve the following questions :

(*a*) Explain the terms, mean deviation and standard deviation.

The normality of solution is determined by four separate titrations, the results are being 0.2041, 0.2039, 0.2049, 0.2043. Calculate the mean deviation and standard deviation for these values. 8

(*b*) What is phase difference ? Explain the identification of unit cell from systematic absence in diffraction pattern. 7

5. Attempt the following questions :

   (*a*) What is principle of neutron diffraction ? Explain the scattering of neutron by solids and liquids. 8

   (*b*) State and explain great orthogonality theorem (GOT) and give its consequences. 7

6. Write short notes on : 15

   (*a*) Reducible and irreducible representation

   (*b*) Ramchandran diagram

   (*c*) Wierl equation.

X301Y5DF075X301Y5DF075X301Y5DF075X301Y5DF075

This question paper contains **2** printed pages]

NEPRT—101—2024

FACULTY OF SCIENCE

M.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2024

CHEMISTRY

Paper : SCHEC-1451

(Inorganic Chemistry)

(Thursday, 18-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (*i*) Question number *one* is compulsory. Solve any *three* from remaining five.

(*ii*) Calculator and log table is allowed.

1. (*a*) What is Fischer-Tropsch synthesis ? Give its mechanism. 5

(*b*) Explain the importance of sulphur oxide dismutase. 5

(*c*) Calculate the number of EPR line shown by X band EPR spectra of $\dot{C}H_2OH$ radical. 5

(*d*) Prove that $Mn_2(CO)_5$ and C_2H_6 are isolobal with each other. 5

P.T.O.

X301Y4D1C08X301Y4D1C08X301Y4D1C08X301Y4D1C08

2. (*a*) What is Waker's process ? Discuss its mechanistic aspect. 10

   (*b*) If fundamental frequencies of $^{35}Cl_2$ is 564.9 cm^{-1}. What will be force constant of its in Nm^{-1} ? 10

   (Avogadro's No. = 6.022×10^{23})

3. (*a*) Explain Mossbauer spectrum of $Na_2[Fe(CN)_5 NO]$. 10

   (*b*) What are frontier orbitals ? Explain ML_6 complex is isolobal with CH_4 and ML_5 complex is isolobal with CH_3 radical. 10

4. (*a*) Discuss the mechanism of hydroformulation of olefins using cobalt salt. 10

   (*b*) Give an account of structure and function of Hemoglobin. 10

5. (*a*) What is Photosynthesis ? Explain in detail photosystem-II. 10

   (*b*) Calculate the number of lines in : 10

   (*i*) Naphthalene radical

   (*ii*) Anthracene radical.

6. Write notes on :

   (*a*) Ziegler Natta Catalyst. 5

   (*b*) Nitrogenase enzyme. 5

   (*c*) Mossbauer spectrum of $FeSO_4.7H_2O$. 5

   (*d*) Isolobal analogy. 5

X301Y4D1C08X301Y4D1C08X301Y4D1C08X301Y4D1C08

This question paper contains **4** printed pages]

NEPRT—122—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2024

CHEMISTRY

Paper SCHEC-452

(Organic Chemistry)

(Saturday, 20-4-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—80

N.B. :— (*i*) Question No. **1** is compulsory.

(*ii*) Solve any *three* from remaining five questions.

(*iii*) Simple calculator and log table is allowed.

1. Solve the following : 20

(*a*) What are the conditions that favour E^1CB mechanism in the elimination reaction ? Explain with suitable example.

(*b*) Explain regioselectivity in addition reaction towards unsymmetrical alkenes.

(*c*) Explain Claisen rearrangement with example.

(*d*) Describe the Joblonski diagram and explain how it relate to photo-chemical processes.

P.T.O.

2. Solve the following : 20

(*a*) Why does trans-1-bromo-4-tert-butyl cyclohexane undergo E^2 reaction in the presence of ethoxide ion much more slowly than corresponding cis isomer. Explain.

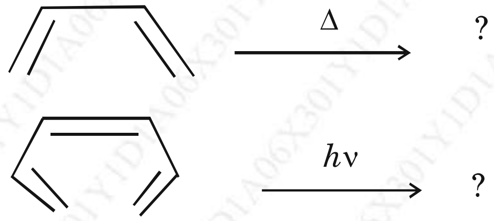
(*b*) Explain the following :

(*i*) Wittig reaction

(*ii*) Mannich reaction.

3. Answer the following : 20

(*a*) Explain the following reaction with FMO method :

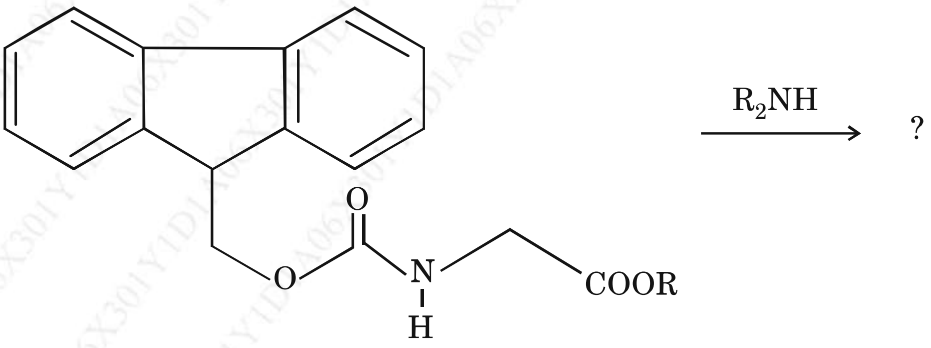


(*b*) Explain Norrish type–I and Norrish type–II reaction with suitable example.

4. Explain the following : 20

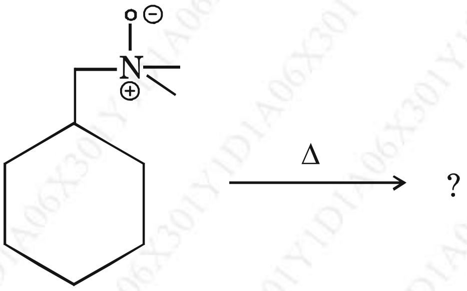
(*a*) Predict the product of the following reaction with mechanism :

(*i*)



X301Y1D1A06X301Y1D1A06X301Y1D1A06X301Y1D1A06

(*ii*)



(*b*) Explain the following :

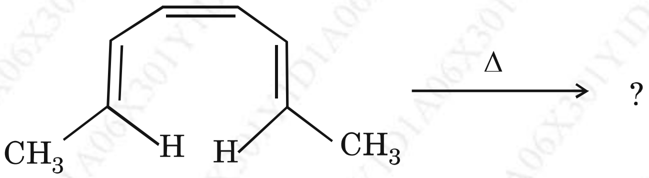
(*i*) Sharpless asymmetric epoxidation.

(*ii*) Perkin reaction with mechanism.

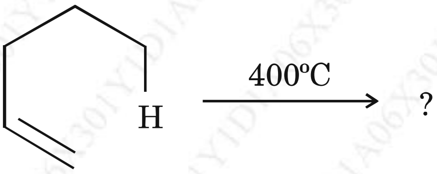
5. Discuss the following : 20

(*a*) Complete the following reaction with mechanism :

(*i*)



(*ii*)



(*b*) Explain the following :

(*i*) Photoreduction

(*ii*) Paterno-Buchi reaction.

X301Y1D1A06X301Y1D1A06X301Y1D1A06X301Y1D1A06

6. Write short notes on the following : 20

(*a*) E^1 Elimination

(*b*) Benzoin condensation

(*c*) Cope and aza-cope rearrangement

(*d*) Photochemistry of α, β-unsaturated ketone.

X301Y1D1A06X301Y1D1A06X301Y1D1A06X301Y1D1A06

This question paper contains **3** printed pages]

NEPRT—143—2024

FACULTY OF SCIENCE

M.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2024

CHEMISTRY

Paper-II-SCHEC-453

(Physical Chemistry)

(Tuesday, 23-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (1) Q. No. **1** is compulsory.

(2) Solve any *three* questions from Q. Nos. **2** to **6**.

(3) Use of log table and calculator is allowed.

(4) Figures to the right indicate full marks.

1. Solve the following : 20

(*a*) What are surface active agents ? Discuss their classification in detail with examples.

(*b*) Define $\overline{M}_M$ and $\overline{M}_N$. Determine $\overline{M}_N$ and $\overline{M}_M$ of a polymer sample containing of equal number of molecules with M_1 = 20,000 and M_2 = 2,00,000. Also calculate polydispersity index.

(*c*) What is half-wave potential in polarography ? Explain its importance.

(*d*) Describe Lindemann's theory of unimolecules reactions.

P.T.O.

2. Attempt the following : 20

(*a*) Derive Gibbs adsorption isotherm. Explain in detail its significance.

(*b*) What is current exchange density ? Explain Tafel Plot.

3. Solve : 20

(*a*) Write an account on liquid crystal polymers. Discuss an Osmometry method of molecular weight determination of polymers.

(*b*) What is Differential method for determination of order of a reaction ?

At a certain temperature the half-life periods for the catalytic decomposition of ammonia were found to be as :

$p_{(\text{mm of Hg})}$	50	100	200
$t_{1/2}$ (min)	3.52	1.92	1.01

Find out order, *n*

4. Solve the following : 20

(*a*) State BET equation for multilayer adsorption and explain its significance. How is it used for the estimation of surface area of an adsorbent.

(*b*) What is intrinsic viscosity ? The intrinsic viscosity of a solution of polyisobutylene at 20°C is 180 cm^3/gm. If $[\eta]$ is related to viscosity-average molar mass by equation, $[\eta] = 3.60 \times 10^{-2}\ [m]^{0.629}$ calculate the molar mass of polymer.

X301Y4B813DX301Y4B813DX301Y4B813DX301Y4B813D

5. Solve : 20

(*a*) Derive Butler-Volmer equation of electrode kinetic reactions.

(*b*) What is enzyme catalysis ? Derive Michaelis-Menten equation and explain its importance.

6. Write short notes on the following : 20

(*a*) Surface films on liquids

(*b*) Corrosion monitoring and its prevention methods

(*c*) Kinetics of pyrolysis of acetaldehyde

(*d*) Electrically conducting and fire resistant polymers.

X301Y4B813DX301Y4B813DX301Y4B813DX301Y4B813D

This question paper contains **3** printed pages]

NEPRT—170—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (NEP) (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2024

CHEMISTRY

Paper SCHEE-451

(Principles of Spectroscopy)

(Monday, 29-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—60

Note :— (*i*) Question No. **1** is compulsory.

(*ii*) Attempt any *three* questions from Q. No. **2** to Q. No. **6**.

(*iii*) Use of logarithm table and simple non-programmable calculator is allowed.

1. Answer the following questions : 15

(*a*) What are the different regions of electromagnetic spectrum ?

(*b*) Find out the fundamental modes of vibrations for molecules :

(*i*) H_2O

(*ii*) C_2F_2 (linear)

(*c*) Explain the spectrum of hydrogen atom.

P.T.O.

X301Y12D80BX301Y12D80BX301Y12D80BX301Y12D80B

2. Answer the following questions :

(*a*) (*i*) The microwave spectrum of gaseous diatomic molecule consists of a series of equally spaced lines separated by 4.80 cm^{-1}. Calculate the bond length. The reduced mass of molecule is 10.6×10^{-27} kg. 4

$(h = 6.6 \times 10^{-34}$ Js, $c = 3 \times 10^{8}$ m/s)

(*ii*) Explain the factors affecting intensity of spectral line. 4

(*b*) Derive equation for vibrational energy of diatomic molecule as simple harmonic oscillator. 7

3. Attempt the following questions :

(*a*) Explain basic principle of photoelectron spectroscopy and give its applications. 8

(*b*) What is zero point energy ? Explain the first and second overtone in anharmonic oscillator molecule. 7

4. Attempt the following questions :

(*a*) (*i*) The force constant for a diatomic molecule is 920 Nm^{-1}. If the reduced mass of molecule is 1.85×10^{-27} kg, then determine the fundamental vibrational frequency. 4

(*ii*) Explain the factors affecting the band position in IR-spectroscopy. 4

(*b*) Discuss the rotational spectrum of non-rigid rotator. 7

5. Answer the following questions :

   (*a*) Explain in detail radiative and non-radiative decay. 8

   (*b*) What is Raman effect ? Explain quantum theory of Raman effect. 7

6. Write short notes on the following : 15

   (*i*) Resonance Raman spectra

   (*ii*) Vector representation of momenta

   (*iii*) Photoelectric effect.

X301Y12D80BX301Y12D80BX301Y12D80BX301Y12D80B

This question paper contains **3** printed pages]

RT—317—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS Pattern)

CHEMISTRY

Paper-IX (CH-424)

(Analytical Chemistry/Principles of Spectroscopy)

(Monday, 29-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—75

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Use of calculator and logarithm table is allowed.

1. Attempt any *three* of the following : 15

(*a*) The microwave spectra of gaseous diatomic molecule consist of series of equally spaced lines separated by 17.86 cm^{-1}. Calculate internuclear distance if the reduced mass of molecule is 1.43×10^{-27} kg ($h = 6.6 \times 10^{-34}$ Js, $c = 3 \times 10^{8}$ m/s).

(*b*) Explain the terms transmission and polarization related to spectroscopy.

(*c*) Discuss the factors affecting coupling constant (J).

(*d*) Explain the factors affecting intensities of spectral line in rotational spectra.

(*e*) Discuss basic principle of electron spectroscopy.

2. Attempt any *three* of the following : 15

(*a*) Derive equation for moment of inertia of diatomic rigid rotator molecule.

P.T.O.

X301Y0E631AX301Y0E631AX301Y0E631AX301Y0E631A

(*b*) Explain the terms overtone, hot bands formation in vibrational spectroscopy.

(*c*) Explain the zero-field splitting in ESR.

(*d*) Explain the classical theory of Raman spectrum.

(*e*) If the force constant of one molecule if 490 Nm^{-1} and reduced mass is 1.44×10^{-27} kg, determine the fundamental vibrational frequency of that molecule.

3. Attempt the following :

(*a*) Explain the internal conversion and spectra of transition metal complex. 8

Or

Explain the basic principle of photoelectron spectroscopy and Koopman's theorem.

(*b*) What is Raman effect and Raman resonance spectroscopy ? 7

Or

Give the principle of IR spectroscopy and derive equation of vibrational energy of diatomic molecule behaving as simple harmonic oscillator.

4. Attempt the following :

(*a*) Enumerate the basic principle involved in FT NMR and its instrumentation. 8

Or

What do you mean by hyperfine coupling and explain its types.

(*b*) Explain the breakdown of Born Oppenheimer approximation and vibrations of polyatomic molecules. 7

Or

Explain the measurement technique of ESR spectroscopy and give its applications.

5. Write short notes on any *three* : 15

(*i*) Radioactive and non-redioactive decay

(*ii*) Application of NQR spectroscopy

(*iii*) Stark effect

(*iv*) Spin densities and McConnell relationship

(*v*) Quadrupole nuclei and Quadrupole moment.

X301Y0E631AX301Y0E631AX301Y0E631AX301Y0E631A

This question paper contains **4** printed pages]

RT—86—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

CHEMISTRY

CH–412

(Organic Chemistry–I)

(Friday, 19-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Figures to the right indicate full marks.

1. Attempt any *three* of the following : 15

(*a*) Explain neighbouring group participation by σ and π bonds.

(*b*) What is antiaromaticity ? Explain alternate and non-alternate hydrocarbons.

(*c*) Explain Hammand's postulate for transition state structures in detail.

(*d*) Explain vinyl chloride is unreactive towards SN^1 and SN^2 reaction.

(*e*) Write a short note on cross conjugation.

P.T.O.

2. Attempt any *three* of the following : 15

(*a*) Compare the stability of carbocation and carbanion with suitable examples.

(*b*) Explain the stereochemistry of Biphenyls.

(*c*) Trans (ee) 1, 3 dimethyl cyclohexane is more stable than trans (ee) 1, 2 dimethyl cyclohexane.

(*d*) Explain the generation and stability of carbene and Nitrenes.

(*e*) Explain with suitable examples the term homotropic, enantiotropic and diastereotropic groups and faces.

3. (*a*) Give the order of stability of different confirmational isomers in chair form of 1, 4 dimethyl cyclohexane by drawing their chair confirmations and Newmann's projection formula of each and illustrating 1, 3 diaxial interaction. 7

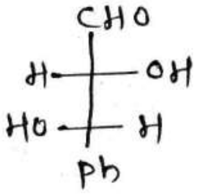
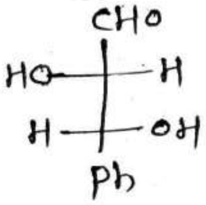
Or

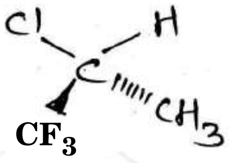
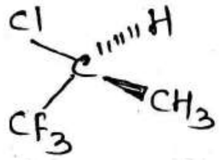
Discuss the following :

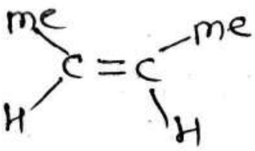
(*i*) Anchimeric Assistance

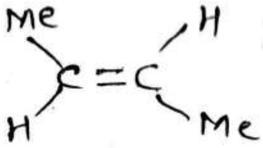
(*ii*) Sommelet–Hauser rearrangement

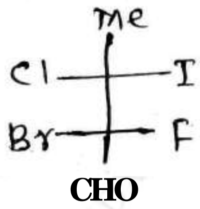
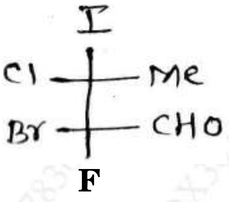
(*b*) Indicate whether the relationship in each pair of compounds below is identical, enantiomeric or diastereomeric by assigning R and S configuration and E and Z configuration (any *four*) : 8

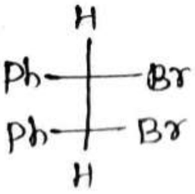
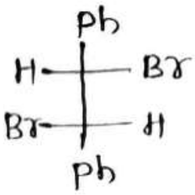
(*i*) 
CHO
H
OH
HO
H
Ph
and

CHO
HO
H
H
OH
Ph

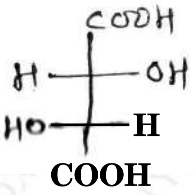
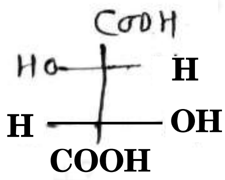
(*ii*) 
Cl
H
C
CH3
CF3
and

Cl
H
C
CH3
CF3

(*iii*) 

and


(*iv*) 
Me
Cl
I
Br
F
CHO
and

I
Cl
Me
Br
CHO
F

(*v*) 
H
Ph
Br
Ph
Br
H
and

Ph
H
Br
Br
H
Ph

(*vi*) 
COOH
H
OH
HO
H
COOH
and

COOH
HO
H
H
OH
COOH

X301Y07836DX301Y07836DX301Y07836DX301Y07836D

4. (*a*) Discuss the following : 7

(*i*) SN^i mechanism

(*ii*) Smiles rearrangement

Or

Explain aromaticity in benzenoid and Non-Benzenoid compounds.

(*b*) (*i*) What are Annulenes ? Explain aromaticity of [10] Annulenes. 8

(*ii*) Substituent constant and reaction constant.

Or

Comment on the following :

(*i*) Hyperconjugation

(*ii*) Taft equation

5. Write short notes on any *three* of the following : 15

(*a*) Hammett equation

(*b*) E'CB elimination reaction

(*c*) Benzyne intermediate reaction

(*d*) Pyrolytic elimination

(*e*) Stereochemistry of allenes and spiranes.

X301Y07836DX301Y07836DX301Y07836DX301Y07836D

This question paper contains **4** printed pages]

RT—164—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper III (CH-413)

(Physical Chemistry-I)

(Monday, 22-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Use of log-table is allowed.

(*iii*) Given :

(*i*) $h = 6.626 \times 10^{-34}$ Js

(*ii*) Mass of an electron, $M_e = 9.109 \times 10^{-31}$ kg

(*iii*) $C = 3 \times 10^8$ m/s

(*iv*) $R = 8.314$ JK^{-1} $mole^{-1}$

(*v*) $N = 6.022 \times 10^{23}$ molecules

(*vi*) Boltzmann constant, $K = 1.38 \times 10^{-23}$ J/K

(*vii*) σ for H_2 – gas = 2

(*viii*) Molar mass of iodine = 253.80 gm/mole.

1. Solve any *three* : 15

(*a*) Explain Pauli's exclusion principle by quantum mechanical approach.

P.T.O.

X301Y6F351CX301Y6F351CX301Y6F351CX301Y6F351C

(*b*) What are solid-state defects ? Explain :

(*i*) Line and

(*ii*) Screw dislocations.

(*c*) Describe any *three* postulates of quantum mechanics.

(*d*) Draw the phase-diagram of tricomponent system, water-chloroform-acetone and explain it.

(*e*) Write an account on 'spin-orbit coupling and RS-coupling'.

(*f*) Explain a three component system involving two-pairs of partially miscible liquids with a suitable phase diagram.

2. Solve any *three* : 15

(*a*) What is chemical potential ? Explain its importance.

(*b*) Explain the concept of Lattice energy with reference to the formation of NaCl crystal.

(*c*) Derive Lippmann equation of surface-excess phenomenon.

(*d*) Describe the applications of partition functions.

(*e*) What are Eutectic systems ? Explain with examples.

(*f*) Evaluate the commutators :

(*i*) $\left[\hat{L}^2, \hat{L}_x\right] = 0$

(*ii*) $\left[\hat{L}_+, \hat{L}_z\right] = -\hbar\hat{L}_+$

3. Solve the following :

(*a*) An aqueous solution at 25°C is of 5×10^{-3} m NaCl and 8×10^{-3} m K_2SO_4, calculate the activity of Na^+ and SO_4^{2-} ions. 7

X301Y6F351CX301Y6F351CX301Y6F351CX301Y6F351C

Or

Why $\lim_{P \to 0} \frac{F}{P} = 1$?

Explain graphical method for determination of Fugacity of real gases.

(*b*) Calculate the translational partition function of an I_2 molecule at 300 K assuming V to be one litre. Comment on your answer. 8

Or

Derive the expressions of rotational and vibrational partition functions.

4. Solve the following :

(*a*) State the Schrödinger's wave equation in polar co-ordinate and solve it for a system of Rigid-rotator. 8

Or

Describe a first-order and non-degenerate perturbation theory for the system of H-atom.

(*b*) Find the degree of degeneracy of the energy levels for a particle in a cubic box with edges of length 'a' and volume 'a^3' with the following levels of $8\, m_e a^2 E/h^2$; 7

(*i*) 12

(*ii*) 14

(*iii*) 17

(*iv*) 27.

Or

What is meant by packing of uniform spheres ? Explain it with reference to simple cubic lattice unit cells and face-centered cubic lattice.

P.T.O.

X301Y6F351CX301Y6F351CX301Y6F351CX301Y6F351C

5. Write short notes on any *three* : 15

(*a*) Semiconductors and effect of temperature on N- & P-type semiconductors

(*b*) Helmholtz-Perrin theory of an electrical double layer

(*c*) Concept of thermodynamic probability

(*d*) Verification of Onsager's equation for strong electrolytes

(*e*) Mitscherlich law of isomorphism.

X301Y6F351CX301Y6F351CX301Y6F351CX301Y6F351C

This question paper contains **3** printed pages]

RT—256—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (Firth Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS/New Pattern)

CHEMISTRY

Paper-IV (CH-414)

(Physical Methods in Chemistry)

(Wednesday, 24-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—75

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Use of calculator and logarithm table is allowed.

1. Attempt any *three* of the following : 15

(*a*) Explain inversion center and plane of symmetry operation with suitable example.

(*b*) Explain the CPU and its working in computers.

(*c*) Write a difference between RAM and ROM.

(*d*) Calculate Miller indices of crystal plane which cut through the crystal axes at :

(*i*) (2*a*, *b*, *c*)

(*ii*) (2*a*, 3*b*, 2*c*).

(*e*) Explain Mullikan symbols in character table.

2. Attempt any *three* of the following : 15

(*a*) Write group multiplication table of water molecule.

(*b*) Discuss the use and advantages of flow chart in the development of computer system.

P.T.O.

X301YF5B35EX301YF5B35EX301YF5B35EX301YF5B35E

(*c*) Derive Bragg's equation and solve the problem "Find the interplanar distance in a crystal in which a series of planes produces a second order reflection of wavelength 1.5 Å was observed at angle (2θ) equal to 21.795(sin 10.895° = 0.189).

(*d*) Explain the use of electron diffraction study in structural study of compound.

(*e*) Write a note on measurement technique used in neutron diffraction and give its advantages.

3. Attempt the following :

(*a*) What is operating system ? Explain the DOS operating system. 8

Or

Write programming steps for to compute rate constant of zero order reaction by equation $k = x/t$.

(*b*) State great orthogonality theorem and write character table for C_{2v} group. 7

Or

Write symmetry elements, locate them diagrammatically and identify point groups of molecules HCL, PCl_5, XeF_4, benzene.

4. Attempt the following :

(*a*) Explain in short data processing, principles of programming. 8

Or

Derive Bragg's equation and describe Debye-Scherrer method for the structural analysis of crystal using X-ray diffraction.

(*b*) Explain structure factor and its relation to intensity and electron density. 7

X301YF5B35EX301YF5B35EX301YF5B35EX301YF5B35E

Or

Give an account of scattering intensity. What would be the wavelength of an electron beam acceleration by an applied potential difference of 10 kilovolts to produce diffraction pattern. ($h = 6.626 \times 10^{-34}$ Js, mass of electron = 9.1×10^{-31} Kg, charge of electron 1.6×10^{-19}C).

5. Write short notes on any *three* : 15

(*i*) Input devices.

(*ii*) Abelian and non-abelian groups with suitable example.

(*iii*) Application of neutron scattering.

(*iv*) Point group.

(*v*) Ramachandran diagram.

X301YF5B35EX301YF5B35EX301YF5B35EX301YF5B35E

This question paper contains **3** printed pages]

RT—45—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

CHEMISTRY

Paper–II (CH–421)

(Inorganic Chemistry)

(Thursday, 18-4-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Log table and calculator is allowed.

1. Answer the following (any *three*) : 15

(*a*) Predict the products 'A' and 'B' in the following reaction :

$$\left[\mathrm{Pt(NH_3)_4}\right]^{2+} \xrightarrow{\mathrm{Py}} \mathrm{A} \xrightarrow{\mathrm{Py}} \mathrm{B}$$

(*b*) Define catalyst and explain catalytic activity.

(*c*) Give an account of biological importance of essential elements.

(*d*) Calculate the number of fundamental modes of vibration of NH_3, SO_2.

(*e*) Write the basic principle of Mossbauer spectroscopy.

P.T.O.

2. Answer the following (any *three*) : 15

(*a*) What is Trans effect ? Write trans effect series with increasing order.

(*b*) Distinguish between Homogeneous and heterogeneous catalyst.

(*c*) What are metalloporphyrins ? Explain it with suitable examples.

(*d*) "The compound $Na_4[Fe(CN)_6]$ gives single line Mossbauer spectrum with no quadrupole splitting". Explain.

(*e*) Explain the basic principle of electron spin resonance spectroscopy.

3. (*a*) Explain polarization theory of Trans effect. 8

Or

Explain Hydrogenation of alkenes with the role of Wilkinson's catalyst.

(*b*) Describe structure and functions of Haemoglobin. 7

Or

$FeSO_4.7H_2O$ show quadrupole doublet. Explain.

4. (*a*) Explain, how steric effect and charge on complex affect the rate of substitution reaction in square plan or complexes. 8

Or

Give an account of Hydroformation reaction in context of catalyst.

(*b*) Describe the structure and functions of biological enzyme nitrogenase. 7

Or

Explain the following points of Methyl Radical ($CH_3^{\bullet}$) :

(*i*) Number of lines

(*ii*) Spectrum

(*iii*) Hyperfine structure

(*iv*) Relative intensities.

5. Write short notes on (any *three*) : 15

(*a*) Tethered catalyst

(*b*) Iron sulfur proteins

(*c*) Cis-effect

(*d*) Reference compound in ESR.

X301Y9B43D3X301Y9B43D3X301Y9B43D3X301Y9B43D3

This question paper contains **4** printed pages]

RT—124—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

CHEMISTRY

CH-413

(Organic Chemistry–II)

(Saturday, 20-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Figures to the right indicate full marks.

1. Attempt any *three* of the following : 15

(*a*) Discuss photochemistry of cis trans isomerism in olefins

(*b*) Interconversion of 1, 3, 5 hexatriene $\rightleftharpoons$ 1, 3 cyclohexadiene under thermal and photochemical condition can be explained by FMO method.

(*c*) Explain the Barton reaction with suitable examples.

(*d*) Explain the IPSO substitution reaction

(*e*) Explain cis trans phenomena in Wittig reaction with example.

P.T.O.

X301YF8A4AFX301YF8A4AFX301YF8A4AFX301YF8A4AF

2. Attempt any *three* from the following : 15

(*a*) Explain cycloaddition of 1, 3 butadiene and ethylene by FMO and PMO method.

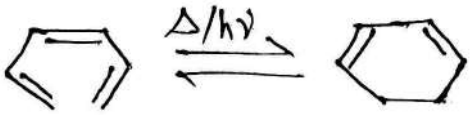
(*b*) Explain the effect of substrates, attacking nucleophile and leaving group in aliphatic electrophilic substitution reaction.

(*c*) Why on thermal reaction cis 3, 4-dimethyl cyclobutene gives (2E, 4Z), 2, 4-hexadiene while the trans isomer give the (2E, 4E) 2, 4 hexadiene.

(*d*) What is Joblonsky diagram ? Explain in detail with suitable example.

(*e*) What are sigmatropic rearrangement ? Explain 1, 3 sigmatropic rearrangement by FMO and PMO method.

3. (*a*) Construct correlation diagram and FMO method for the following transformations. Predict whether these transformations are thermally or photo chemically allowed. 7



Or

Explain the following with mechanism

(*i*) Micheal addition

(*ii*) Benzoin condensation.

X301YF8A4AFX301YF8A4AFX301YF8A4AFX301YF8A4AF

(*b*) Explain the Paterno-Buchi reaction with suitable example and its stereochemistry. 8

Or

Explain the following :

(*i*) Ortho-para ratio

(*ii*) Vilsmeir reaction.

4. (*a*) Comment on the following : 7

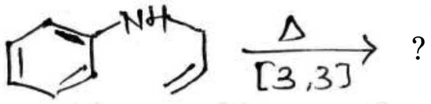
(*i*) Photoreduction of carbonyl compound

(*ii*) Photochemistry of α, β unsaturated ketones.

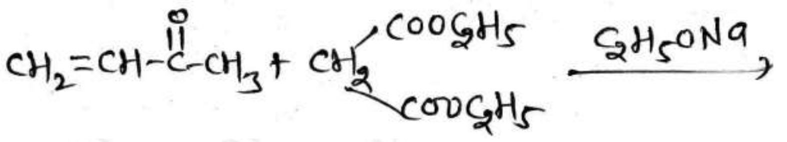
Or

What is photochemistry ? Explain the Norrish type-I and Norrish type-II reactions with examples.

(*b*) Predict the products with mechanism of the following (any *four*) : 8

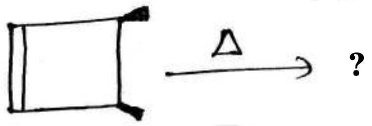
(*i*) 

?

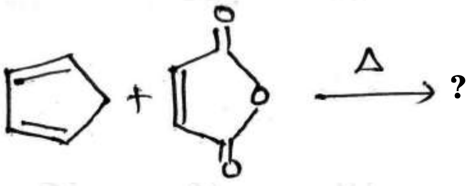
(*ii*) 

$CH_2=CH-\overset{O}{\overset{\|}{C}}-CH_3 + CH_2\begin{cases}COOC_2H_5\\COOC_2H_5\end{cases} \xrightarrow{C_2H_5ONa} ?$

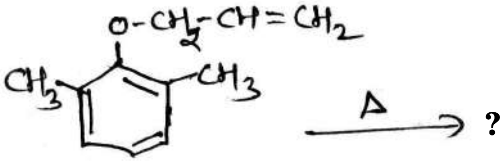
(*iii*)



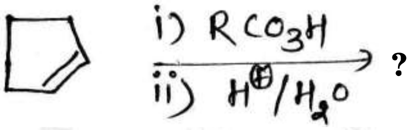
(*iv*)



(*v*)


O-CH2-CH=CH2
CH3
CH3
Δ
?

(*vi*)


i) RCO3H
ii) H⊕/H2O
?

5. Write short notes on (any *three*) : 15

(*a*) Stobbe reaction

(*b*) Cope rearrangement

(*c*) SE^i mechanism

(*d*) Diazonium coupling

(*e*) Cheleotropic reactions.

X301YF8A4AFX301YF8A4AFX301YF8A4AFX301YF8A4AF

This question paper contains **3** printed pages]

RT—210—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (Second Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS/New Pattern)

CHEMISTRY

CH-423

(Physical Chemistry)

(Tuesday, 23-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours *Maximum Marks*—75

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Use of calculator and log table is allowed.

1. Solve any *three* : 15

(*a*) Describe the kinetics of photochemical reaction between H_2 and Cl_2 reactions.

(*b*) Discuss Lindemann's theory of unimolecular reaction.

(*c*) What is exchange current density ? Discuss Tafel plots.

(*d*) Derive Gibb's Adsorption isotherm.

(*e*) Differentiate between polymer and macromolecule. Explain liquid crystal polymers.

2. Solve any *three* : 15

(*a*) What is Micellisation ? Explain factors affecting CMC.

P.T.O.

X301Y49AF56X301Y49AF56X301Y49AF56X301Y49AF56

(*b*) A polymer mixture contains two polymers having molecular weight $M_1 = 1,00,000$ and $M_2 = 60,000$. The two components are present with equimolar concentration. Calculate $\overline{M_n}$ and $\overline{M_w}$?

(*c*) Explain merits and demerits of DME used in polarography.

(*d*) What is concentration polarization ? Explain its variation with current density in polarography.

(*e*) Describe fractional change method of determination of order of reaction.

3. (*a*) Describe B.E.T. theory for multilayer adsorption. 8

Or

Describe viscometry for molar mass determination of polymer. The intrinsic viscosity of a solution of polysiobutylene at 25°C is 1.85 cm^3 per gm. Calculate molar mass of polymer if constant :

$k = 3.80 \times 10^{-4}$ and $a = 0.64$.

(*b*) What is Enzyme Catalysis ? Derive Michalis-Menten equation with significance. 7

Or

Derive Butler-Volmer equation in kinetics of electrode reactions.

4. (*a*) What is salt effect ? Explain primary salt effect in detail. 8

Or

Describe corrosion, it's types and monitoring and prevention methods.

(*b*) Discuss transition state theory of reaction rate. 7

Or

What are different types of polymers ? Explain in detail.

X301Y49AF56X301Y49AF56X301Y49AF56X301Y49AF56

5. Write short notes on (any *three*) : 15

(*i*) Overpotential types of overpotential.

(*ii*) Oscillatory reactions.

(*iii*) Applications of polarography

(*iv*) Surface active agents and classification of surface active agents.

X301Y49AF56X301Y49AF56X301Y49AF56X301Y49AF56

This question paper contains **7** printed pages]

RT—10—2024

FACULTY OF SCIENCE

M.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

CHEMISTRY

Paper–OCH-511/CH-531

(Advanced Spectroscopic Methods)

(Tuesday, 16-4-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Attempt any *three* of the following : 15

(*a*) Explain how mass spectroscopy is useful to detect halogens in organic compounds ?

(*b*) Why are water and ethanol not commonly used as solvents in IR-spectroscopy ?

(*c*) TMS is used as internal standard for proton magnetic resonance spectroscopy. Explain.

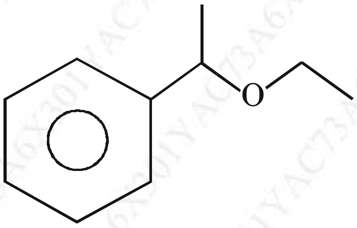
P.T.O.

(*d*) Differentiate between the two isomeric alcohols, 3-pentanol and 2-Methyl 2-butanol on the basis of their CMR data.

(*e*) Why trans-isomers absorb UV at higher wavelength than cis isomer ?

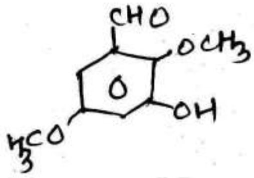
2. Attempt any *three* of the following : 15

(*a*) Explain the genesis of the ions for the compound :

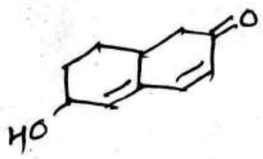


m/z : 150, 135, 106, 105, 79, 77.

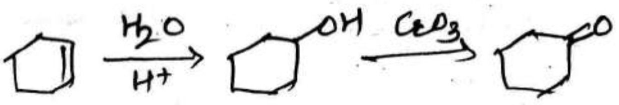
(*b*) Calculate λ_{max} for the following compounds :



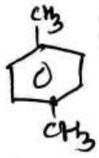
and

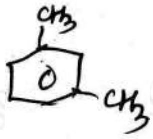


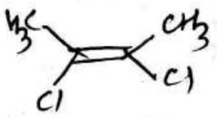
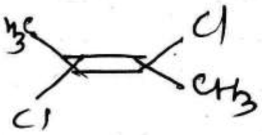
(*c*) How will you follow the following sequence of reaction by using IR :



(*d*) How will you distinguish the following pairs of compounds by using CMR :

(*i*) 

and 

(*ii*) 
H3C
CH3
Cl
Cl
and 
H3C
Cl
CH3
Cl

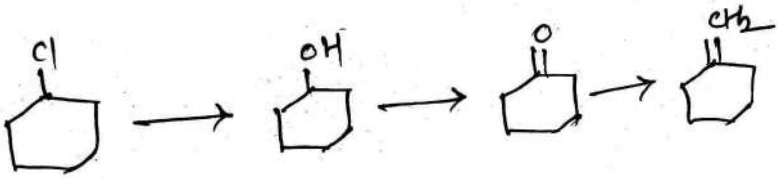
(*e*) An organic compound with M. F : $C_7H_{14}O$, displays the following ^1H NMR data :

δ : 1.05 (d, 12H, J = 7Hz)

δ : 2.7 (Septet, 2H, J = $7H_2$)

3. Solve the following : 7

(*a*) How will you follow the following sequence of reaction using IR-spectroscopy ?

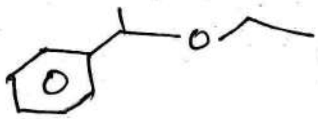


P.T.O.

Or

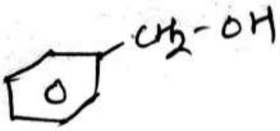
Explain the genesis of ions of the following :

(*i*)



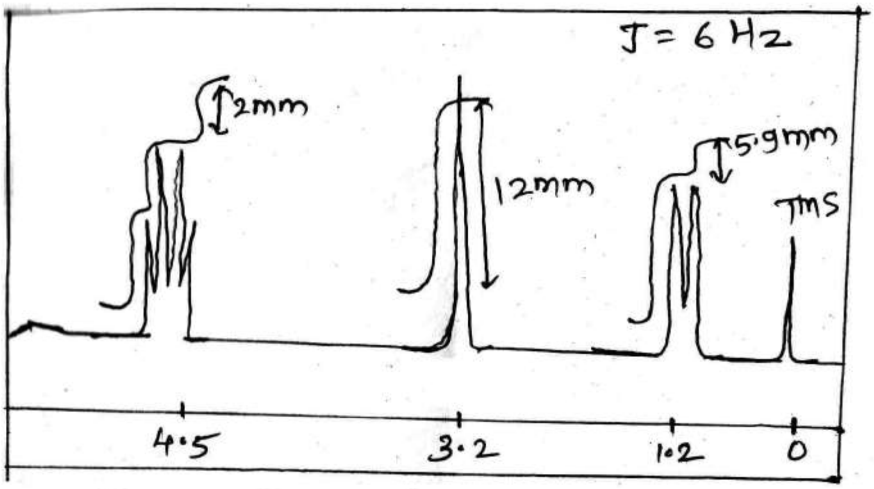
m/z : 77, 79, 105, 106, 135, 130

(*ii*)



m/z : 77, 79, 105, 106, 107, 108.

(*b*) A compound $C_4H_{10}O_2$ shows the following NMR spectrum. Deduce its structure : 8



X301YAC73A6X301YAC73A6X301YAC73A6X301YAC73A6

Or

Deduce the structure of compound based on the following data : 8

M.F. C_{10} H_5 N

IR (cm^{-1}) : 3350 (broad), 1600

Mass (m/z) : 149, 134, 91 (base peak)

PMR (δ) : 1.1 (6H, d, J = 7Hz)

1.5 (1H, bs, Exchangeable with D_2O)

2.75 (1H, Septet, J = 7Hz)

3.7 (2H, S)

7.25 (5H, S)

4. Solve the following : 8

(*a*) Compound with MF $C_{10}H_{14}$ shows the following spectral data :

UV : λ_{max} 265 nm (ε_{max} 450)

IR : 3030, 2970, 1600, 1515, 1465 and 813 cm^{-1}

PMR : δ 1.2 (d, 6H, J = 7Hz)

2.3 (5, 3H)

2.8 (Septet, 1H, J = 7Hz)

7.1 (m, 4H)

CMR : (δ PPM) 21.3(q), 24.2(q)

139(d), 126(d), 128(d)

139(s), 145(s)

Rationalize the spectral data and assign the structure to the compound.

P.T.O.

Or

A compound with MF $C_{10}H_{12}O$ displays the following spectral data :

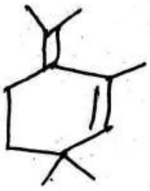
IR : 1690, 1600, 1580, 1490, 770, 690 cm^{-1}

PMR : δ PPM : 1.3 (d, 6H)
5.3 (Septet, 1H)
7.3-7.7 (m, 5H)

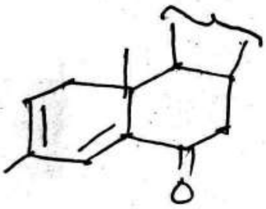
^{13}C NMR (δ PPM) : 22 (q), 68(d),
128 (d), 129(d),
131(s), 135(d)
175(s)

Justify your answer.

(*b*) Using the Woodward-Fieser rules, predict λ_{max} of the following compound : 7



and



Or

Assign the structure to the compound with M.F. $C_{11}H_{14}O_3$ which exhibits the following ^1H NMR data :

1H NMR (δ, PPM) : 1.95 (m, 12mm, J = 6Hz)

2.22 (*t*, 12mm, J = 6Hz)

3.2 (*t*, 12mm, J = 6Hz)

3.78 (*s*, 18mm,)

6.75 (d, 12 mm, J = 8Hz)

7.05 (d, 12 mm, J = 6Hz)

12.5 (*s*, 6 mm Exchangeable with D_2O)

Justify spectral data.

5. Write short notes on any *three* of the following : 15

(*a*) Electronic effect on absorption frequency of carbonyl group

(*b*) MacLafferty Rearrangement

(*c*) Deshielding due to hydrogen bonding

(*d*) Off resonance ^{13}C spectrum.

X301YAC73A6X301YAC73A6X301YAC73A6X301YAC73A6

This question paper contains **3** printed pages]

RT—09—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (First Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

CHEMISTRY

(CH–411)

(Inorganic Chemistry)

(Tuesday, 16-04-2024) **Time : 10.00 a.m. to 1.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Log table and calculator is allowed.

1. Answer the following (any *three*) : 15

(*a*) The electronic configuration of metal ion in the complex greatly influences the rate of substitution. Explain it with examples.

(*b*) Explain ligand substitution reaction and its types.

P.T.O.

(*c*) Calculate the number of microstate for P^3 and ^2D.

(*d*) What is Nanomaterials ? Give its classification.

(*e*) Complex containing metal-metal bonds are intensly coloured rationalize the statement.

2. Answer the following (any *three*) : 15

(*a*) Give the characteristics and examples of dissociative mechanism.

(*b*) Explain top-down approach method for the synthesis of Nanomaterials.

(*c*) Give an account for inner sphere mechanism.

(*d*) Calculate the ground state spectroscopic term symbol for d^1 configuration.

(*e*) Explain Tanabe-Sngano diagram for d^9.

3. (*a*) Explain SN^1CB mechanism with characteristics. 8

Or

Explain Carbon nanotube and give different structure and synthesis method of carbon nanotube.

(*b*) Describe SN^2 mechanism with its characteristics. 7

Or

State and explain spin selection rule and laporte selection rule.

4. (*a*) Explain Tunneling mechanism in outer sphere mechanism. 8

Or

Explain in detail Nephelauxetic effect and Nephelauxetic series.

(*b*) Describe in detail Inner sphere mechanism and give its proof for Inner sphere mechanism. 7

Or

Explain DNA and Nanomaterial.

5. Write short notes on (any *three*) : 15

(*a*) J-J Coupling

(*c*) Anation Reaction

(*d*) Natural and Artificial Nanomaterial

(*d*) Bio-inorganic Nanomaterials.

X301YC53EF5X301YC53EF5X301YC53EF5X301YC53EF5

This question paper contains **2** printed pages]

RT—258—2024

FACULTY OF SCIENCE

M.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

ORGANIC CHEMISTRY

Paper–XVIII (OCH-514)/(CH-534/2A)

(Medicinal Chemistry)

(Wednesday, 24-4-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) Attempt *all* questions.

(*ii*) Figures to the right indicate full marks.

1. Solve any *three* of the following : 15

(*a*) What are coagulants ? Explain mechanism of Blood Clotting.

(*b*) Give SAR and synthesis of Cycloserine.

(*c*) Explain Biological and Chemical Assay.

(*d*) Explain drug absorption in Pharmacokinetics of a drug.

(*e*) What are antibiotics ? How are they classified ?

2. Attempt any *three* of the following : 15

(*a*) Explain structure based drug design.

(*b*) Write a note on Immunological assay.

P.T.O.

X301YCD15C0X301YCD15C0X301YCD15C0X301YCD15C0

(*c*) What are soft and hard drugs ? Give their properties.

(*d*) Offer synthesis and SAR of 4-amino salicylic acid.

(*e*) Write a note on lipophilicity in QSAR study.

3. (*a*) Explain drug distribution and drug elimination with respect to Pharmacokinetics. 8

Or

Explain hydrolysis and conjugation with the help of suitable examples of Drug Metabolism.

(*b*) Discuss occupancy and rate theories of drug activity. 7

Or

Write notes on :

(*i*) Sulfonamides

(*ii*) Membrane active drugs.

4. (*a*) Explain SAR, mode of action of chloramphenicol. 8

Or

Explain mechanism of drug action.

(*b*) What are lead compounds ? Explain about lead discovery with suitable example. 7

Or

Write a note on Competitive Inhibitors.

5. (*a*) Discuss about enzyme inhibition in drug design. 5

(*b*) Write short notes on (any *two*) : 10

(*a*) Mechanism of blood clotting

(*b*) LD_{50} and ED_{50}

(*c*) Biological defence.

X301YCD15C0X301YCD15C0X301YCD15C0X301YCD15C0

This question paper contains **5** printed pages]

RT—88—2024

FACULTY OF SCIENCE & TECHNOLOGY

M.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

ORGANIC CHEMISTRY

Paper-OCH-512

(Natural Product)

(Friday, 19-04-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (1) Attempt *all* questions.

(2) Figures to the right indicate full marks.

1. Solve any *three* : 15

(*a*) Discuss the structure determination of Cital.

(*b*) Discuss the structure of methyl morphol.

(*c*) Write a note on Pheromones.

(*d*) Give the synthesis of cyanidin chloride.

(*e*) Give the synthesis of PGE_2.

2. Answer the following (any *three*) : 15

(*a*) Write a note on Diels' hydrocarbon.

(*b*) Give the synthesis of quercetin by Robinson method.

P.T.O.

(*c*) What are Anthocyanins ? Discuss the general method for structure determination of Anthocyanidin.

(*d*) Discuss the constitution of α-Tocopherol.

(*e*) Discuss the constitution of Testosterone.

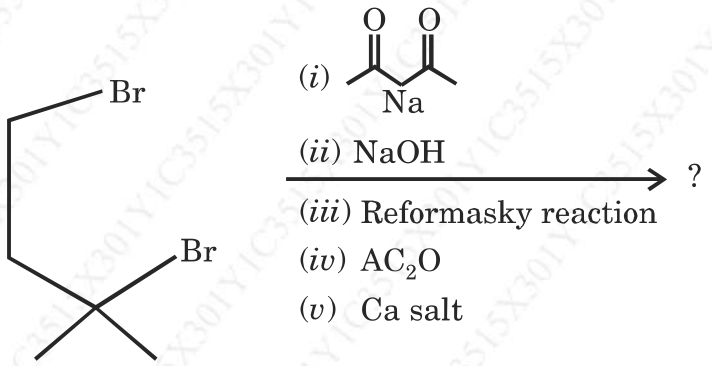
3. (A) What are Vitamins ? How are they classified ? Discuss the deficiency disease and various sources of vitamins. 7

Or

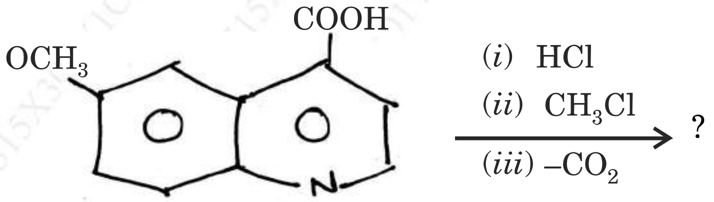
What are natural and synthetic pyrethroids ? Discuss their biological activities.

(B) Predict the product (any *four*) : 8

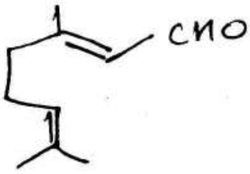
(*i*)


Br
Br
O O
(i)
Na
(ii) NaOH
?
(iii) Reformasky reaction
(iv) AC$_2$O
(v) Ca salt

(*ii*)

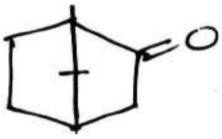

COOH
OCH$_3$
N
(i) HCl
(ii) CH$_3$Cl
?
(iii) –CO$_2$

(*iii*)



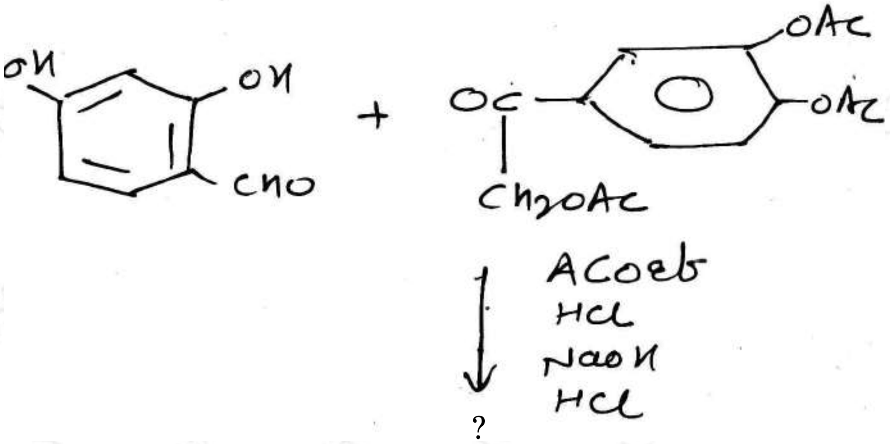
$\xrightarrow[\text{Acidic medium}]{\text{Na–Hg}}$?

(*iv*)

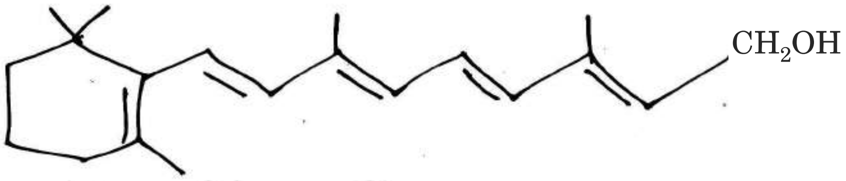


(*i*) HNO_3
(*ii*) (O)
$\longrightarrow$?
(*iii*) O/–CO_2
(*iv*) (O)

(*v*)


OH
OH
CHO
+
OC
CH₂OAc
OAc
OAc
ACoeb
HCl
NaOH
HCl
?

(*vi*)



(*i*) ConC. HCl
$\longrightarrow$?
(*ii*) EtOH
(*iii*) Se

P.T.O.

X301Y1C3515X301Y1C3515X301Y1C3515X301Y1C3515

(*vii*) $\alpha\text{-Codeimethine} \xrightarrow[\substack{(iii)\ \mathrm{HBr} \\ (iv)\ \mathrm{Na/EtOH}}]{\substack{(i)\ \Delta \\ (ii)\ \mathrm{CH_3}^{1}/\mathrm{OH}^-}} ?$

4. (*a*) Explain the structure of ring system in cholesterol. 7

Or

Give the synthesis of Bombykol.

(*b*) How will you convert : 8

(*a*) Cholesterol to Androsterone

(*b*) Biogenin to Progesterone.

Or

Explain the following :

(*i*) Role of pheromones as sex attractant for plant protection.

(*ii*) Write a note on Rotenones.

5. (A) (1) Cholesterol is .... sterol. 5

(*a*) Myco (*b*) Zoo

(*c*) Phyto (*d*) None of these

(2) M.F. of Cholestone is ....

(*a*) $C_{27}H_{50}$ (*b*) $C_{27}H_{48}$

(*c*) $C_{27}H_{46}$ (*d*) $C_{27}H_{52}$

X301Y1C3515X301Y1C3515X301Y1C3515X301Y1C3515

(3) Camphor exists in .... configuration.

(*a*) Boat (*b*) Chair

(*c*) Twist boat (*d*) None of these

(4) .... is caused due to the deficiency of vitamin A.

(*a*) Pellagra (*b*) Night blindness

(*c*) Scurvey (*d*) Xerophthalmia

(5) Zingiberene is .... terpenoid.

(*a*) Di (*b*) Sester

(*c*) Sesqui (*d*) Mono

(B) Write short notes on (any *two*) : 10

(*a*) Baker Venkataraman synthesis of Flavone.

(*b*) Quininic acid

(*c*) Synthesis of Ascorbic acid for L-xylose.

X301Y1C3515X301Y1C3515X301Y1C3515X301Y1C3515

This question paper contains **6** printed pages]

RT—166—2024

FACULTY OF SCIENCE

M.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

CHEMISTRY (Organic Chemistry)

Paper OCH-513

(Organic Synthesis)

(Monday, 22-04-2024) **Time : 2.00 p.m. to 5.00 p.m.**

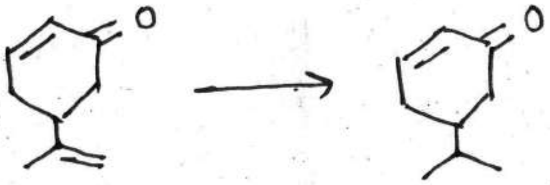
Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) Attempt *All* questions.

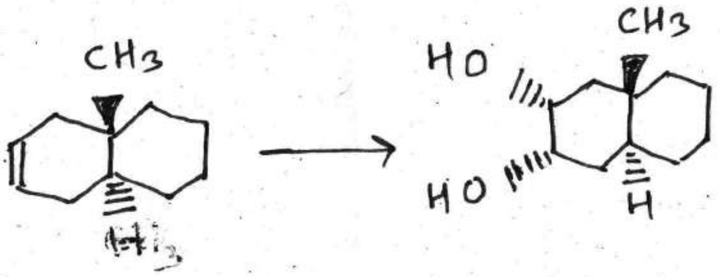
(*ii*) Figures to the right indicate full marks.

1. Complete the following conversion by giving suitable reagents (any *three*) : 15

(*a*)

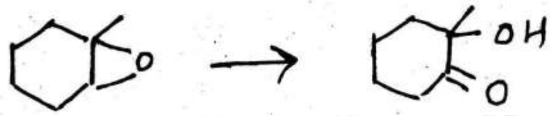


(*b*)

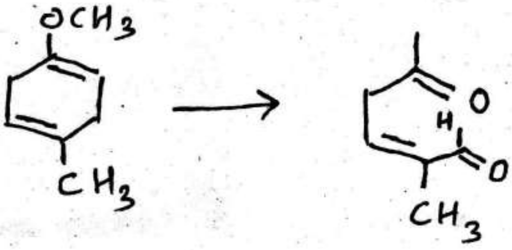


P.T.O.

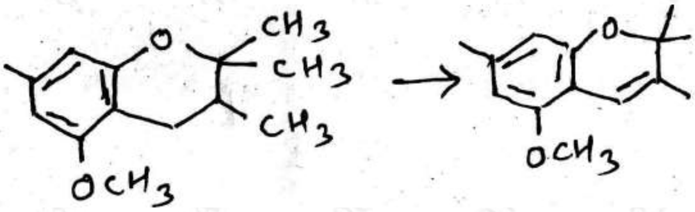
(*c*)



(*d*)

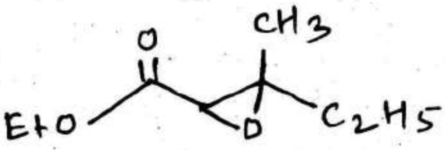

OCH3
CH3
O
H
O
CH3

(*e*)

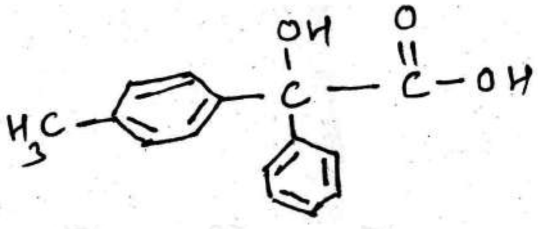

O
CH3
CH3
CH3
OCH3
O
OCH3

2. How will you prepare the following using (any *three*) : 15

(*a*) Darzen Reaction :

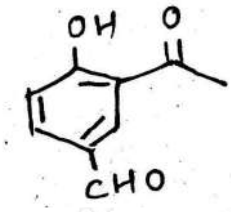

O
CH3
EtO
O
C2H5

(*b*) Benzylic Acid Rearrangement :

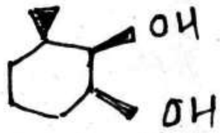

OH
O
C
C
OH
H3C

X301YA25896X301YA25896X301YA25896X301YA25896

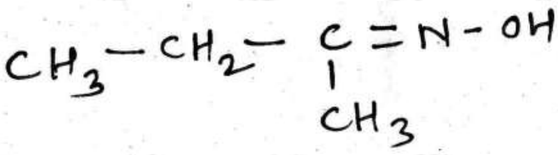
(*c*) Reimer-Tiemann Reaction :



(*d*) Woodward Reaction :



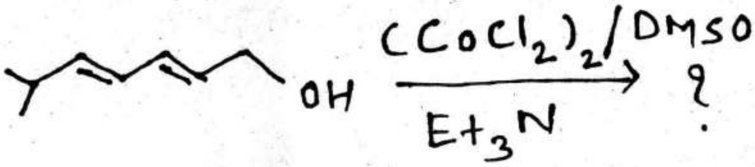
(*e*) Partial Reduction of Nitro compound :



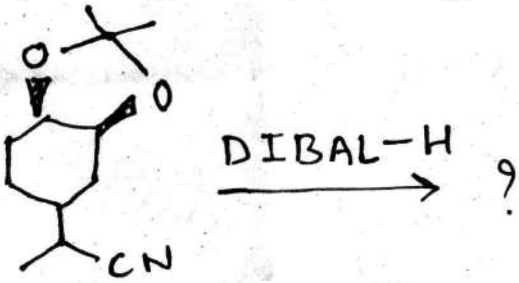
$$CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{C}}=N-OH$$

3. Predict the product(s) with mechanism : 15

(*a*)

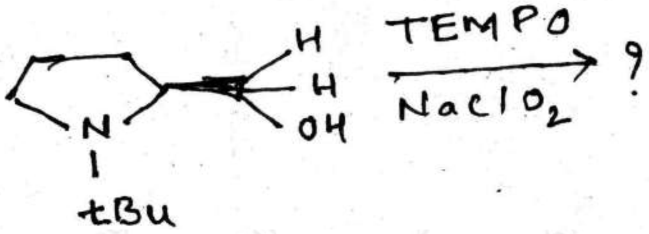

OH
$(CoCl_2)_2/DMSO$
Et_3N
?

(*b*)

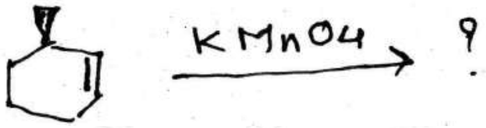

O
O
CN
DIBAL−H
?

P.T.O.

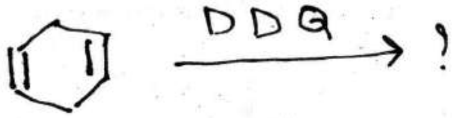
(*c*)



(*d*)



(*e*)



4. Solve the following : 15

(A) Discuss the following giving suitable example with mechanism : 8

(*a*) Wagner-Meerwein Rearrangement;

(*b*) Wittig Rearrangement.

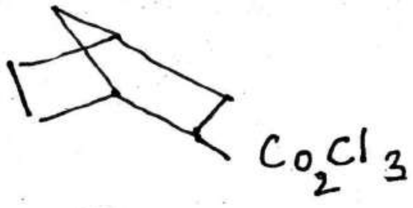
Or

(*a*) Discuss Wolf-Kishner reduction and Birch reduction.

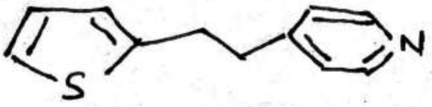
(*b*) Discuss Jone's reagent and Collin's reagent with suitable example.

(B) How will you prepare the following using : 7

(*a*) Wolf rearrangement :



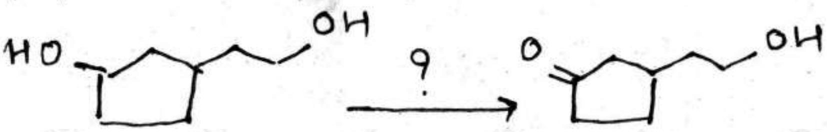
(*b*) Heck coupling reaction :



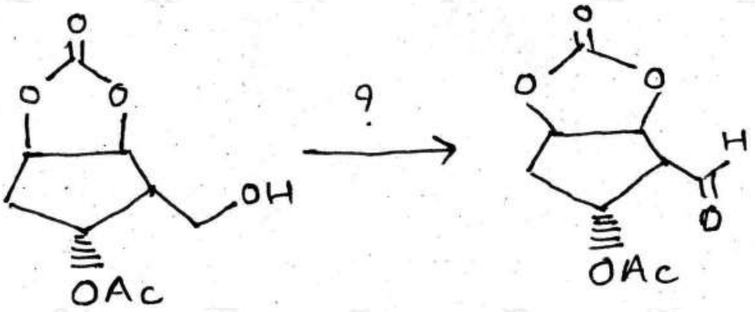
Or

Suggest suitable reagent for the following conversion and give appropriate mechanism :

(*a*)



(*b*)



5. (A) Select correct answer from the given options : 5

(*i*) Isocyanide intermediate is not involved in :

- (*a*) Hofmann
- (*b*) Beckmann
- (*c*) Lossen
- (*d*) Curtius

P.T.O.

(*ii*) Carbonyl reduction to methylene using Zn—Hg/HCl is :

(*a*) Wolf-Kishner

(*b*) Clemmenson

(*c*) M.P.V.

(*d*) None of the above

(*iii*) DDQ is applicable for :

(*a*) Dehydrogenation

(*b*) Aromatisation

(*c*) Both (*a*) and (*b*)

(*d*) None of the above

(*iv*) Which of the following reagent used for the reduction of acid and ester ?

(*a*) $LiAlH_4$

(*b*) DIBAL—H

(*c*) Both (*a*) and (*b*)

(*d*) None of the above

(*v*) Which of the following Poison is used in Lindlar catalyst ?

(*a*) $BaSO_4$

(*b*) $CaCO_3$

(*c*) Quinoline

(*d*) Pyridine

(B) Write short notes on the following (any *two*) : 10

(*a*) McMurry reaction

(*b*) Brook rearrangement

(*c*) Lindlar and Rosenmund catalyst with a suitable example.

X301YA25896X301YA25896X301YA25896X301YA25896

This question paper contains **3** printed pages]

RT—260—2024

FACULTY OF SCIENCE

M.Sc. (Second Year) (Third Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

ORGANIC CHEMISTRY

Paper-(CH-534/2B)

(Polymer Chemistry-I)

(Wednesday, 24-04-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three Hours *Maximum Marks*—75

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Figures to the right indicate full marks.

1. Answer any *three* of the following : 15

(*a*) Explain the cationic addition polymerisation.

(*b*) How many X-ray diffraction data be used to estimate the size of polymer crystallinity ?

(*c*) What is crystalline melting point (T_m) ? How is it determined ?

(*d*) Describe spray up technique for producing reinforced plastic articles.

(*e*) Comment on rotational casting.

(*f*) Explain polydispersity for polymers.

P.T.O.

2. Attempt any *three* of the following : 15

(*a*) Write merits and demerits of emulsion polymerisation.

(*b*) Discuss polymer tacticity of polymers.

(*c*) Comment on calendering process in the formation of film.

(*d*) What are the effect of plasticizers molecular weight and cross-linking on Tg of the polymer ?

(*e*) Explain the types of polymers.

(*f*) Explain Thermoforming method.

3. (*a*) Explain the morphology of polymer and give the properties of required for better crystal structure of polymers. 8

Or

Explain in detail about spinning process and wet spinning.

(*b*) Discuss in detail co-ordination polymerisation using Ziegler-Natta catalyst with examples. 7

Or

Explain number average molecular weight in detail.

4. (*a*) Describe the process of determination of molecular weight of polymer by light scattering method. 8

Or

Discuss in detail condensation polymerisation.

X301Y69B523X301Y69B523X301Y69B523X301Y69B523

(*b*) Explain how infrared spectroscopy can be used to determine co-polymer reactivity ratios. Give an illustrative example. 7

Or

Comment in detail on Blow moulding process.

5. Write short notes on any *three* of the following : 15

(*a*) Plastics

(*b*) Glass transition temperature

(*c*) End group analysis method.

(*d*) Degree of polymer.

X301Y69B523X301Y69B523X301Y69B523X301Y69B523

This question paper contains **5** printed pages]

RT—47—2024

FACULTY OF SCIENCE

M.Sc. (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

ORGANIC CHEMISTRY

Paper–XX

(Advance Heterocyclic Chemistry)

(Thursday, 18-4-2024) **Time : 2.00 p.m. to 5.00 p.m.**

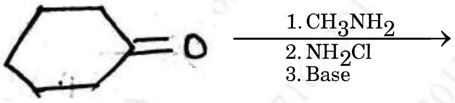
Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) Attempt *all* questions.

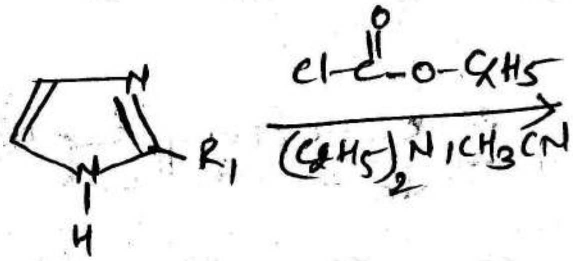
(*ii*) Figures to the right indicate full marks.

1. Predict the product in any *three* of the following : 15

(*a*)

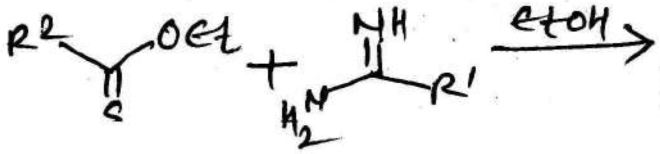

1. CH_3NH_2
2. NH_2Cl
3. Base

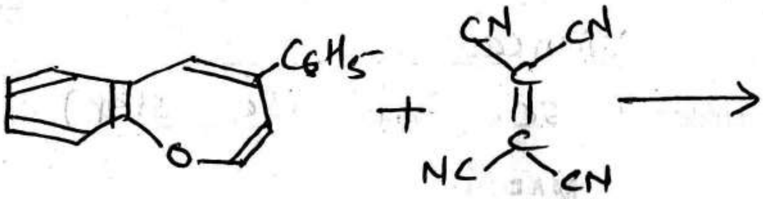
(*b*)

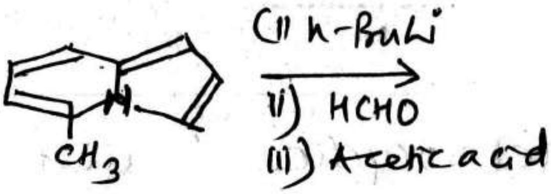

$Cl-\overset{O}{\overset{\|}{C}}-O-C_2H_5$
$(C_2H_5)_2N$, CH_3CN
N
N
H
R_1

P.T.O.

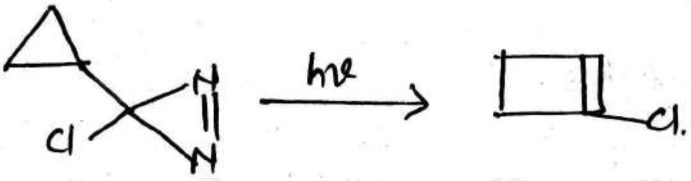
X301Y203716X301Y203716X301Y203716X301Y203716

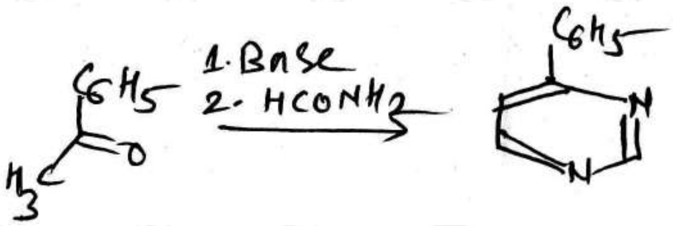
(*c*) 
R2
OEt
NH
H2N
R'
etoH

(*d*) 
C6H5
O
CN
CN
NC
CN

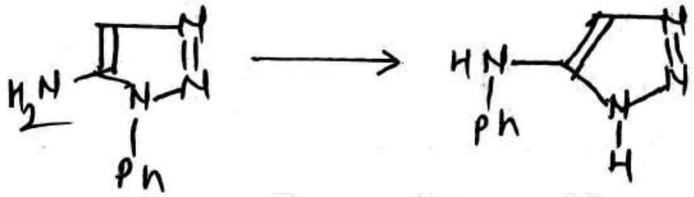
(*e*) 
N
CH3
(I) n-BuLi
II) HCHO
(II) Acetic acid

2. Suggest the mechanism for any *three* of the following : 15

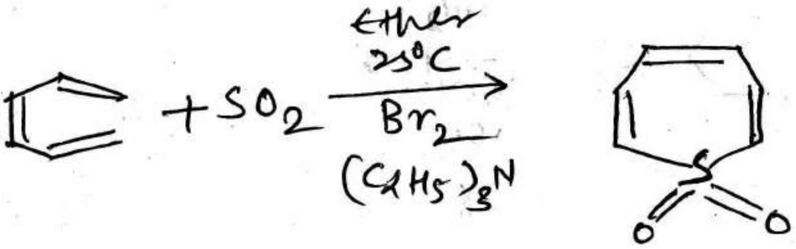
(*a*) 

(*b*) 
C6H5
O
H3C
1. Base
2. HCONH2
C6H5
N
N

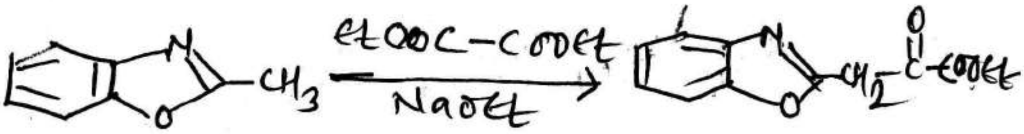
(*c*)


H2N
N
N
N
Ph
HN
Ph
N
N
N
H

(*d*)


Ether
25°C
Br2
(C2H5)3N
S
O
O

(*e*)


N
O
CH3
EtOOC–COOEt
NaOEt
N
O
CH2
O
C
COOEt

3. Solve the following : 8

(*a*) Explain the synthesis of Azetidines from :

(*i*) 3, 5–dimethyl isoxazole and sodium in *n*-pentanol and with tosylchloride

(*ii*) γ-haloalkyl amines.

Or

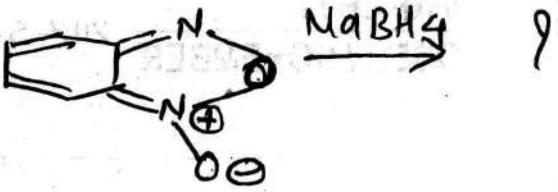
Explain the synthesis of oxazole from :

(*i*) Ethyl α-hydroxy keto succinate

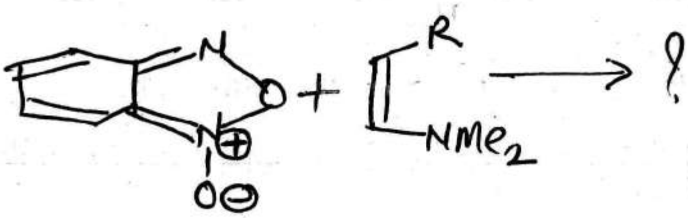
(*ii*) α-Amino carbonyl compounds.

(*b*) Explain the following chemical reaction of oxadiazoles : 7

(*i*)



(*ii*)



Or

Explain the following chemical reactions of Azepines :

(*i*) Thermal Reaction

(*ii*) Ring contraction.

4. Solve the following : 8

(*a*) Explain the Hantzsch-Widman system for the nomenclature of Heterocyclic compounds.

Or

Explain the synthesis of Azinine :

(*i*) From Neber Rearrangement

(*ii*) From vinyl azides.

(*b*) Explain the following chemical reactions of Thiazole : 7

(*i*) Reaction with oxidizing and reducing agents

(*ii*) Photochemical Reactions.

Or

Explain the following chemical reactions of quinolizinium salt :

(*i*) Electrophilic substitution

(*ii*) With styrene.

5. Write short notes on the following (any *three*) : 15

(*a*) Benzimidazole

(*b*) Azomines

(*c*) Triazoles

(*d*) Pyrazine.

X301Y203716X301Y203716X301Y203716X301Y203716

This question paper contains **4** printed pages]

RT—126—2024

FACULTY OF SCIENCE AND TECHNOLOGY

M.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

ORGANIC CHEMISTRY

OCH–522

(Advanced Organic Chemistry)

(Saturday, 20-04-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

1. Solve any *three* : 15

(*a*) Explain Sandmayer reaction with mechanism.

(*b*) Give synthesis and applications of organosilicon compounds.

(*c*) Explain reversible and irreversible enzyme inhibitors

(*d*) Explain asymmetric hydrogenation including BINAP.

(*e*) Compare enzymes with non-biological catalyst

P.T.O.

X301Y3D8775X301Y3D8775X301Y3D8775X301Y3D8775

2. Answer the following (any *three*) : 15

(*a*) Discuss free radicals.

(*b*) Explain Acyolin condensation with suitable example.

(*c*) Discuss applications of α-chymotrypsin

(*d*) What are co-enzymes ? Explain structure, chemistry and properties of T.P.P.

(*e*) Explain Sandmayer's reaction.

3. (*a*) Explain induced fit theory with mechanism for enzyme action. 7

Or

Explain Michaelis-Menten equation in detail.

(*b*) Discuss introduction, classification and nomenclature of enzymes. 8

4. (*a*) How will you prepare organotitanium compands ? Explain with examples. 7

Or

Explain *two* examples of proline catalysed asymmetric reactions.

(*b*) Explain the following reactions with examples. 8

(*i*) Bouveault-Blank reaction.

(*ii*) McMurry reaction.

5. (*a*) Select correct alternative for multiple choice questions. 5

(*i*) Non-protein component of enzyme is ....

(*a*) Apoenzyme

(*b*) Coenzyme

(*c*) Co-factor

(*d*) Both (*a*) and (*b*)

(*ii*) .... free radicals are mosts stable.

(*a*) Tertiary

(*b*) Primary

(*c*) Secondary

(*d*) None of the above

(*iii*) Thiamine phosphate is .... group carrier.

(*a*) Acyl

(*b*) Hydroxy

(*c*) Amino

(*d*) Carboxyl

(*iv*) CBS catalyst is derived from ....

(*a*) Biotin

(*b*) Proline

(*c*) NADH

(*d*) None of the above

(*v*) EC stands for ....

(*a*) Enzyme commission

(*b*) Enzyme catalysts

(*c*) Enzyme constants

(*d*) Equation constant

(*b*) Write short notes on (any *two*) : 10

(*a*) Biotin (CO_2 carrier)

(*b*) Acid-Base catalysts

(*c*) Ribonuclease.

X301Y3D8775X301Y3D8775X301Y3D8775X301Y3D8775

This question paper contains **7** printed pages]

RT—212—2024

FACULTY OF SCIENCE

M.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS/New Pattern)

ORGANIC CHEMISTRY

Paper-XXII (OCH-523)

(Organic Synthesis : Retro Synthetic Analysis)

(Tuesday, 23-04-2024) **Time : 2.00 p.m. to 5.00 p.m.**

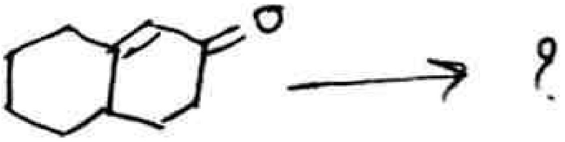
Time—Three Hours *Maximum Marks*—75

N.B. :— (*i*) Attempt *All* questions.

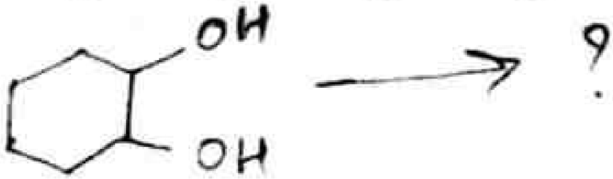
(*ii*) Figures to the right indicate full marks.

1. Using retrosynthesis analysis, suggest suitable method, for the synthesis of the following (any *three*) : 15

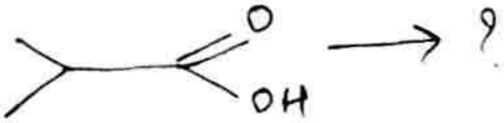
(*a*)



(*b*)



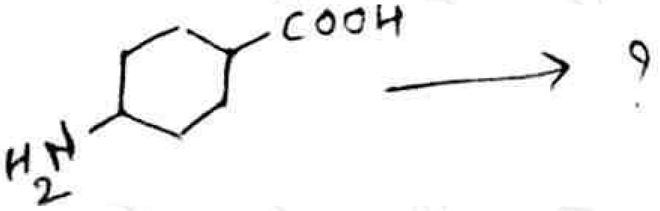
(*c*)



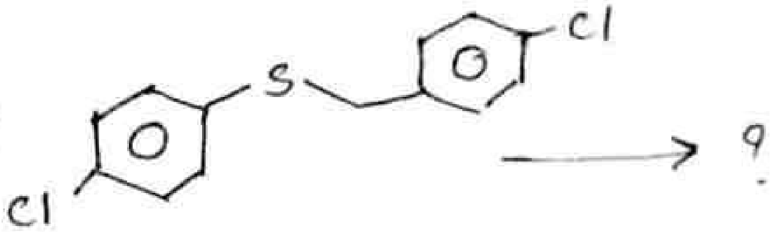
P.T.O.

X301Y762D0FX301Y762D0FX301Y762D0FX301Y762D0F

(*d*)

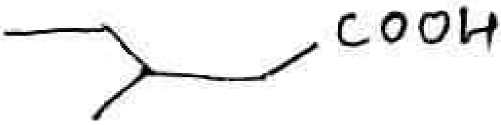


(*e*)

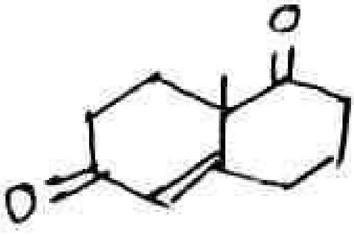


2. Using retrosynthesis, suggest suitable method, for the synthesis of the following : 15

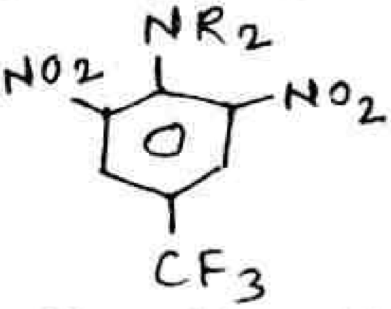
(*a*)



(*b*)

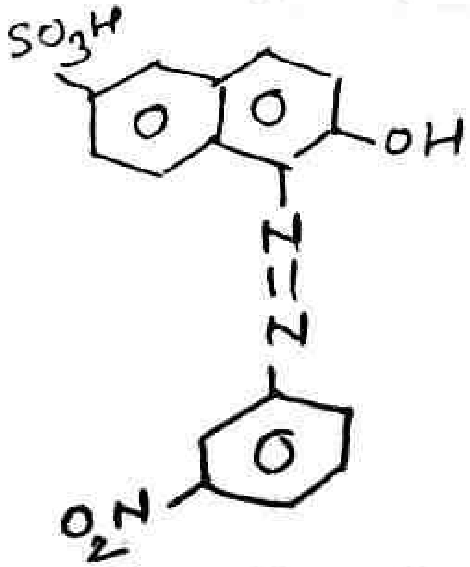


(*c*)

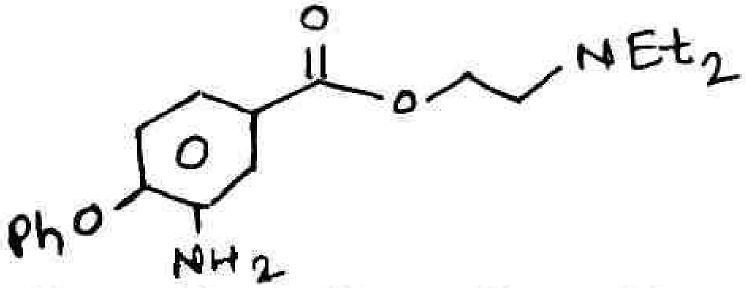


X301Y762D0FX301Y762D0FX301Y762D0FX301Y762D0F

(*d*)


SO3H
OH
N
N
O2N

(*e*)


O
O
NEt2
PhO
NH2

3. Solve the following :

(A) Explain with suitable example :

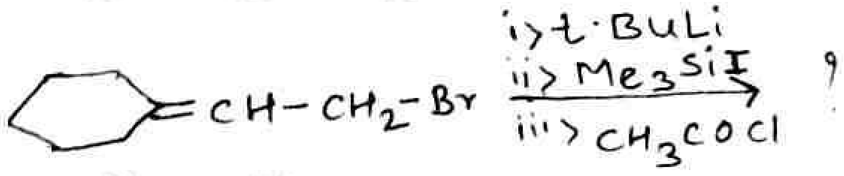
(*i*) Concept of protecting functional group. 8

(*ii*) Umpolung concept.

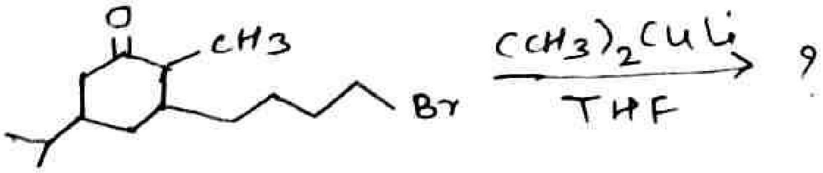
Or

Predict the product with mechanism :

(*i*)

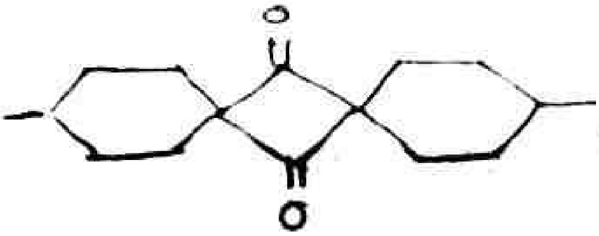

=CH−CH2−Br
i> t·BuLi
ii> Me3SiI
iii> CH3COCl
?

(*ii*)

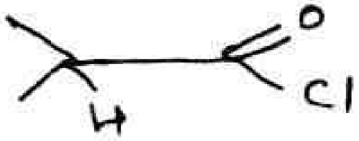

CH3
Br
(CH3)2CuLi
THF
?

(B) How will you synthesis, the following compounds using ketene : 7

(*i*)

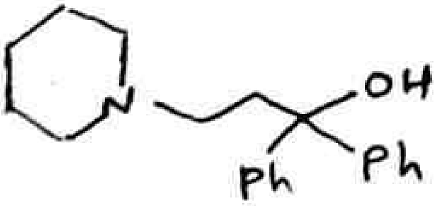


(*ii*)

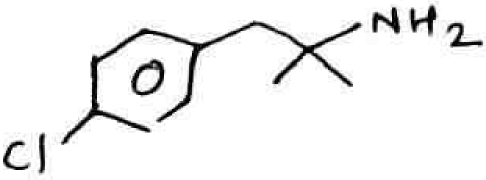


Or

(*i*) Suggest the retrosynthesis path for the following compound :

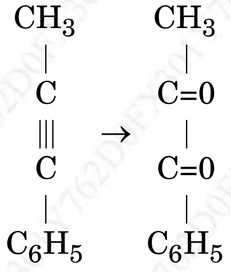


(*ii*) Use of nitro compound in the synthesis of :



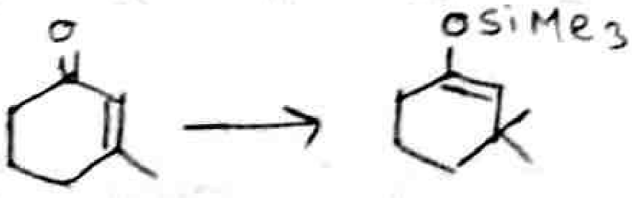
4. (A) Suggest suitable reagent for the following conversion and justify with mechanism : 7

(*i*)



$CH_3-C\equiv C-C_6H_5 \rightarrow CH_3-C(=0)-C(=0)-C_6H_5$

(*ii*)

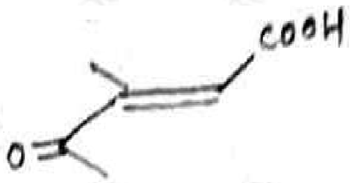


Or

Solve the following :

(*i*) Explain with example synthesis of five members aromatic heterocyclic rings.

(*ii*) Control of enantioselectivity in the following carbonyl condensation :



(B) Discuss the reterosynthetic analysis of camphor. 8

Or

Discuss the protection of amino group and carbonyl group using suitable example.

P.T.O.

5. (A) Select the correct answer from the following alternatives : 8

(*i*) Synthetic equivalent of $\overset{\ominus}{C}H_3$ is :

(*a*) CH_3MgBr

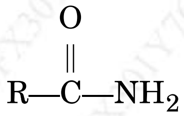
(*b*) $(CH_3)_2CuLi$

(*c*) CH_3Li

(*d*) All of the above

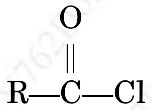
(*ii*) The more reactive acid derivative is :

(*a*)



$R—\overset{\overset{O}{\|}}{C}—NH_2$

(*b*)



$R—\overset{\overset{O}{\|}}{C}—Cl$

(*c*) $(RCO)_2^O$

(*d*) $R—COOR'$

(*iii*) DCC is .... reagent.

(*a*) Oxidizing

(*b*) Dehydrating

(*c*) Reducing

(*d*) Both (*a*) and (*b*)

(*iv*) 1, 5-difunctionalized compound on disconnection gives :

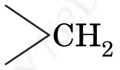
(*a*) Michael acceptor

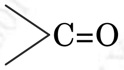
(*b*) Epoxide

(*c*) Aldehyde

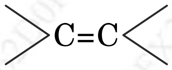
(*d*) Carboxylic acid

(*v*) Enamines are prepared for the protection of :

(*a*) 
$>CH_2$

(*b*) 
$>C{=}O$

(*c*) $—NH_2$

(*d*) 
$>C{=}C<$

(B) Write short notes on any *two* of the following : 7

(*i*) LTA

(*ii*) Give the synthetic utility and limitations of PPA

(*iii*) Robinson annelation.

X301Y762D0FX301Y762D0FX301Y762D0FX301Y762D0F

This question paper contains **3** printed pages]

RT—319—2024

FACULTY OF SCIENCE

M.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(CBCS/New Pattern)

ORGANIC CHEMISTRY

Paper-XXIII (OCH-524)

(Medicinal Chemistry)

(Monday, 29-04-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—75

N.B. :— (1) Attempt *all* questions.

(2) Figures to the right indicate full marks.

1. Solve any *three* of the following : 15

(*a*) Discuss Chemotherapy of malaria.

(*b*) Discuss SAR and mechanism of action of Sulphonyl Urea as hypoglycemic agents.

(*c*) Offer synthesis and structure activity of 6-Mercaptopurine.

(*d*) How are drugs used to test cardiac functions ?

(*e*) Offer synthesis and SAR of Fluconazole.

2. Answer the following (any *three*) : 15

(*a*) Give structure and activity of Cardiac glycosides.

(*b*) What are antispasmodic agents ? Offer synthesis of Mebendazole and Famotidine.

P.T.O.

X301Y3F80A4X301Y3F80A4X301Y3F80A4X301Y3F80A4

(*c*) What are general anaesthetics ? Give structure-activity of divinyl either and pentothal.

(*d*) Discuss synthesis and structure activity of Chlorambucil.

(*e*) Offer synthesis of Chloroquine phosphate and Pyrimethamine.

3. (*a*) Discuss SAR of methyl salicylate, phenyl butazone, ibuprofen and mefenamic acid. 8

Or

Discuss structure activity of 1, 4 dihydropyrimidines and methyldopa.

(*b*) What are antidepressants ? Discuss SAR of Chloropromazine and synthesis of chloropromazine and haloperidol. 7

Or

What are anti-viral agents ? How are they classified ? Discuss SAR of 4-amino quinolines and Biguanide derivatives and antimalarials.

4. (*a*) Give synthesis and SAR of Procainamide and Propranolol. 8

Or

Discuss SAR of substituted Barbiturates and Procaine.

X301Y3F80A4X301Y3F80A4X301Y3F80A4X301Y3F80A4

(*b*) Discuss about : 7

(*i*) Surgery and Radiation therapy used in the treatment of cancer.

(*ii*) Role of alkylating agents and antimetabolites in the treatment of cancer.

Or

What are analgesics ? Discuss SAR of piperidine and 6, 7 benzomorphans.

5. Write short notes on any *three* of the following : 15

(*a*) Patent application under PCT

(*b*) β-Adrenergic blocking agents.

(*c*) Lidocaine and its analogues.

(*d*) Surgery and Radiation therapy used in the treatment of cancer.

X301Y3F80A4X301Y3F80A4X301Y3F80A4X301Y3F80A4

This question paper contains **2** printed pages]

RT—321—2024

FACULTY OF SCIENCE

M.Sc. (Second Year) (Fourth Semester) EXAMINATION

APRIL/MAY, 2024

(New/CBCS Pattern)

ORGANIC CHEMISTRY

Paper (XXIII) (OCH-524)

(Polymer Chemistry-II)

(Monday, 29-04-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three Hours *Maximum Marks*—75

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Figures to the right indicate full marks.

1. Answer any *three* of the following : 15

(*a*) Give the role of polymer additives.

(*b*) Explain the origin and structure of Natural Rubber.

(*c*) Explain phase transfer catalyst.

(*d*) Discuss mechanical degradation.

(*e*) Explain electrically conducting polymers.

(*f*) Give a detailed information about starch.

2. Answer any *three* of the following : 15

(*a*) Give application of phenolic resins.

(*b*) What is the role of antioxidants in polymer ?

(*c*) Give application of polymer supported protecting groups.

(*d*) Explain Ethyl cellulose polymer.

(*e*) What is polymer degradation ? Explain.

(*f*) Describe manufacturing process of cupra ammonium rayon.

P.T.O.

X301Y3F8F14X301Y3F8F14X301Y3F8F14X301Y3F8F14

3. (*a*) Explain oxidative degradation of polymers. 8

Or

Give application of polymer catalysis.

(*b*) Discuss the properties and application of polycarbonate. 7

Or

Epxlain in detail about plasticizers.

4. (*a*) Explain in detail viscose rayon with its preparation, properties and applications. 8

Or

Explain vulcanisation process for rubber in detail.

(*b*) Give the preparation methods of polymer supported substrate. 7

Or

Discuss the properties of linear saturated polyesters.

5. Write short notes on any *three* : 15

(*a*) Artificial Heart

(*b*) Transition metal complexes

(*c*) UV-absorber and stabilizers

(*d*) Fillers.

X301Y3F8F14X301Y3F8F14X301Y3F8F14X301Y3F8F14