

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-I

(Physical Chemistry)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

- Describe Gibb's-Duhem equation thermodynamically and show how this equation is useful ?
- Explain the following terms :—
 - Entropy is a state function.
 - The relation between the chemical potential and composition.
- Write notes on any **Two** of the following :—
 - Flash Photolysis
 - Polarography
 - Overpotential
- What do you mean by the term ionic strength ? Explain the dependence of activity coefficient on ionic strength ?
- Derive the activated Complex Theory and Compare with Arrhenius Theory.
 - The hydrolysis of an ester in presence of dilute acid follows first order while that in the presence of dilute alkali follows second order kinetics, explain.
- Write notes on any **Two** of the following :—
 - Laplace Equation
 - Boltzmann Distribution Law
 - Ilkovic Equation
- What do you understand by the term over potential ? Write notes on :—
 - Oxygen overvoltage and
 - Hydrogen overvoltage.
- Explain the following :—
 - An ensemble and types of ensembles
 - Lagrange's method of undetermined multipliers.
- What are macromolecules ? What methods are employed for determination of the molecular weights of polymer ? Describe scattering method of its determination.
- Express the term molecular interpretation of second law and third law of thermodynamics. Give atleast one example in each case.

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EXAMINATION PROGRAMME-2022
M.Sc. Chemistry, Part-I

Date	Papers	Time	Examination Centre
09.11.2022	Paper-I	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
11.11.2022	Paper-II	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
14.11.2022	Paper-III	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
16.11.2022	Paper-IV	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
18.11.2022	Paper-V	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
21.11.2022	Paper-VI	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.11.2022	Paper-VII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
25.11.2022	Paper-VIII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-II

(Inorganic Chemistry)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Draw molecular orbital diagram of NO_2 , CO_2 and CH_2 molecule. Explain their configuration bond order, stability and magnetic property.
2. Explain $d\pi - P\pi$ bonding by giving suitable examples and write short notes on Bent rule.
3. (a) What are Lanthanide contractions ? Compare it with Actinide Contraction ?
(b) What are the consequences of Lanthanide Contraction ?
4. Determine the ground state term symbol and Free Ion Term for d^2 , d^4 and d^5 system. Determine also their no. of microstates.
5. Explain why the molecule of CO_2 and CH_4 possess zero dipole moment.
6. (a) Describe the shell-model and liquid drop model of a nucleus.
(b) Write a note on G-M counter.
7. Explain the following :-
(a) Nuclear reactions and their types.
(b) Nuclear fission and manufacturing of atom bomb.
8. What is Scintillation ? Describe the Scintillation Counter operation to detect radiation caused due to radio active substances. What are its advantages over Geiger-Muller Counter.
9. State and explain Bent rule with suitable examples. Apply bent rule in prediction of bond angles in $H-C-H$ and in $CH_3-C \equiv CH$ molecule.
10. Write notes on any **Two** of the following :-
(a) Dirty Bomb. (b) Paramagnetic behaviour of lanthanide.
(c) Structure of Boranes. (d) Radio carbon dating.

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EXAMINATION PROGRAMME-2022
M.Sc. Chemistry, Part-I

Date	Papers	Time	Examination Centre
09.11.2022	Paper-I	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
11.11.2022	Paper-II	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
14.11.2022	Paper-III	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
16.11.2022	Paper-IV	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
18.11.2022	Paper-V	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
21.11.2022	Paper-VI	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
23.11.2022	Paper-VII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
25.11.2022	Paper-VIII	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna

NALANDA OPEN UNIVERSITY

M.Sc. Chemistry, Part-I PAPER-III (Organic Chemistry) Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

- What do you understand by Carbocation and Carbonion ? Explain their stability.
- What are Carbenes ? How are they generated ? Give the important reactions of Carbenes.
- Explain the Huckel theory of aromaticity with mentioning of Huckel's Rule ? Explain the aromaticity in benzenoid and non-benzenoid compound.
- (a) Explain with mechanism that electrophilic substitution occurs more easily in Toluene than in benzene ?
(b) Which of the following compound will show aromaticity :—
(i) Benzene (ii) Cyclo pentadiene (iii) Pyrrole
- What do you mean by aromatic nucleophilic substitution ? Explain unimolecular Nucleophilic aromatic substitution reaction.
- (a) Explain why aniline is more reactive than acetanilide in electrophilic substitution.
(b) Chlorobenzene is far less reactive than aniline in electrophilic substitution although chlorine and nitrogen have almost the same electronegativity.
- Explain the following :—
(a) $-NH_2$ group is ortho and para directing group. (b) $-NO_2$ group is meta-directing group.
(c) Halogens are ortho and para directing group.
- Write notes on any **Two** of the following :—
(a) Perkin reaction. (b) Mannic reaction. (c) Aldol Condensation
- Explain any **Two** term of the following :—
(a) Hyper Conjugation. (b) Tautomerism. (c) Element of symmetry.
- Discuss the following of any **Two** :—
(a) Hammond Postulate. (b) Free Radical rearrangement. (c) Sandmeyer reaction.

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M.Sc. Chemistry, Part-I Programme for Practical Counselling Classes and Practical Examination, 2022 Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. : 190250001 to 190250500 and 200250001 to 200250800

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
26.11.2022	11.00 AM to 5.00 PM	I	28.11.2022	11:00 AM to 2:00 PM
		II	28.11.2022	2:30 PM to 5:30 PM
		III	29.11.2022	11:00 AM to 2:00 PM
		V	29.11.2022	2:30 PM to 5:30 PM

For Enrollment No. 200250801 to 200251300 and 210250001 to 210250080

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
30.11.2022	11.00 AM to 5.00 PM	I	01.12.2022	11:00 AM to 2:00 PM
		II	01.12.2022	2:30 PM to 5:30 PM
		III	02.12.2022	11:00 AM to 2:00 PM
		V	02.12.2022	2:30 PM to 5:30 PM

For Enrollment No. : 210250081 to 210250200

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
05.12.2022	11.00 AM to 5.00 PM	I	06.12.2022	11:00 AM to 2:00 PM
		II	06.12.2022	2:30 PM to 5:30 PM
		III	07.12.2022	11:00 AM to 2:00 PM
		V	07.12.2022	2:30 PM to 5:30 PM

For Enrollment No. : 210250201 to 210250320

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
08.12.2022	11.00 AM to 5.00 PM	I	09.12.2022	11:00 AM to 2:00 PM
		II	09.12.2022	2:30 PM to 5:30 PM
		III	10.12.2022	11:00 AM to 2:00 PM
		V	10.12.2022	2:30 PM to 5:30 PM

For Enrollment No. : 210250321 to 210250450

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
12.12.2022	11.00 AM to 5.00 PM	I	13.12.2022	11:00 AM to 2:00 PM
		II	13.12.2022	2:30 PM to 5:30 PM
		III	14.12.2022	11:00 AM to 2:00 PM
		V	14.12.2022	2:30 PM to 5:30 PM

For Enrollment No. : 210250451 to 210250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
15.12.2022	11.00 AM to 5.00 PM	I	16.12.2022	11:00 AM to 2:00 PM
		II	16.12.2022	2:30 PM to 5:30 PM
		III	17.12.2022	11:00 AM to 2:00 PM
		V	17.12.2022	2:30 PM to 5:30 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-IV (Solid State Chemistry & Quantum Chemistry)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

- What are perfect and imperfect crystals ? Write notes on the cohesive energy.
- Explain the Powder method of crystal structure analysis.
- State Hermitian operator. Discuss its two important properties and explain it.
- Calculate the average distance of the electron from nucleus of Hydrogen atom in the 2s configuration. Can electron exist at any distance from the nucleus ?
- Derive the Schrödinger wave equation with respect to space. List the application of the Schrödinger wave equation ?
- Determine the term symbol and no. of microstates of following configuration :—
 (a) d^9 system (b) d^5 system (c) p^2 system (d) d^8 system
- To hybrid orbitals has 20% and 80% p-character. Give the expression for the hybrid orbitals and determine the angle between them.
- Explain the following terms :—
 (a) Perfect and Imperfect Crystals. (b) Super conductor.
- Discuss the postulates of Quantum mechanics.
- Write notes on any **Two** of the following :—
 (a) Difference between a conductor, semi-conductor and non-conductor.
 (b) Pauli exclusion principles. (c) Angular momentum operators.

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M.Sc. Chemistry, Part-I

Programme for Practical Counselling Classes and Practical Examination, 2022

Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. : 190250001 to 190250500 and 200250001 to 200250800

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
26.11.2022	11.00 AM to 5.00 PM	I	28.11.2022	9:00 AM to 12:00 Noon
		II	28.11.2022	12:15 PM to 3:15 PM
		III	28.11.2022	3:30 PM to 6:30 PM
		V	29.11.2022	8:00 AM to 11:00 AM

For Enrollment No. 200250801 to 200251300 and 210250001 to 210250080

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
29.11.2022	11.00 AM to 5.00 PM	I	30.11.2022	9:00 AM to 12:00 Noon
		II	30.11.2022	12:15 PM to 3:15 PM
		III	30.11.2022	3:30 PM to 6:30 PM
		V	01.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250081 to 210250200

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
01.12.2022	11.00 AM to 5.00 PM	I	02.12.2022	9:00 AM to 12:00 Noon
		II	02.12.2022	12:15 PM to 3:15 PM
		III	02.12.2022	3:30 PM to 6:30 PM
		V	05.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250201 to 210250320

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
05.12.2022	11.00 AM to 5.00 PM	I	06.12.2022	9:00 AM to 12:00 Noon
		II	06.12.2022	12:15 PM to 3:15 PM
		III	06.12.2022	3:30 PM to 6:30 PM
		V	07.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250321 to 210250450

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
07.12.2022	11.00 AM to 5.00 PM	I	08.12.2022	9:00 AM to 12:00 Noon
		II	08.12.2022	12:15 PM to 3:15 PM
		III	08.12.2022	3:30 PM to 6:30 PM
		V	09.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250451 to 210250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
09.12.2022	11.00 AM to 5.00 PM	I	10.12.2022	9:00 AM to 12:00 Noon
		II	10.12.2022	12:15 PM to 3:15 PM
		III	12.12.2022	9:00 AM to 12:00 Noon
		V	12.12.2022	12:15 PM to 3:15 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-V (Co-ordination Chemistry)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

- What do you understand by crystal field stabilization energy in complexes ? What are the factors which determine the crystal field stabilization energy. Justify the order $\Delta_{sp} > \Delta_0 > \Delta_t$.
- S and P terms do not split in crystal field but D and F term split. Explain.
- Draw the MO diagram of $[Co(CN)_6]^{3-}$.
- Calculate the free ion ground state term and no. of microstates of following configuration :—
 Ti^{+3} , Cr^+ , Fe^{++} , Sc^{++} .
- (a) Explain the selection rules for d-d transition ? When and why the selection rules break down ?
 (b) What is Spectrochemical series ?
- Explain the following :—
 (a) Labile and inert complex (b) Acid hydrolysis reaction
- (a) Explain magnetic moment and magnetic susceptibility and establish relationship between them.
 (b) Determine the magnetic moment (μ) of following ions :— Fe^{+3} , V^{+2} , Co^{+2} , Cu^{+2}
- Determine CFSE value for d^2 , d^3 , d^8 and d^{10} configuration with d-orbital occupancy diagrams.
- Explain the multiplet width. Explain population of J level in context to KT.
- Write notes on any **Two** of the following :—
 (a) Limitation of Crystal Field Theory (b) Jhon and Teller Effect
 (c) Explain the quenching of d-orbital contribution

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M.Sc. Chemistry, Part-I

Programme for Practical Counselling Classes and Practical Examination, 2022

Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. : 190250001 to 190250500 and 200250001 to 200250800

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
26.11.2022	11.00 AM to 5.00 PM	I	28.11.2022	9:00 AM to 12:00 Noon
		II	28.11.2022	12:15 PM to 3:15 PM
		III	28.11.2022	3:30 PM to 6:30 PM
		V	29.11.2022	8:00 AM to 11:00 AM

For Enrollment No. 200250801 to 200251300 and 210250001 to 210250080

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
29.11.2022	11.00 AM to 5.00 PM	I	30.11.2022	9:00 AM to 12:00 Noon
		II	30.11.2022	12:15 PM to 3:15 PM
		III	30.11.2022	3:30 PM to 6:30 PM
		V	01.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250081 to 210250200

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
01.12.2022	11.00 AM to 5.00 PM	I	02.12.2022	9:00 AM to 12:00 Noon
		II	02.12.2022	12:15 PM to 3:15 PM
		III	02.12.2022	3:30 PM to 6:30 PM
		V	05.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250201 to 210250320

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
05.12.2022	11.00 AM to 5.00 PM	I	06.12.2022	9:00 AM to 12:00 Noon
		II	06.12.2022	12:15 PM to 3:15 PM
		III	06.12.2022	3:30 PM to 6:30 PM
		V	07.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250321 to 210250450

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
07.12.2022	11.00 AM to 5.00 PM	I	08.12.2022	9:00 AM to 12:00 Noon
		II	08.12.2022	12:15 PM to 3:15 PM
		III	08.12.2022	3:30 PM to 6:30 PM
		V	09.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250451 to 210250600

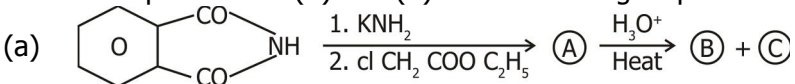
Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
09.12.2022	11.00 AM to 5.00 PM	I	10.12.2022	9:00 AM to 12:00 Noon
		II	10.12.2022	12:15 PM to 3:15 PM
		III	12.12.2022	9:00 AM to 12:00 Noon
		V	12.12.2022	12:15 PM to 3:15 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-VI (Chemistry of Biomolecule)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

- What are aminoacids ? Discuss the chemical reaction of aminoacids involving the both functional groups present in the molecule.
- Write down the structure and synthesis of any **Two** of the following :—
 (a) Adenine (b) Guanine (c) Uracil
- What are alkaloids ? How are they classified ? Give details of Quinine.
- What are Glycosides ? Give classification of glycosides. Determine the structure of glycoside by its synthesis ?
- What are important Lipids ? Write details about biological functions of Lipid and its metabolism ?
- What are Carbohydrates ? Give its classification ? Establish the ring structure of D-glucose.
- Name the products of the reaction of D-glucose with the following reagents :—
 (a) NH_2OH (b) $C_6H_5NHNH_2$ (c) Br_2 / H_2O (d) CH_3OH / HCl (e) CH_3I / Ag_2O
- Predict the products of (A) and (B) in the following sequences of reactions :—
 (a) 
 (b) $CH_3CHO \xrightarrow[KCN]{NH_4Cl} (A) \xrightarrow[Heat]{H_3O^+} (B)$
- How you will carry the following conversions :—
 (a) Glucose to Fructose (b) Citral to Cyclohexanone (c) Fructose to Glucose
- Write notes on any **Two** of the following :—
 (a) Inversion of Sucrose (b) Peptides linkage (c) Morphine

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M.Sc. Chemistry, Part-I

Programme for Practical Counselling Classes and Practical Examination, 2022

Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. : 190250001 to 190250500 and 200250001 to 200250800

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
26.11.2022	11.00 AM to 5.00 PM	I	28.11.2022	9:00 AM to 12:00 Noon
		II	28.11.2022	12:15 PM to 3:15 PM
		III	28.11.2022	3:30 PM to 6:30 PM
		V	29.11.2022	8:00 AM to 11:00 AM

For Enrollment No. 200250801 to 200251300 and 210250001 to 210250080

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
29.11.2022	11.00 AM to 5.00 PM	I	30.11.2022	9:00 AM to 12:00 Noon
		II	30.11.2022	12:15 PM to 3:15 PM
		III	30.11.2022	3:30 PM to 6:30 PM
		V	01.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250081 to 210250200

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
01.12.2022	11.00 AM to 5.00 PM	I	02.12.2022	9:00 AM to 12:00 Noon
		II	02.12.2022	12:15 PM to 3:15 PM
		III	02.12.2022	3:30 PM to 6:30 PM
		V	05.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250201 to 210250320

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
05.12.2022	11.00 AM to 5.00 PM	I	06.12.2022	9:00 AM to 12:00 Noon
		II	06.12.2022	12:15 PM to 3:15 PM
		III	06.12.2022	3:30 PM to 6:30 PM
		V	07.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250321 to 210250450

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
07.12.2022	11.00 AM to 5.00 PM	I	08.12.2022	9:00 AM to 12:00 Noon
		II	08.12.2022	12:15 PM to 3:15 PM
		III	08.12.2022	3:30 PM to 6:30 PM
		V	09.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250451 to 210250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
09.12.2022	11.00 AM to 5.00 PM	I	10.12.2022	9:00 AM to 12:00 Noon
		II	10.12.2022	12:15 PM to 3:15 PM
		III	12.12.2022	9:00 AM to 12:00 Noon
		V	12.12.2022	12:15 PM to 3:15 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER–VII (Reaction Mechanism and Super Molecular Chemistry)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

- Write special features of anionic bonding. Write the synthesis of crown ether ?
- Describe the path way of optical inversion and isomerization ?
- Write notes on Helicate, Rosettes, Cage in Supramolecular chemistry.
- How the supramolecular catalysts are similar to enzyme catalyst ? What are differences between them ?
- Explain the Free-ion ground state terms of d^2 , d^7 , d^5 , d^9 configuration and also determine the no of microstates of this ion.
- Write short notes on any **Two** of the following :—
 (a) Excited electron transfer. (b) Reaction of 2-2' bipyridines.
 (c) Optical inversion
- Write in detail about the following :—
 (a) Metal alkoxides (b) Acetylacetonate complexes
- (a) Give the structure of schiff's base derived from the reaction of salicylaldehyde and ethylene diamins ?
 (b) Explain S_NCB mechanism by giving examples.
- Explain the following :—
 (a) Bailar Twist Mechanism. (b) Marcus-Husch Theory.
- (a) Describe inner and outer sphere mechanism of electron transfer reaction in complexes. Give examples.
 (b) What are non-complimentary reaction.

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M.Sc. Chemistry, Part-I

Programme for Practical Counselling Classes and Practical Examination, 2022

Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. : 190250001 to 190250500 and 200250001 to 200250800

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
26.11.2022	11.00 AM to 5.00 PM	I	28.11.2022	9:00 AM to 12:00 Noon
		II	28.11.2022	12:15 PM to 3:15 PM
		III	28.11.2022	3:30 PM to 6:30 PM
		V	29.11.2022	8:00 AM to 11:00 AM

For Enrollment No. 200250801 to 200251300 and 210250001 to 210250080

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
29.11.2022	11.00 AM to 5.00 PM	I	30.11.2022	9:00 AM to 12:00 Noon
		II	30.11.2022	12:15 PM to 3:15 PM
		III	30.11.2022	3:30 PM to 6:30 PM
		V	01.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250081 to 210250200

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
01.12.2022	11.00 AM to 5.00 PM	I	02.12.2022	9:00 AM to 12:00 Noon
		II	02.12.2022	12:15 PM to 3:15 PM
		III	02.12.2022	3:30 PM to 6:30 PM
		V	05.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250201 to 210250320

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
05.12.2022	11.00 AM to 5.00 PM	I	06.12.2022	9:00 AM to 12:00 Noon
		II	06.12.2022	12:15 PM to 3:15 PM
		III	06.12.2022	3:30 PM to 6:30 PM
		V	07.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250321 to 210250450

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
07.12.2022	11.00 AM to 5.00 PM	I	08.12.2022	9:00 AM to 12:00 Noon
		II	08.12.2022	12:15 PM to 3:15 PM
		III	08.12.2022	3:30 PM to 6:30 PM
		V	09.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250451 to 210250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
09.12.2022	11.00 AM to 5.00 PM	I	10.12.2022	9:00 AM to 12:00 Noon
		II	10.12.2022	12:15 PM to 3:15 PM
		III	12.12.2022	9:00 AM to 12:00 Noon
		V	12.12.2022	12:15 PM to 3:15 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-VIII
(Natural Product)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

- What are Vitamins ? Discuss the classification of vitamins. Write the important sources of vitamin and mentioned deficiency diseases.
- How flavone is related to isoflavone ? Give critical account of the structure determination and synthesis of isoflavone.
- Discuss the structure of Vitamin C and discuss its synthesis.
- What are Terpenoids ? How are they classified ? Establish the structure of Phytol.
- Write notes on any **Two** of the following :—
(a) Structure of cholesterol and chlostenal. (b) Narcotine.
(c) Presence of phenanthrene nucleons in morphine.
- Discuss the structure of abietic acid and conformed by synthetic method.
- Write notes on any **Two** of the following :—
(a) Synthesis of Chlorophyll-a (b) Structure of Eestron (c) Santonin
- Establish the structure of Vitamin B₂. Give the synthesis of Vitamin B₂.
- (a) Establish the structure of zingiberene.
(b) Discuss the structure of opianic acid.
- What are porphyrins ? Write the degradative and synthetic evidence for the determination of structure of Haemin.

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REVISED

M.Sc. Chemistry, Part-I

Programme for Practical Counselling Classes and Practical Examination, 2022

Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. : 190250001 to 190250500 and 200250001 to 200250800

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
26.11.2022	11.00 AM to 5.00 PM	I	28.11.2022	9:00 AM to 12:00 Noon
		II	28.11.2022	12:15 PM to 3:15 PM
		III	28.11.2022	3:30 PM to 6:30 PM
		V	29.11.2022	8:00 AM to 11:00 AM

For Enrollment No. 200250801 to 200251300 and 210250001 to 210250080

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
29.11.2022	11.00 AM to 5.00 PM	I	30.11.2022	9:00 AM to 12:00 Noon
		II	30.11.2022	12:15 PM to 3:15 PM
		III	30.11.2022	3:30 PM to 6:30 PM
		V	01.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250081 to 210250200

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
01.12.2022	11.00 AM to 5.00 PM	I	02.12.2022	9:00 AM to 12:00 Noon
		II	02.12.2022	12:15 PM to 3:15 PM
		III	02.12.2022	3:30 PM to 6:30 PM
		V	05.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250201 to 210250320

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
05.12.2022	11.00 AM to 5.00 PM	I	06.12.2022	9:00 AM to 12:00 Noon
		II	06.12.2022	12:15 PM to 3:15 PM
		III	06.12.2022	3:30 PM to 6:30 PM
		V	07.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250321 to 210250450

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
07.12.2022	11.00 AM to 5.00 PM	I	08.12.2022	9:00 AM to 12:00 Noon
		II	08.12.2022	12:15 PM to 3:15 PM
		III	08.12.2022	3:30 PM to 6:30 PM
		V	09.12.2022	8:00 AM to 11:00 AM

For Enrollment No. : 210250451 to 210250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
09.12.2022	11.00 AM to 5.00 PM	I	10.12.2022	9:00 AM to 12:00 Noon
		II	10.12.2022	12:15 PM to 3:15 PM
		III	12.12.2022	9:00 AM to 12:00 Noon
		V	12.12.2022	12:15 PM to 3:15 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER-IX
(Spectroscopy)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. Explain the Zero-field splitting in ESR Spectroscopy. What is G factor in ESR ?
2. What are the applications of ESR in the study of organic and simple inorganic radicals ?
3. Explain the following :—
(a) Bond length and calculation. (b) Stark effect.
4. Determine the ground state term and no. of microstates of following ion ?
(a) Fe^{+3} (b) Cu^{+2} (c) Co^{+2} (d) Ni^{+2}
5. Write notes on any **Two** of the following :—
(a) Beer-Lambert's law (b) Red and Blue Shift (c) Mc Lafferty Rearrangement
6. Explain any **Two** of the following :—
(a) Selection rule in I-R Spectroscopy
(b) Steric effect in biphenyls
(c) Pascal Triangle and its significance
7. (a) What are meant by the chemical shift in NMR spectroscopy ? Describe the factors affecting chemical shift.
(b) What are the formulae of chemical shift and what influences of chemical shift ?
8. (a) What is the basic principle of TMS.
(b) Why TMS is used as a reference compound in NMR spectroscopy.
(c) Which of the following nuclei do not show nuclear magnetic resonance :—
 ^1H , $^{12}\text{C}_6$, $^{14}\text{N}_7$, $^{16}\text{O}_6$, $^{19}\text{F}_9$, $^4\text{He}_2$
(d) Which of the following are microwave active ?
(i) HCl (ii) CO_2 (iii) H_2 (iv) O_2
9. Explain any **Two** of the following :—
(a) d-d transition (b) $n \rightarrow \pi^*$ transition (c) Franck-Condon principle
10. Explain the following :—
(a) Hyperfine structure in ESR spectra.
(b) Distinguish between pure rotational spectrum and vibration rotation spectrum of molecule. How are they different from electronic spectrum ?

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EXAMINATION PROGRAMME-2022
M.Sc. Chemistry, Part-II

Date	Papers	Time	Examination Centre
27.01.2023	Paper-IX	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
31.01.2023	Paper-X	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
02.02.2023	Paper-XI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
04.02.2023	Paper-XII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
06.02.2023	Paper-XIII	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
08.02.2023	Paper-XIV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
10.02.2023	Paper-XV	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
14.02.2023	Paper-XVI	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER-X

(Advance Chemical Dynamics)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

- Discuss the NMR method for study of fast reaction. What are the advantages of using fast Track ?
- What is Kinetic primary and secondary salt effect ? Describe the Bronsted Bjerrum equation.
- Write notes on any **Two** of the following :—
 - Theory of acid-base catalyst.
 - Primary and Secondary salt effect.
 - Vant Hoff intermediates.
- Describe the Kinetics of Corrosion. Describe the various factors which influence the Corrosion.
- Explain the Kinetic of reaction in liquid and gas phase. What is diffusion controlled reaction?
- Describe the postulates of the Transition state theory. Compare between the collision and the transition state theory.
- Explain the following :—
 - Ground state terms and no. of microstates of d^8 configuration and d^6 configuration.
 - Activation Controlled Reaction.
- Write notes on any **Two** of the following :—
 - Laser Flash Photolysis.
 - Bronsted Catalysis Reaction.
 - Photo dissociation and recombination reaction.
- Answer the following :—
 - General mechanism of catalytic reaction.
 - Oscillatory Reaction.
 - Stoichiometric Number.
- Discuss the effect of ionic strength and dielectric constant of the medium on the rate constant of the reaction.

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M.Sc. Chemistry, Part-II
Programme for Practical Counselling Classes and Practical Examination, 2022
Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. 180250001 to 180250300 & 190250001 to 190250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
15.02.2023	11.00 AM to 5.30 PM	XII	16.02.2023	11:30 AM to 2:30 PM
		XIII	16.02.2023	2:45 PM to 5:45 PM
		XV	17.02.2023	11:30 AM to 2:30 PM
		XVI	17.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250001 to 200250230

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
20.02.2023	11.00 AM to 5.30 PM	XII	21.02.2023	11:30 AM to 2:30 PM
		XIII	21.02.2023	2:45 PM to 5:45 PM
		XV	22.02.2023	11:30 AM to 2:30 PM
		XVI	22.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250231 to 200251300

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
23.02.2023	11.00 AM to 5.30 PM	XII	24.02.2023	11:30 AM to 2:30 PM
		XIII	24.02.2023	2:45 PM to 5:45 PM
		XV	25.02.2023	11:30 AM to 2:30 PM
		XVI	25.02.2023	2:45 PM to 5:45 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XI
(Molecular Thermodynamics)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. (a) Entropy production due to heat flow inside the system is irreversible processes. Explain.
(b) How entropy is conserved in reversible process ?
2. (a) State and derive the Bose-Einstein statistics.
(b) Why is BEC created ?
3. Compare between the Maxwell-Boltzmann's, Bose-Einstein's and the Fermi-Dirac statistics.
4. Write short notes on any **Two** of the following :—
(a) Dulong and Petit's law.
(b) Micro-Canonical ensembles.
(c) Specific heat of solid.
5. Derive expression for any **Two** of the following :—
(a) Rotational partition function.
(b) Translational partition function.
(c) Vibrational partition function.
6. (a) Mention various types of ensembles.
(b) Define Canonical ensembles in statistical thermodynamics.
7. Explain statistical interpretation of entropy and heat capacity of gases.
8. What is Onsager reciprocal relation ? What is basic of this relationship ? Discuss the unity of these relations in couples flow system.
9. Write notes on any **Two** of the following :—
(a) Nuclear partition function.
(b) Entropy of ortho and para hydrogen and their ratio.
(c) Electronic partition function.
10. Explain the following :—
(a) Thermodynamic Reversibility.
(b) Comparison of various Ensembles
(c) Entropy production and its expression for the rate of entropy production.

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M.Sc. Chemistry, Part–II
Programme for Practical Counselling Classes and Practical Examination, 2022
Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. 180250001 to 180250300 & 190250001 to 190250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
15.02.2023	11.00 AM to 5.30 PM	XII	16.02.2023	11:30 AM to 2:30 PM
		XIII	16.02.2023	2:45 PM to 5:45 PM
		XV	17.02.2023	11:30 AM to 2:30 PM
		XVI	17.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250001 to 200250230

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
20.02.2023	11.00 AM to 5.30 PM	XII	21.02.2023	11:30 AM to 2:30 PM
		XIII	21.02.2023	2:45 PM to 5:45 PM
		XV	22.02.2023	11:30 AM to 2:30 PM
		XVI	22.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250231 to 200251300

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
23.02.2023	11.00 AM to 5.30 PM	XII	24.02.2023	11:30 AM to 2:30 PM
		XIII	24.02.2023	2:45 PM to 5:45 PM
		XV	25.02.2023	11:30 AM to 2:30 PM
		XVI	25.02.2023	2:45 PM to 5:45 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XII
(Ligand Field Theory)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

- Explain charge transfer Bands and their assignment in both octahedral and tetrahedral field.
- Explain the following :–
 (a) Racah Parameters. (b) Non-crossing Rule.
- Explain the following :–
 (a) Cross Over Points. (b) Correlation diagrams for d^1 and d^8 systems.
- Explain the following :–
 (a) Vibronic Coupling. (b) High spin and low spin octahedral complex
- Derive the free ion term, ground state term and no. of microstates of following configuration :
 Cr^{+2} , Fe^{+3} , Cu^{+2} , V^{+2}
- Write short notes on any **Two** of the following :–
 (a) Nephelauxetic Ratio.
 (b) Spin Cross Over Phenomenon and importance of spin cross over.
 (c) Condon Shortley Parameters.
- Explain the application of ESR spectroscopy in the study of Inorganic Chemistry.
- (a) How does the term 4F split by spin orbit coupling.
 (b) Explain Hund's rule of maximum spin multiplicity.
- Explain the application of IR spectroscopy in metal carbonyl and nitrosyl.
- Explain the following :–
 (a) How IR spectra can be used to distinguish Fe(II) and Fe(III) ion ?
 (b) Write selection rules observed in IR spectra of diatomic molecules.

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M.Sc. Chemistry, Part–II
Programme for Practical Counselling Classes and Practical Examination, 2022
Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. 180250001 to 180250300 & 190250001 to 190250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
15.02.2023	11.00 AM to 5.30 PM	XII	16.02.2023	11:30 AM to 2:30 PM
		XIII	16.02.2023	2:45 PM to 5:45 PM
		XV	17.02.2023	11:30 AM to 2:30 PM
		XVI	17.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250001 to 200250230

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
20.02.2023	11.00 AM to 5.30 PM	XII	21.02.2023	11:30 AM to 2:30 PM
		XIII	21.02.2023	2:45 PM to 5:45 PM
		XV	22.02.2023	11:30 AM to 2:30 PM
		XVI	22.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250231 to 200251300

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
23.02.2023	11.00 AM to 5.30 PM	XII	24.02.2023	11:30 AM to 2:30 PM
		XIII	24.02.2023	2:45 PM to 5:45 PM
		XV	25.02.2023	11:30 AM to 2:30 PM
		XVI	25.02.2023	2:45 PM to 5:45 PM

NALANDA OPEN UNIVERSITY

M.Sc. Chemistry, Part-II

PAPER–XIII

(Organotransition Metal Chemistry and Metal Clusters)

Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

- What are the factors determining the stability of transition metal alkyls ? Why organometallic compounds are more stable than alkyl organometallic compounds ?
- How you will synthesize the δ bonded organo-transition metal compound.
- What is ZSM-5 ? How methanol can be transformed into gasoline using ZSM-5 ?
- What is metal nitrosyl ? Explain the structure of nitrosyl ? Write the Molecular Orbital diagram for NO and NO⁺ ?
- What is Zeigler-Natta catalyst ? How ethylene is polymerized to produce useful material like plastic, fibre and PVC ? Discuss mechanism involved in it ?
- What is the concept of organometallic compounds ?
 - Explain the preparation and structure of Zeise's salt ?
 - What are the application of Zeise's salt ?
- Explain MO diagram of CO.
 - What is 18 electron rule?
 - What is naked cluster ?
- Write short notes on the following :—
 - Zintl ions.
 - Gasoline of four types.
- Write notes on any **Two** of the following :—
 - MO treatment for 3 centres-2 electron Bond formation in B_2H_6 molecule.
 - Oxo Process.
 - Fischer-Tropsch reaction.
- Write the general method of preparation of metal carbonyl and its properties.

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M.Sc. Chemistry, Part–II

Programme for Practical Counselling Classes and Practical Examination, 2022

Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. 180250001 to 180250300 & 190250001 to 190250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
15.02.2023	11.00 AM to 5.30 PM	XII	16.02.2023	11:30 AM to 2:30 PM
		XIII	16.02.2023	2:45 PM to 5:45 PM
		XV	17.02.2023	11:30 AM to 2:30 PM
		XVI	17.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250001 to 200250230

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
20.02.2023	11.00 AM to 5.30 PM	XII	21.02.2023	11:30 AM to 2:30 PM
		XIII	21.02.2023	2:45 PM to 5:45 PM
		XV	22.02.2023	11:30 AM to 2:30 PM
		XVI	22.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250231 to 200251300

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
23.02.2023	11.00 AM to 5.30 PM	XII	24.02.2023	11:30 AM to 2:30 PM
		XIII	24.02.2023	2:45 PM to 5:45 PM
		XV	25.02.2023	11:30 AM to 2:30 PM
		XVI	25.02.2023	2:45 PM to 5:45 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XIV

(Photochemistry and Pericyclic Reaction)
Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. Give mechanism of Norrish Type-I process. How many types of Carbonyl compounds gives this reaction ?
2. What do you mean by Pericyclic reaction ? What are the types of Pericyclic reaction ? Write them with suitable examples.
3. What is Conrotatory motion and disrotatory motion.
4. Write short notes on the following :–
 (a) Photochemistry of aromatic compounds.
 (b) Franck Condon Principle.
5. Give π molecular diagram of
 (a) 1, 3 – Pentadiene
 (b) 1, 3, 5 – Heptatriene
6. What is the endo-rule as applied to Diel-Alder reaction ?
7. Explain Barton reaction. Give its synthetic use and application.
8. Discuss Zimmerman mechanism for the rearrangement given by 2, 5-dinones.
9. Write notes on any **Two** of the following :–
 (a) Singlet and Triplet State.
 (b) Cape rearrangement and Aza Cape rearrangements.
 (c) Quenching.
10. Give the photochemistry of intermolecular dimerisation (2+2) cycloaddition.

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M.Sc. Chemistry, Part–II
Programme for Practical Counselling Classes and Practical Examination, 2022
Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. 180250001 to 180250300 & 190250001 to 190250600

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
15.02.2023	11.00 AM to 5.30 PM	XII	16.02.2023	11:30 AM to 2:30 PM
		XIII	16.02.2023	2:45 PM to 5:45 PM
		XV	17.02.2023	11:30 AM to 2:30 PM
		XVI	17.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250001 to 200250230

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
20.02.2023	11.00 AM to 5.30 PM	XII	21.02.2023	11:30 AM to 2:30 PM
		XIII	21.02.2023	2:45 PM to 5:45 PM
		XV	22.02.2023	11:30 AM to 2:30 PM
		XVI	22.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250231 to 200251300

<i>Counselling Class Programme</i>		<i>Practical Examination Programme</i>		
<i>Date</i>	<i>Time</i>	<i>Paper</i>	<i>Date</i>	<i>Time</i>
23.02.2023	11.00 AM to 5.30 PM	XII	24.02.2023	11:30 AM to 2:30 PM
		XIII	24.02.2023	2:45 PM to 5:45 PM
		XV	25.02.2023	11:30 AM to 2:30 PM
		XVI	25.02.2023	2:45 PM to 5:45 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XV

(Organic Synthesis)
 Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

- Discuss the preparation and four properties of thioether.
- Explain the synthetic use of H_2O_2 and O_5O_4 in the oxidation of alkene to glycol.
- (a) Explain the synthetic use of $NaBH_4$. Compare reductions with $NaBH_4$ and $LiAlH_4$.
 (b) Is $NaBH_4$ oxidising or reducing agent ?
- Write notes on any **Two** of the following :—
 (a) Etard Reaction (b) Barton Reaction (c) Oppenauer Oxidation
- Write notes on any **Two** of the following :—
 (a) Prevost Reaction (b) Aldol Reaction. (c) Perkin Reaction.
- How organomagnesium compounds are prepared ? How does Grignard reagents react with :—
 (a) Acetaldehyde (b) Formaldehyde (c) Acetone (d) CO_2 (e) H_2O
- Write notes on the following :—
 (a) Sulpha Drug (b) Mustard Gas
- How thio alcohol may be prepared from alcohol ? How thiols react with (a) Acetone, (b) Mercuric oxide, (c) Lead acetate, and (d) Acetyl Chloride.
- Write mechanism of each of the following rearrangements :—
 (a) Claisen's Rearrangement. (b) Arndt Eistert Reaction.
- How are organo lithium compounds are prepared ? Explain that organo lithium compounds give α, β unsaturated alcohol with α, β unsaturated ketone whereas Grignard reagent give saturated ketones under same condition.p

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M.Sc. Chemistry, Part–II
Programme for Practical Counselling Classes and Practical Examination, 2022
Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. 180250001 to 180250300 & 190250001 to 190250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
15.02.2023	11.00 AM to 5.30 PM	XII	16.02.2023	11:30 AM to 2:30 PM
		XIII	16.02.2023	2:45 PM to 5:45 PM
		XV	17.02.2023	11:30 AM to 2:30 PM
		XVI	17.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250001 to 200250230

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
20.02.2023	11.00 AM to 5.30 PM	XII	21.02.2023	11:30 AM to 2:30 PM
		XIII	21.02.2023	2:45 PM to 5:45 PM
		XV	22.02.2023	11:30 AM to 2:30 PM
		XVI	22.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250231 to 200251300

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
23.02.2023	11.00 AM to 5.30 PM	XII	24.02.2023	11:30 AM to 2:30 PM
		XIII	24.02.2023	2:45 PM to 5:45 PM
		XV	25.02.2023	11:30 AM to 2:30 PM
		XVI	25.02.2023	2:45 PM to 5:45 PM

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XVI
 (Environmental Chemistry and Analytical Chemistry)
 Annual Examination, 2022

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. Explain Biogeochemical cycles in environments ? How do they sustain life in biosphere ?
2. Explain the composition of soil ? Discuss the organic and inorganic components of soil. Write a note on waste treatment of soil.
3. Explain defluorination and fluoridation. How you will estimate the fluoride in the sample of water ?
4. Write notes on any **Two** of the following :—
 (a) Acid Rain
 (b) Measuring of BOD and COD
 (c) Photochemical Reaction in Atmosphere
5. Explain the following :—
 (a) Rf Value
 (b) TLC
 (c) TGA
6. What are heavy metals which pollute drinking water ? How will you estimate Hg and Pd in water sample ?
7. How SO₂, CO₂, CO, NO₂ pollutants gas are measured ? How these gasses damage our health system in society ?
8. Write notes on the following :—
 (a) Green House Effect
 (b) Arsenic in drinking water and its hazardous effect on your health.
9. What is smog ? What are its mechanism ? How does it harm the human life and other living World ?
10. (a) What is gasoline ? What are its types on the basis of octane number ?
 (b) Is gasoline a gas or oil ?
 (c) What is a gasoline made of ?

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M.Sc. Chemistry, Part–II
Programme for Practical Counselling Classes and Practical Examination, 2022
Venue : Chemistry Lab, 4th Floor, Biscomaun Bhawan, Patna

For Enrollment No. 180250001 to 180250300 & 190250001 to 190250600

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
15.02.2023	11.00 AM to 5.30 PM	XII	16.02.2023	11:30 AM to 2:30 PM
		XIII	16.02.2023	2:45 PM to 5:45 PM
		XV	17.02.2023	11:30 AM to 2:30 PM
		XVI	17.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250001 to 200250230

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
20.02.2023	11.00 AM to 5.30 PM	XII	21.02.2023	11:30 AM to 2:30 PM
		XIII	21.02.2023	2:45 PM to 5:45 PM
		XV	22.02.2023	11:30 AM to 2:30 PM
		XVI	22.02.2023	2:45 PM to 5:45 PM

For Enrollment No. 200250231 to 200251300

Counselling Class Programme		Practical Examination Programme		
Date	Time	Paper	Date	Time
23.02.2023	11.00 AM to 5.30 PM	XII	24.02.2023	11:30 AM to 2:30 PM
		XIII	24.02.2023	2:45 PM to 5:45 PM
		XV	25.02.2023	11:30 AM to 2:30 PM
		XVI	25.02.2023	2:45 PM to 5:45 PM