

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

NEPKR—01—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

RESEARCH METHODOLOGY (Compulsory)

Paper NEPRM-1001

(Thursday, 16-4-2026)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—45

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

(2) Solve any *two* questions from Q. No. 2 to Q. No. 5.

(3) Calculator and log table is allowed.

1. Write notes on :

5×3=15

(a) Research motive

(b) Need of research design

(c) Coding processing operation

(d) Statistical techniques in research

(e) Variables.

P.T.O.

2. (a) Explain in detail various steps involved in research process. 8
- (b) What is research hypothesis ? Give their characteristics. 7
3. (a) Give an account on good research design. 8
- (b) Describe types of research. 7
4. (a) Calculate the mean, median and mode of the following data : 8
- 3, 6, 3, 7, 4, 3, 9.
- (b) Describe interview method for the collection of primary data. 7
5. (a) Calculate the chi-square (χ^2) value of the following data : 8

Fully Agree	Not Sure	Not Agree	Total
102	108	28	238

- (b) Write an essay on case study. 7

This question paper contains 2 printed pages]

NEPKR—61—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(CBCS Pattern)

CHEMISTRY

Paper SCHEC-401

(Inorganic Chemistry)

(Saturday, 18-4-2026)

Time : 10.00 a.m. to 12.30 p.m.

Time—2½ Hours

Maximum Marks—60

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

(2) Calculator and log table is allowed.

1. (a) Discuss that factors that favor S_N1 type substitution mechanism in transition metal complexes. 3
- (b) Explain the electronic theories proposed to the trans effect. 3
- (c) Explain the semi-conducting nano-particles a novel optical property of nano-materials. 3
- (d) Why *d-d* transition in metal complexes often show weak intensity ? 3
- (e) What are the importance of studying natural nano-materials ? 3

P.T.O.

2. (a) Explain with suitable examples the role of conjugate base in S_N1 CB mechanism. 8
- (b) Describe the Top-down approach in synthesis of nano-materials. 7
3. (a) What is bioinorganic nano-materials ? Discuss the general characteristics and importance in modern science. 8
- (b) Calculate the number of microstate in Ti^{+3} and Sc^{+2} ions in octahedral complexes. 7
4. (a) What factors leads to relaxation of selection rules in transition metal complexes ? 8
- (b) What is trans effect ? Explain the π bonding theory of trans effect. 7
5. (a) Determine the spectroscopic ground state term symbol for d^3 and d^6 configuration. 8
- (b) Discuss the optical properties of quantum dots. How they are useful in technological applications ? 7
6. Write short notes on (any *three*) : 15
- (a) The role of tunnelling in electron transfer reaction
- (b) Cis effect
- (c) Self assembled nano-structure
- (d) L-S coupling.

This question paper contains 4 printed pages]

NEPKR—161—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

CHEMISTRY

SCHEC-402

(Organic Chemistry)

(Tuesday, 21-4-2026)

Time : 10.00 a.m. to 12.30 p.m.

Time—2½ Hours

Maximum Marks—60

N.B. :— (i) All questions carry equal marks.

(ii) Q. No. 1 is compulsory.

(iii) Solve any three of the remaining five questions from Q. No. 2 to Q. No. 6.

1. Solve the following questions (Compulsory) : 15

(a) Explain the terms homoaromaticity and antiaromaticity with suitable examples.

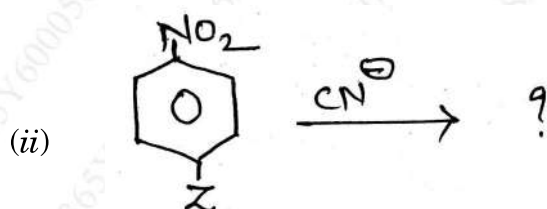
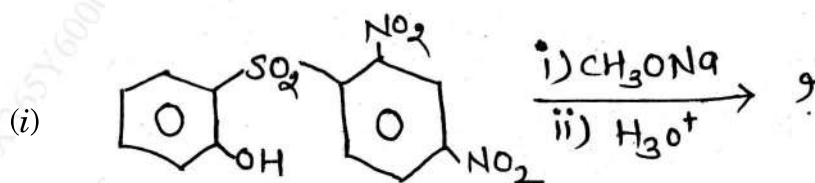
(b) Discuss the stereochemistry of Spiranes and Allenes.

(c) Write a note on NGP.

P.T.O.

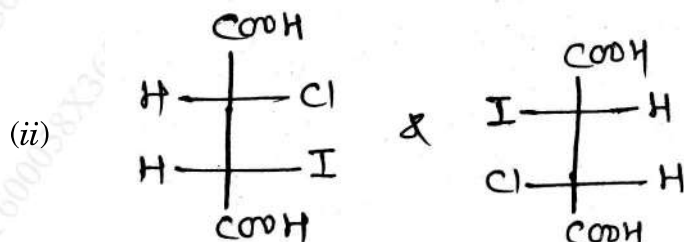
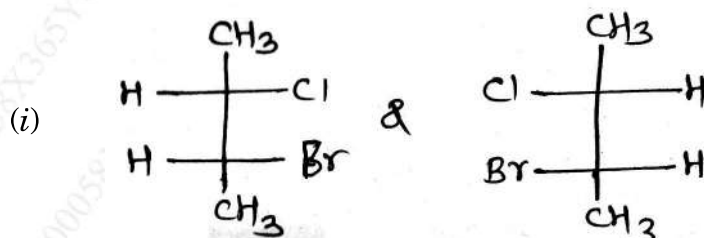
2. Solve the following questions : 15

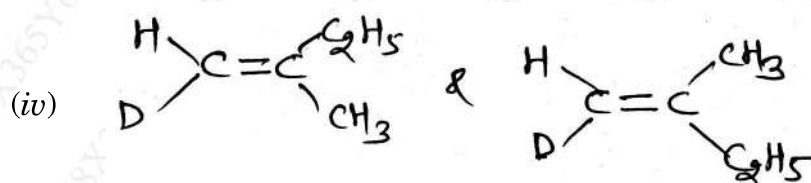
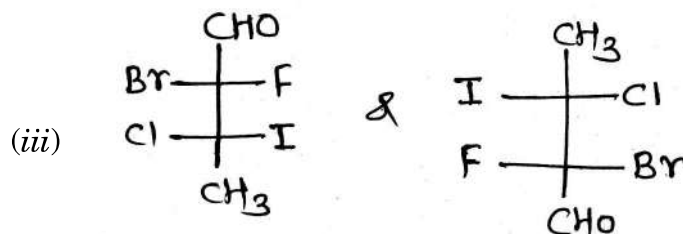
- (a) (i) What are Annulenes ? Explain aromaticity of [10] Annulenes.
 (ii) Comment on the Hammett equation.
- (b) Predict the product of the following with mechanism :



3. Answer the following questions : 15

- (a) Assign the configuration and describe their relationship :





(b) Explain with mechanism :

(i) IPSO substitution reaction

(ii) Vilsmeier reaction.

4. Answer the following questions :

15

(a) (i) Comment on the Benzenoid and Non-Benzenoid.

(ii) Explain the generation and stability of carbanions and free radicals.

(b) Write notes on :

(i) Diazonium coupling

(ii) Arenium ion mechanism.

P.T.O.

5. Answer the following questions : 15

(a) Explain the confirmation of 1, 2 and 1, 3 dimethyl cyclohexane.

(b) Discuss the following :

(i) Anchimeric assistance

(ii) Ambident nucleophile.

6. Write notes on the following : 15

(a) Cross-conjugation

(b) Stereo-specific and stereo-selective reactions

(c) Ortho/para ratio.

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

NEPKR—273—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020 Pattern)

CHEMISTRY

Paper—SCHEC-1403

(Physical Chemistry)

(Thursday, 23-4-2026)

Time : 10.00 a.m. to 12.30 p.m.

Time—2½ Hours

Maximum Marks—60

N.B. :— (i) Question number **1** is compulsory.

(ii) Solve any **3** questions from Q. Nos. **2** to **6**.

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

Given : Mass of O₂ = 5.3×10^{-26} kg

$h = 6.626 \times 10^{-34}$ Js and

Boltzmann constant = K = 1.38069×10^{-23} JK⁻¹

Mass of an electron = M_e = 9.109×10^{-31} kg

Velocity of light = $c = 3 \times 10^8$ ms⁻¹.

P.T.O.

1. Solve the following : 15
- (a) Explain the concept of normalisation of wave functions with reference to '1S' wave function of hydrogen atom.
- (b) Calculate the ionic strength of a solution containing :
0.01 m HCl \oplus 0.05 m BaCl₂
- (c) Explain the significance of Onsager's equation. How is it verified ?
- (d) What are semiconductors ? Explain the effect of temperature on N- and P-type semiconductors.
- (e) What are Eigen values and Eigen functions ?
2. Solve the following : 15
- (a) Evaluate the commutators : 8
- (i) $[L_z, L_{\pm}] = \pm \hbar L_{\pm}$ and
- (ii) $[S^2, S_x] = 0$.
- (b) What is Zeta-potential ? Explain Stern's theory of the electrical double layer. 7
3. Solve the following : 15
- (a) What are partition function ? Explain its significance. Calculate the translational partition function of O₂ confined to a 200 cm³ vessel at 298 K. 7
- (b) (i) State Gibbs' phase rule equation. Reduce it to three component systems and explain the terms involved in it.
- (ii) Explain the Ternary systems with a suitable phase diagram. 8

4. Solve the following : 15
- (a) What is Zero-point energy ? Calculate the transition energy of an electron constrained to move in 1-D box of length 3\AA from first excited state to ground state. What is the wavelength of photon emitted ? 8
- (b) What is fugacity ? Explain the Graphical method of its determination for real gases. 7
5. Solve the following : 15
- (a) Derive the Lippmann equation for surface excess phenomenon. 7
- (b) Define (i) Ionisation potential and (ii) Lattice energy. How does Born-Haber cycle explain the stability of ionic compounds ? 8
6. Write short notes on (any *three*) : 15
- (a) The variation theorem, linear variation principle
- (b) The e.m.f. method for determination of activity and activity coefficients
- (c) Two solid and a liquid component Eutectic systems
- (d) Debye-Falkenhagen effect.

This question paper contains 2 printed pages]

NEPKR—30—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP Pattern)

CHEMISTRY

Paper SCHEC-1451

(Inorganic Chemistry)

(Friday, 17-4-2026)

Time : 10.00 a.m. to 12.30 p.m.

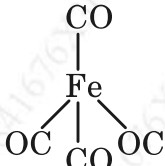
Time—2½ Hours

Maximum Marks—60

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

(2) Log table and calculator is allowed.

1. (a) Explain language of catalysis. 3
- (b) Give an account on trace elements. 3
- (c) The number of EPR lines observed in AlH_3 radical (^{27}Al , nuclear spin = 5/2) will be..... 3
- (d) Write a note on g value in esr spectroscopy. 3

- (e)  isolabel with S. Explain. 3

P.T.O.

2. (a) Explain the application of homogeneous catalyst in hydroformulation reaction using $\text{HCo}(\text{CO})_4$ catalyst. 8
- (b) Calculate the force constant for the bond in N_2 . 7
- Given :
- Fundamental vibrational frequency is $7 \times 10^{13} \text{ s}^{-1}$.
- Atomic weight of N = 14.007
- Avogadro's No. = $6.022 \times 10^{23} \text{ g}$.
3. (a) What are the frontier orbitals ? Explain ML_6 complex is isolabel with CH_3 radical. 8
- (b) Explain Mossbauer spectra of $\text{FeCl}_3 \cdot 3\text{H}_2\text{O}$. 7
4. (a) What is Fischer-Tropsch synthesis ? What is its importance ? Discuss its mechanism. 8
- (b) What is metalloporphyrins ? Explain the structure of porphyrin molecule. 7
5. (a) Predict the number of esr lines in the spectrum of bis salicylaldimine copper (I). (For $\text{Cu} = \text{I} = 3/2$). 8
- (b) Explain in detail biological enzyme nitrogenase. 7
6. Write short notes on (any *three*) : 15
- (a) Tethered catalyst
- (b) Hemocyanins
- (c) Reference compound in ESR
- (d) Isolabel analogy.

This question paper contains 3 printed pages]

NEPKR—111—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

CHEMISTRY

SCHEC-1452

(Organic Chemistry)

(Monday, 20-4-2026)

Time : 10.00 a.m. to 12.30 p.m.

Time—2½ Hours

Maximum Marks—60

N.B. :— (1) *All questions carry equal marks.*

(2) *Question No. 1 is compulsory.*

(3) *Solve any three of the remaining five questions (Q. No. 2 to Q. No. 6).*

1. Solve the following questions (compulsory) : 15

(a) Discuss the mechanism of E² reaction.

(b) Explain the regioselectivity and chemoselectivity with suitable example.

(c) What are sigmatropic rearrangement ? Explain aza cope rearrangement.

P.T.O.

2. Answer the following questions : 15

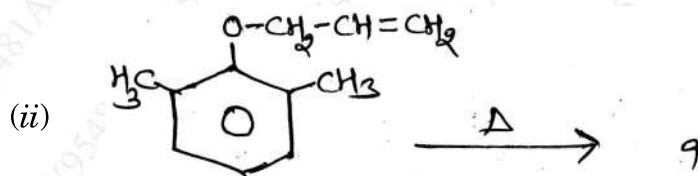
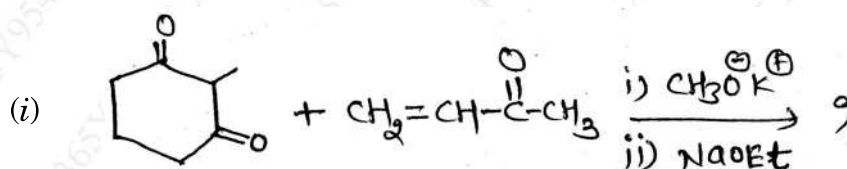
(a) (i) Reduction of ketone with LiAlH_4 is a hydride transfer reaction.

(ii) Explain hydroboration.

(b) With the help of FMO and correlation diagram method. Explain interconversion of 1, 3 butadiene into cyclobutene under thermal and photochemical condition.

3. Answer the following questions : 15

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



(b) What are Norrish type-I and II reaction ? Explain its mechanism with suitable example.

4. Solve the following questions : 15

(a) Explain the Paterno-Buchi reaction with suitable example and its stereochemistry.

(b) Draw correlation diagram for $(4\pi + 2)$ cycloaddition reaction and explain why it is thermally allowed and photochemically symmetry forbidden.

5. Answer the following questions : 15

(a) Illustrate the mechanism for the following reaction with suitable example :

(i) Wittig reaction

(ii) Mannich reaction.

(b) Write short notes on :

(i) 1, 3 dipolar cycloaddition reaction

(ii) [3, 3] sigmatropic rearrangement.

6. Answer the following questions : 15

(a) Write note on E^1CB mechanism with suitable example.

(b) Sharpless asymmetric Epoxidation.

(c) Photochemistry of vision.

This question paper contains 4 printed pages]

NEPKR—212—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP-2020)

CHEMISTRY

Paper SCHECT-1453

(Physical Chemistry)

(Wednesday, 22-4-2026)

Time : 10.00 a.m. to 12.30 p.m.

Time—2½ Hours

Maximum Marks—60

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

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

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

Given : $R = 0.08206 \text{ dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$.

1. Solve the following :

15

(a) What are surface active agents ? Explain their classification with examples.

P.T.O.

(b) Define :

(i) Mass average

(ii) Number average molar mass.

Calculate $\langle M \rangle_N$ and $\langle M \rangle_M$ if equal masses of polymer molecules with $M_1 = 10,000$ and $M_2 = 1,00,000$ are mixed.

(c) Explain the application of polarography for the determination of stability constant of a metal ion complex.

(d) Write an account on kinetics of pyrolysis of acetaldehyde.

(e) What is steric factor ? Explain it using collision theory of reaction rate.

2. Attempt the following : 15

(a) What is CMC ? Explain the factors on which it depends. 7

(b) What is semiconductor interface ? Explain :

(i) Theory of double layer at semiconductor interface and

(ii) Effect of light at semiconductor solution interface. 8

3. Solve the following : 15

(a) Define :

(i) Polydispersity index of a polymer

- (ii) Degree of polymerisation
- (iii) Co-polymers and
- (iv) Intrinsic viscosity of a polymer.

The intrinsic viscosity of a solution of polyisobutylene at 25°C is 1.85 cm³ per gram. Calculate the molar mass of a polymer if the constants 'k' and 'α' are 3.60×10^{-4} and 0.64 respectively. 8

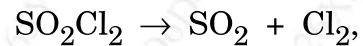
- (b) What are fast reactions ? Explain the flow methods in detail. 7
- 4. Attempt the following : 15
 - (a) Derive B.E.T. equation for multilayer adsorption. 8
 - (b) Explain the light scattering method for the determination of molar mass of a polymer. 7
- 5. Solve the following : 15
 - (a) Define :
 - (i) Diffusion current, and
 - (ii) Half-wave potential.

Explain the merits and demerits of using OME in polarography. 7

P.T.O.

- (b) What is meant by a half-life period of chemical reactions ?

For the reaction,



half-life is 420 seconds. How long it will take for the concentration of SO_2Cl_2 reduced to 2% of initial value ?

8

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

- (a) Salt-effects ionic reactions
- (b) Liquid-crystal polymers
- (c) Monitoring and prevention techniques for corrosion
- (d) Surface tension and Laplace equation.

This question paper contains 5 printed pages]

NEPKR—19—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

ORGANIC CHEMISTRY

(SCHECT-1501)

(Advanced Spectroscopic Methods)

(Thursday, 16-4-2026)

Time : 2.00 p.m. to 5.00 p.m.

Time—3 Hours

Maximum Marks—80

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

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

1. Solve the following : 20

(a) Explain the choice of solvent in U.V. spectroscopy.

(b) TMS is used as internal standard for PMR spectrometry. Explain.

(c) Use of mass spectroscopy in determination of halogen atoms.

(d) Calculate the fundamental vibrations of the following molecule :

(i) $\text{CH}_2 = \text{CH}_2$

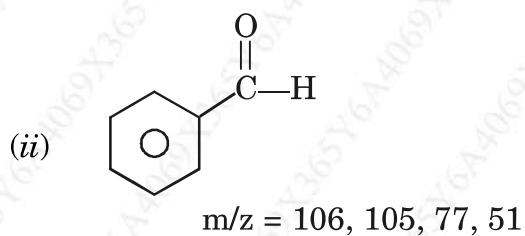
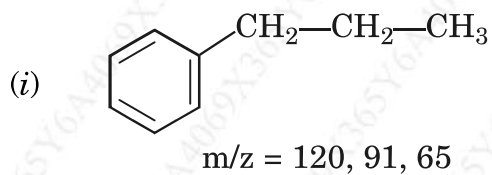
(ii) C_6H_6 .

P.T.O.

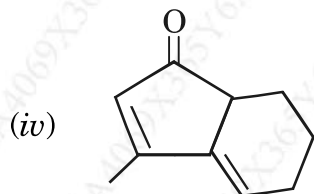
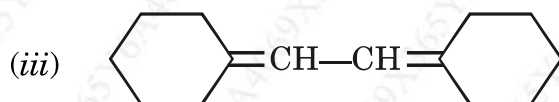
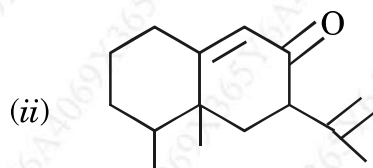
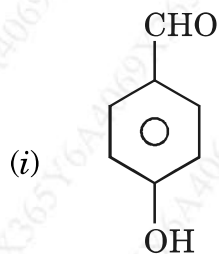
2. Answer the following :

20

(a) Explain the genesis of the following :



(b) Calculate the λ_{\max} of the following :

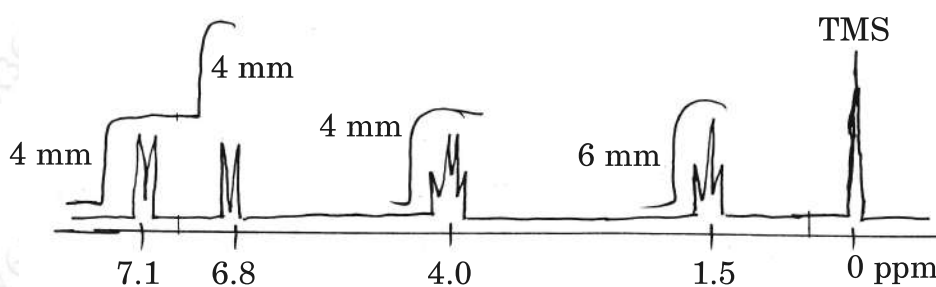


3. Solve the following :

20

(a) Compound having M.F. C_8H_9OBr shows the following NMR spectrum.

Deduce the structure.



(b) An organic compound having M.F. C_9H_8O exhibits the following spectral

data. Deduce the structure :

IR : 2710, 1700, 1675, 1600, 1580, 1500, 760 cm^{-1}

PMR (δ , ppm) : 6.7, dd, 2H, $J = 16Hz$ and 8Hz

7.6, d, 1H, $J = 8Hz$

7.1 – 7.4, m, 5H

^{13}C MR (δ , ppm) : Off resonance

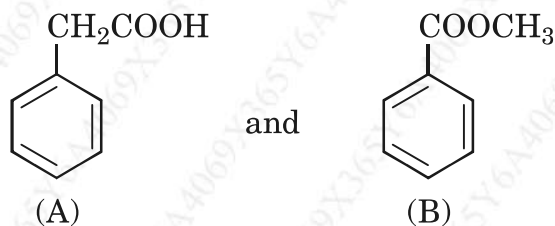
128(d), 129(d), 131(d), 134(s), 152(d) 160(d), 195(d)

P.T.O.

4. Answer the following : 20

(a) Solve the following :

(i) Differentiate the following using IR



(ii) Explain the use of fingerprint region in IR.

(b) A pale yellow compound is slightly acidic in nature and gave the following data, having M.F. $C_6H_5NO_3$

U.V. = 280 nm, $\epsilon_{\max} = 6600$

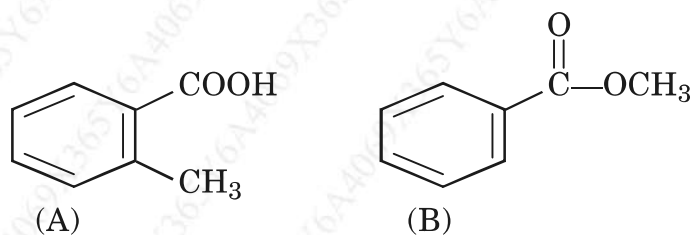
IR (cm^{-1}) : 2780, 3035, 1608, 1585, 1510, 1360, 1320, 740

NMR (δ , ppm) : 7.9, S, 1H, 7.39—7.25, m, 4H

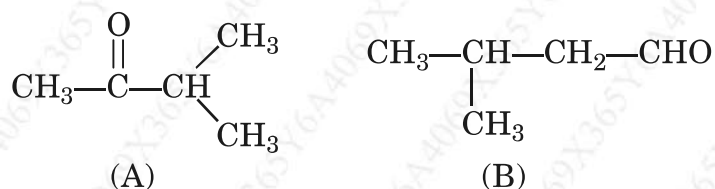
Deduce the structure.

5. Answer the following : 20

(a) (i) Deduce the number of signals in NMR spectra with their multiplicity of the following isomers :



- (ii) How will you distinguish with the following compound by using off resonance decoupled ^{13}C MR



- (b) Assign the structure of compound with M.F. $\text{C}_9\text{H}_{10}\text{O}_2$ having the following spectral data :

U.V. : 262 nm ϵ_{max} : 450.

IR (cm^{-1}) : 1745, 1225, 749, 697.

NMR : (δ , ppm) : 7.22-7.40, m, 5H

5.00, S, 2H

1.96, S, 3H

^{13}C NMR (δ , ppm) : 21.4(*t*), 51.8(*d*), 125.6(*d*), 128.4(*d*), 129.2(*d*), 138(*s*), 171(*s*).

6. Write short notes on :

20

- McLafferty Rearrangement
- Coupling constant
- Fermi resonance
- Metastable ion peak.

This question paper contains 5 printed pages]

NEPKR—87—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

ORGANIC CHEMISTRY

(SCHECT-1502)

(Organic Synthesis-I)

(Saturday, 18-4-2026)

Time : 2.00 p.m. to 5.00 p.m.

Time—3 Hours

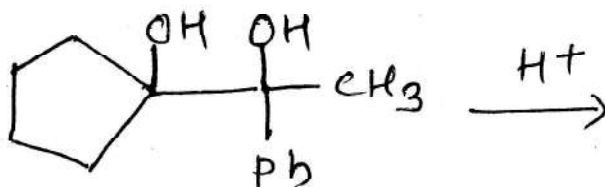
Maximum Marks—80

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

(ii) Solve any *three* of remaining five questions from Q. No. 2 to Q. No. 6.

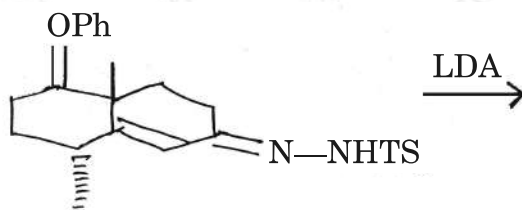
1. Solve the following questions : 20

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



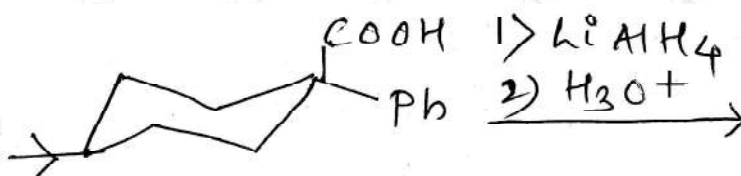
P.T.O.

- (b) Complete the following reaction with mechanism :



- (c) Explain with mechanism of Prevost hydroxylation reaction.

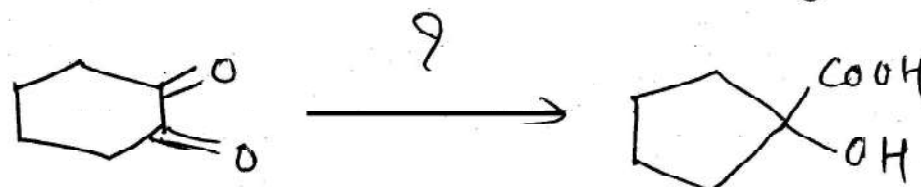
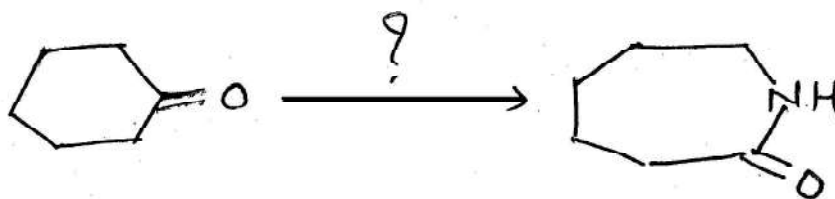
- (d) Predict the product with mechanism :



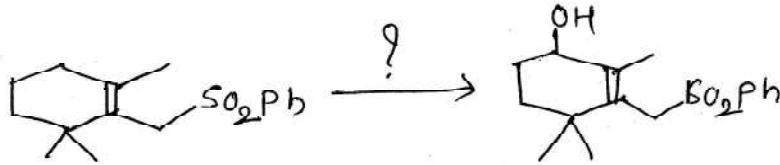
2. Answer the following :

20

- (a) Write a suitable reagent for the following conversion :



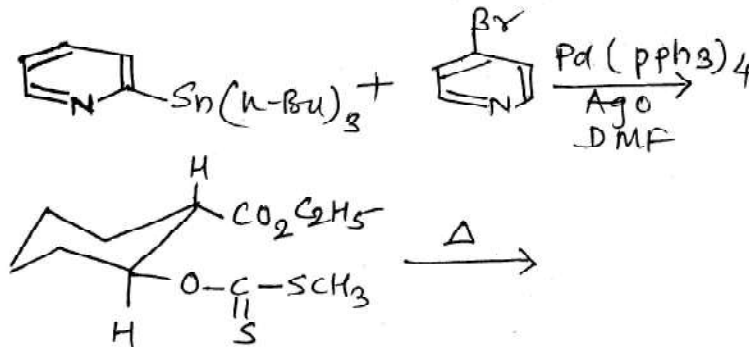
(b) Write a suitable reagent and mechanism for the following conversion :



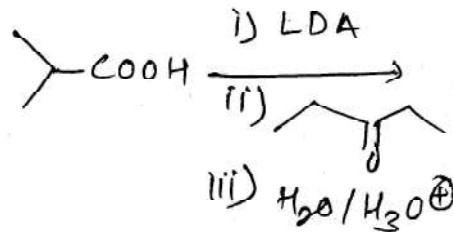
3. Solve the following :

20

(a) Predict the product with suitable mechanism :



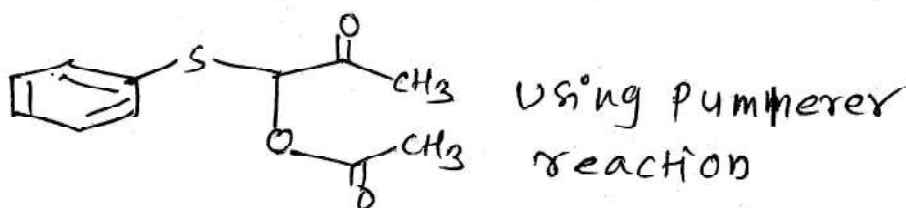
(b) Predict the product with suitable mechanism :



P.T.O.

4. Discuss the following : 20

- (a) Explain with mechanism for the preparation of the following target molecules :

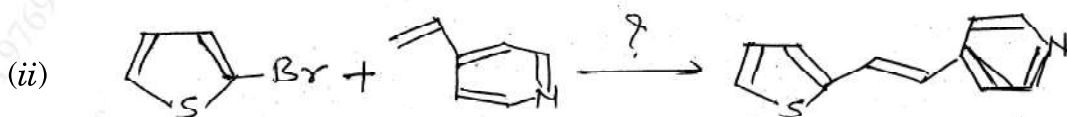
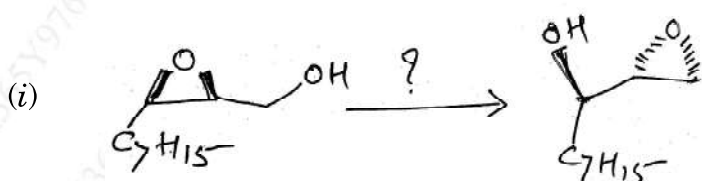


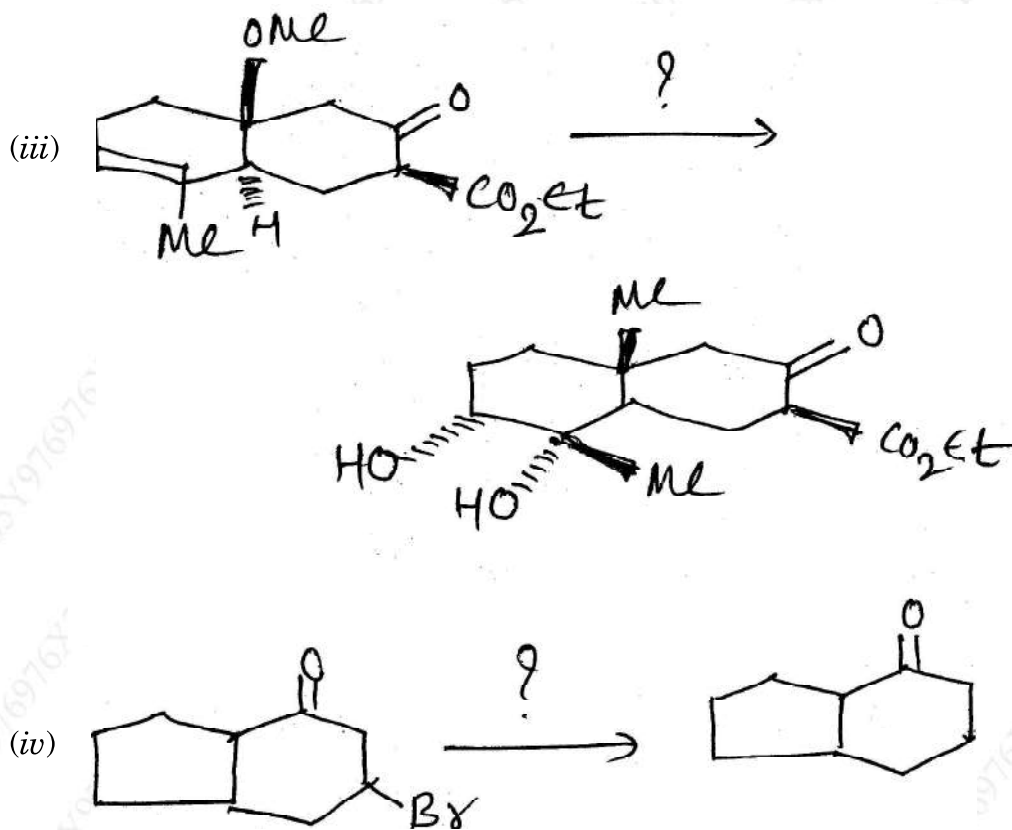
- (b) Discuss the following giving suitable example with mechanism :

(i) Julia-Lythoge reaction

(ii) Buchwald-Hartwig cross coupling reaction.

5. Write a suitable reagent with mechanism for the following conversion : 20





6. Write short notes on the following :

20

- Duff reaction
- Demjanov Rearrangement
- Oxidative cleavage of 1, 2-diols using lead tetraacetate
- N, N'-Dicyclohexyl Carbodiimide (DCC).

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

NEPKR—187—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

ORGANIC CHEMISTRY

Paper—SCHECT-1503

(Natural Products)

(Tuesday, 21-4-2026)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—40

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

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

1. Answer the following : 10
 - (a) What are vitamins ? Discuss deficiency diseases due to Vitamin A, C, D. 2.5
 - (b) Explain Isoprene rule with example. 2.5
 - (c) What are hormones ? Give the structure of testosterone and oestrone. 2.5
 - (d) Discuss skeleton of Quinine. 2.5

P.T.O.

2. Answer the following : 10
- (a) Explain the nature of –OH groups in Morphine and nature of Nitrogen in Morphine.
- (b) Offer synthesis for testosterone.
3. Answer the following : 10
- (a) Give classification of vitamins. Explain presence of β -ionone nucleus in Vitamin A.
- (b) Explain structure determination of Menthol.
4. Answer the following : 10
- (a) Explain the position of angular Methyl groups at C–10 and C–13.
- (b) Explain stereochemistry of Morphine in detail.
5. Answer the following : 10
- (a) Give determination of structure of Zingiberene.
- (b) Write a note on Diels hydrocarbon.
6. Solve the following : 10
- (a) Explain presence of five memberd lactone ring in Vitamin C.
- (b) Discuss nature of side chain in cholesterol.
- (c) Explain presence of secondary –OH group in quinine.
- (d) Write a note on oestrone.

This question paper contains 3 printed pages]

NEPKR—318—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

ORGANIC CHEMISTRY

Paper—SCHEET-1501

(Medicinal Chemistry)

(Thursday, 23-4-2026)

Time : 2.00 p.m. to 5.00 p.m.

Time—3 Hours

Maximum Marks—80

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

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

1. Answer the following : 20

(i) Explain the reduction reaction in drug metabolism with suitable example.

(ii) Explain inhibition of cell wall synthesis as mechanism of action of antibiotics.

(iii) Explain the following terms :

(a) Pharmaceutics

(b) Pharmacodynamics.

(iv) What is a Prodrug ? Discuss Prodrugs designing and types of prodrugs.

P.T.O.

2. Discuss the following : 20
- (i) Biological defences and Chemical defences.
 - (ii) Procedures followed in drug design.
3. Explain in brief : 20
- (i) Discuss the theories of drug activity.
 - (ii) SAR of sulphones as antileprotic drugs.
4. Write the answer for the following : 20
- (i) How will you design the enzyme inhibitors by :
 - (a) Competitive inhibitors and
 - (b) Suicide enzyme inactivation.
 - (ii) Explain :
 - (a) Structure activity of tetracycline.
 - (b) Synthesis and SAR of Chloramphenicol.
5. Explain the following : 20
- (i) Give synthesis and SAR of 4-amino salicylic acid and isoniazid.
 - (ii) Explain structure and activity of :
 - (a) Coumarin derivatives and
 - (b) Benzyl penicillin.

6. Write short notes on the following : 20

- (i) Oxidation reaction involved in drug metabolism
- (ii) Biological assay
- (iii) Vitamin-K analogues
- (iv) Free-Wilson method in QSAR studies.

Total No. of Printed Pages:02

SUBJECT CODE NO- NEPKR-45-2026
FACULTY OF SCIENCE AND TECHNOLOGY
EXAMINATION SUMMER 2026
M.SC. (SECOND YEAR) (SEM-IV)
RESEARCH PUBLICATION ETHICS
NEPRPE-1002

[Time: 2:00 Hours]

[Max. Marks:40]

“Please check whether you have got the right question paper.”

- N.B. (i) Question No. 1 is compulsory.
(ii) Solve any three questions from Question number 2 to 6

- Q1. Write note on:** **10**
- a) Scope of philosophy.
 - b) Principles of good scientific practices.
 - c) Objective of publishing paper.
 - d) Open access publication.
 - e) International standard book number.
- Q2.** **5**
- a) Write briefly on any two branches of philosophy.
 - b) Explain common form of scientific misconduct. **5**
- Q3.** **5**
- a) What constitute a violation of publication ethics? **5**
 - b) Mention various steps of Sherpa Romeo online resource to view detail of journal. **5**
- Q4.** **5**
- a) What are the characteristics of predatory journals? **5**
 - b) What is i_{10} index? calculate the i_{10} index of following citation. **5**

Rank	Citation
1	29
2	26
3	15
4	14
5	12
6	11
7	11
8	09
9	06

- Q5.** a) Define publication ethics. Discuss unethical practices prevalent in research publications. **5**
b) What is plagiarism? Explain its types and importance in research. **5**

Q6. Explain:

- a) Types of ethics. **10**
b) Salami slicing
c) Elsevier
d) Turnitin

This question paper contains 5 printed pages]

NEPKR—138—2026

FACULTY OF SCIENCE AND TECHNOLOGY

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

APRIL/MAY, 2026

ORGANIC CHEMISTRY

Paper SCHECT-1551

(Organic Synthesis—II)

(Monday, 20-4-2026)

Time : 2.00 p.m. to 5.00 p.m.

Time—3 Hours

Maximum Marks—80

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

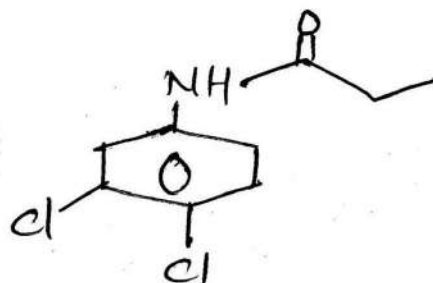
(2) Solve any *three* from remaining five questions.

(3) Simple calculator and log table is allowed.

1. Solve the following :

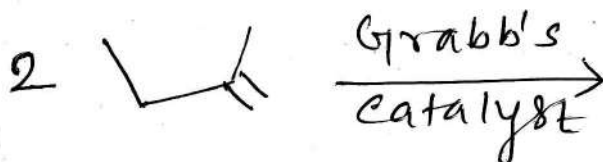
20

(a) Using retrosynthesis analysis, suggest suitable method for the synthesis of the following :

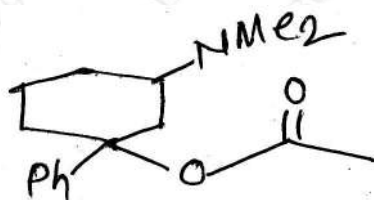


P.T.O.

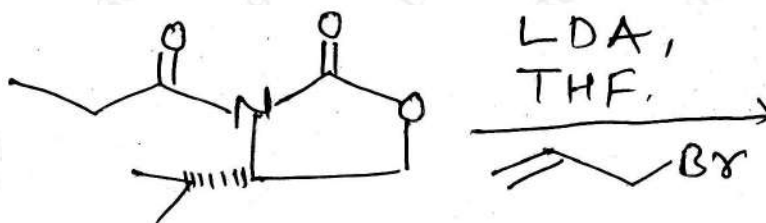
- (b) Predict the product with suitable mechanism :



- (c) Using retrosynthesis analysis, suggest suitable method for the synthesis of the following :



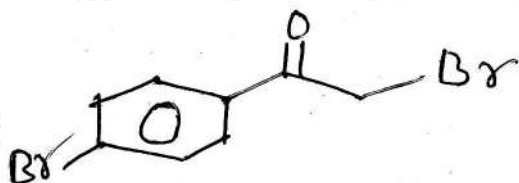
- (d) Predict the product with suitable mechanism :



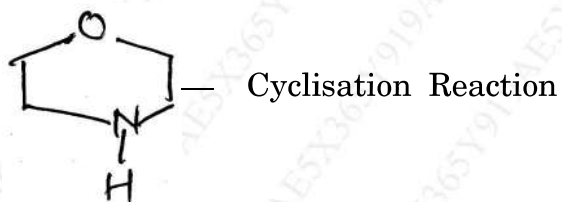
2. Solve the following :

20

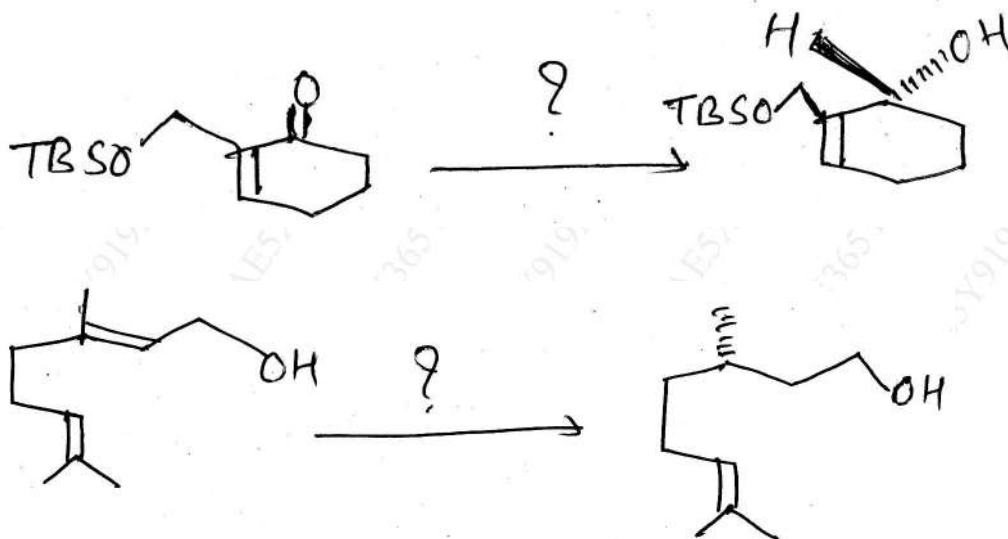
- (a) Using the given concept of synthesis, how will you synthesize the following compounds :



— Reversal of Polarity



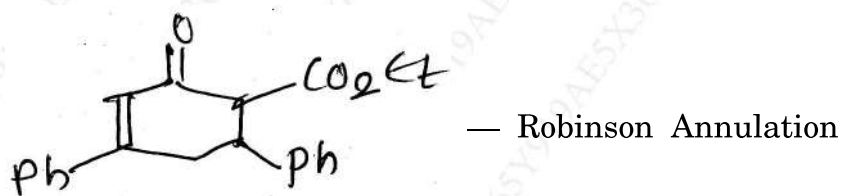
- (b) Suggest a suitable reagent and mechanism for the following conversion :



3. Answer the following :

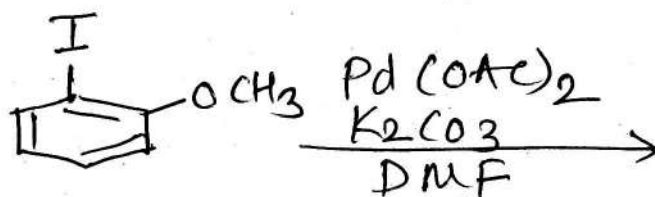
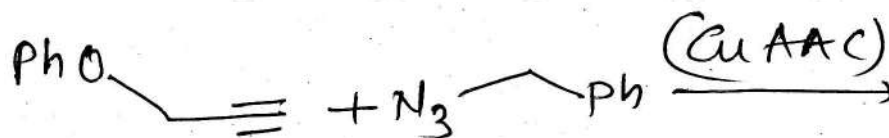
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- (a) How will you synthesize the following target molecules using :



P.T.O.

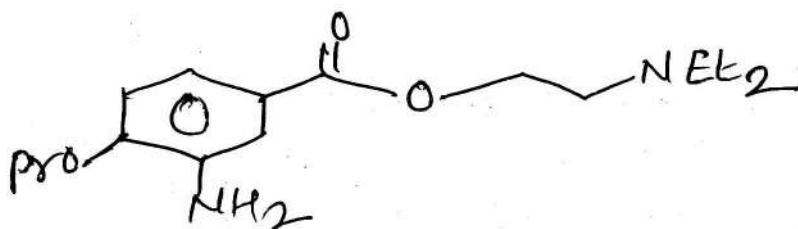
- (b) Predict the product with suitable mechanism :



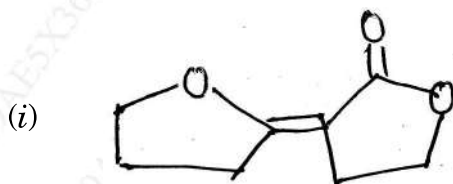
4. Solve the following :

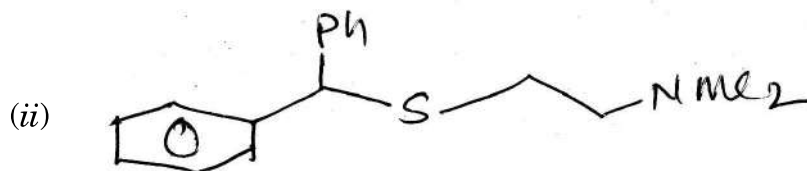
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- (a) How will you synthesize the following target molecules using retrosynthesis :



- (b) Suggest suitable method using retrosynthetic analysis for the synthesis of the following target molecules :

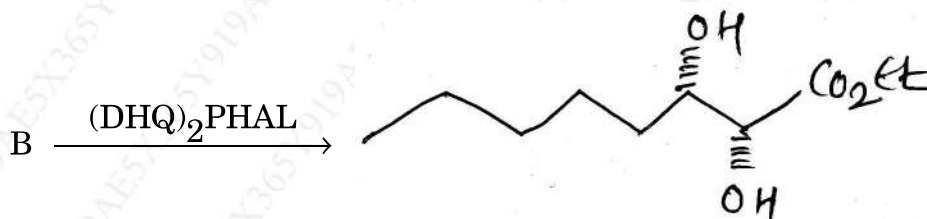
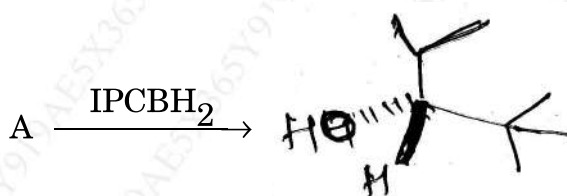




5. Discuss the following :

20

- (a) Identify 'A' and 'B' in the following reaction and write down the suitable mechanism for the formation of product :



- (b) Explain with suitable example :

- (i) Ring opening metathesis
(ii) N-heterocyclic carbene.

6. Write short notes on :

20

- (a) Use of acetylene in organic synthesis
(b) Functional group interconversion
(c) C-H activation using Nickel
(d) Jacobsen epoxidation.

This question paper contains 4 printed pages]

NEPKR—239—2026

FACULTY OF SCIENCE

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

APRIL/MAY, 2026

(NEP Pattern)

ORGANIC CHEMISTRY

Paper—SCHECT-1552

(Advanced Heterocyclic Chemistry)

(Wednesday, 22-4-2026)

Time : 2.00 p.m. to 5.00 p.m.

Time—3 Hours

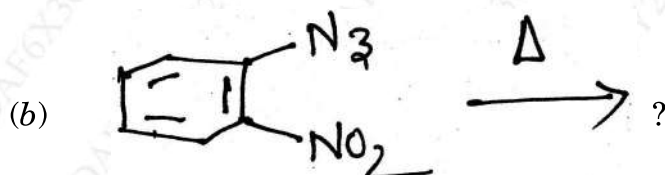
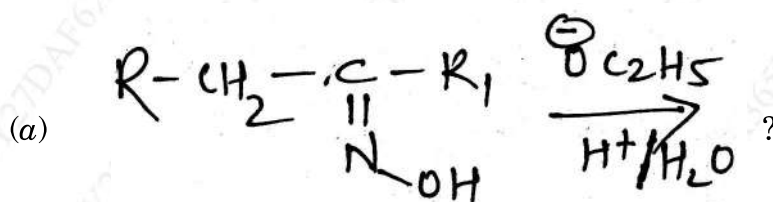
Maximum Marks—80

N.B. :— (i) First question is compulsory.

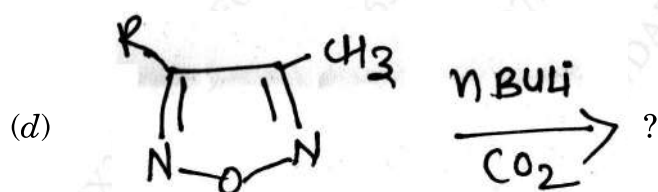
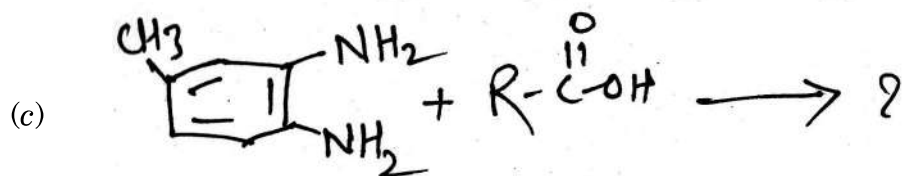
(ii) Solve any three questions from remaining five.

1. Predict the products of the following :

20



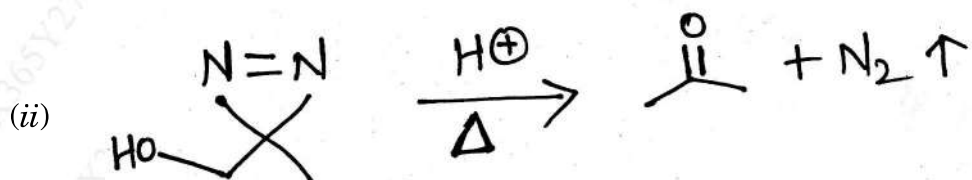
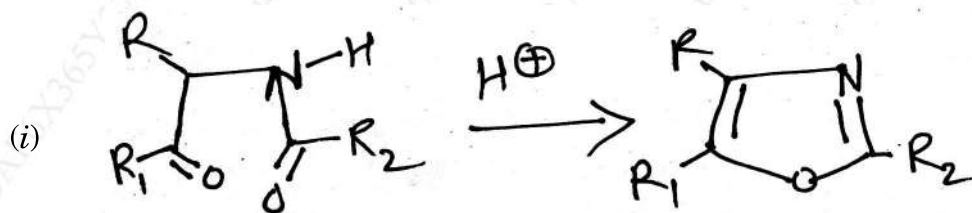
P.T.O.



2. Answer the following :

20

(a) Suggest the mechanism of the following :



(b) Explain the synthesis of diazepines :

(i) From 1, 7 diazopenta 2-4-diene

(ii) From Pyridine-N-Ylide.

3. Solve the following : 20

(a) Explain the following chemical reactions of benzimidazole :

(i) Mannich reaction

(ii) Reaction with *n*-BuLi.

(b) Give the synthesis of Azetidine from :

(i) α -haloalkylamine

(ii) Aziridine.

4. Answer the following : 20

(a) How will you obtain pyrimidine from :

(i) Malonic ester and urea

(ii) Acetyl acetone and amidine

(iii) Acetophenone and Formamide.

(b) Explain Hantzsch-Widman nomenclature system for heterocyclic compounds.

5. Answer the following : 20

(a) Solve the following :

(i) Explain the synthesis of thiazole from α -halocarbonyl compound and by Gabriel synthesis.

(ii) Explain the action of nucleophile on oxazole.

P.T.O.

(b) How will you obtain benzothiazole from :

(i) o-aminophenol and Carboxylic acid

(ii) N-aryl thioamides.

6. Write short notes on :

20

(a) Imidazole

(b) Azonine

(c) Triazine

(d) Oxazole.