

NALANDA OPEN UNIVERSITY

B.Sc. Chemistry, Part-I

PAPER-I (Honours)

(Physical Chemistry and Inorganic Chemistry)

Annual Examination, 2023

Time : 3 Hours.

Full Marks : 80

Answer any **Five** questions. All questions carry equal marks.

1. What is Hybridization ? Determine the hybridization, structure and shape of following molecules :—
 H_2O , NH_3 , CH_4 , BCl_2 , PCl_5 , CO_2
2. Write down the electronic configuration of the following :—
 Cr^+ , Mo , Cu^{++} , O^{-2} , Fe^{+3} , X_e , A_r , B_r^-
3. (a) What is Bohr-Sommerfeld model of Atom ? What are its limitation ?
(b) Explain the meaning of ψ and ψ^2 ?
4. Write notes on any **Two** of the following :—
(a) Electronegativity (b) Inert pair effect (c) Fajan'n Rule
5. Write the electronic dot structure of following compounds :—
(i) CCl_4 , (ii) CaF_2 (iii) Na_2O (iv) O_3 (v) SO_4^{-2} (vi) CO , (vii) CaO (viii) $BeCl_2$
6. Explain the position of noble gases in Periodic table. Write their electronic configuration. Why these are called inert gases also ? How they are isolated from atmospheric air ?
7. (a) What is sigma (δ) and Pai (π) bond ? Distinguish between them ?
(b) Draw the shape of all five 3d-orbitals ?
8. What are the postulates of the kinetic molecular theory of Gases ? Derive kinetic equation for gases?
9. Explain the following terms:-
(a) Collision frequency (b) Collision diameter (c) Mean freepath
10. Write notes on any two:-
(a) Hydrolysis of part (b) Common ion effect (c) P^H of solution

• • •

EXAMINATION PROGRAMME, 2023 B.Sc. Physics, Chemistry, Botany, Zoology & Mathematics (Hons.), Part-I

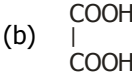
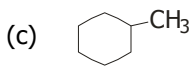
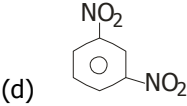
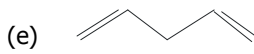
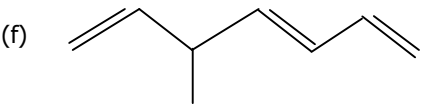
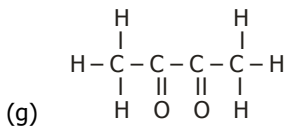
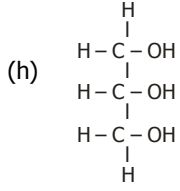
Date	Papers	Time	Examination Centre
01.09.2023	Honours Paper-I	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
05.09.2023	Honours Paper-II	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
07.09.2023	Hindi Composition-100 or Hindi-50 + Urdu-50 or Eng-50	2.30 PM to 5.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
12.09.2023	Chemistry (Sub)-I	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
13.09.2023	Mathematics (Sub)-I	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
14.09.2023	Zoology (Sub)-I	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
15.09.2023	Physics (Sub)-I	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
16.09.2023	Botany (Sub)-I	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
18.09.2023	Geography (Sub) P-I	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna
19.09.2023	Home Science (Sub) P-I	10.30 AM to 1.30 PM	Nalanda Open University, 2 nd Floor, Biscomaun Bhawan, Patna

NALANDA OPEN UNIVERSITY
B.Sc. Chemistry, Part-I,
PAPER-II (Honours)
Annual Examination, 2023
(Physical Chemistry and Organic Chemistry)

Time : 3 Hours.

Full Marks : 80

*Answer any **Five** questions. All questions carry equal marks.*

- State and explain First law of thermodynamics.
 - Derive relationship $C_p - C_v = R$
- Write notes on any **Two** of the following :—
 - Entropy.
 - Work done in isothermal process
 - Extensive and intensive properties
- Give IUPAC name of following organic compounds :—
 - $CH_3 - CH = CH - C \equiv C - COOH$
 - 
 - 
 - 
 - 
 - 
 - 
 - 
- Write the structure formula of following compounds :—
 - Methanic acid
 - Propanoic acid
 - Aniline
 - Benzoic acid
 - Phenol
 - Toluene
 - Trinitro benzene
 - 2-nitro benzoic acid
- How urea is prepared ? Explain why urea is basic ? How would you identify urea in laboratory ? How urea reacts with (a) hydrazine (b) HNO_2 .
- Write notes on any **Two** of the following :—
 - Inductive effect
 - Carbanium ion
 - Electrometric effect
- How primary amine is prepared ? Explain the basicity of amine ? Explain that secondary amine is more basic than primary amine and tertiary amine ?
- Explain the stereo chemistry of lactic acid and tartaric acid.
 - Explain Geometrical Isomerism.
- Write IUPAC name of Lactic acid. How Lactic acid is prepared industrially? How it reacts with (a) PCl_5 (b) conc. H_2SO_4 (c) I_2
- What are alcohols and how they are classified? How you will distinguish between primary secondary and tertiary alcohols? Give equation wherever possible?

• • •
 Programme of B.Sc. Part-I Chemistry (Hons.)

Practical Examination 2023

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

Practical Counselling Class Programme

Date	Time	Roll No.
08.09.2023	11:00 AM to 02:00 PM	200470001 to 200470200 210470001 to 210470200 220470001 to 220470030
	02:00 PM to 05:00 PM	220470031 to 220470700

Practical Exam Programme

Date	Paper	Time	Roll No.
09.09.2023	I	11:00 AM to 02:00 PM	200470001 to 200470200 210470001 to 210470200 220470001 to 220470030
	II	02:30 PM to 05:30 PM	220470031 to 220470700
11.09.2023	I	11:00 AM to 02:00 PM	220470031 to 220470700
	II	02:30 PM to 05:30 PM	

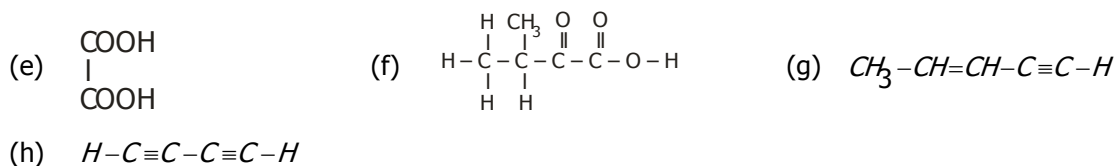
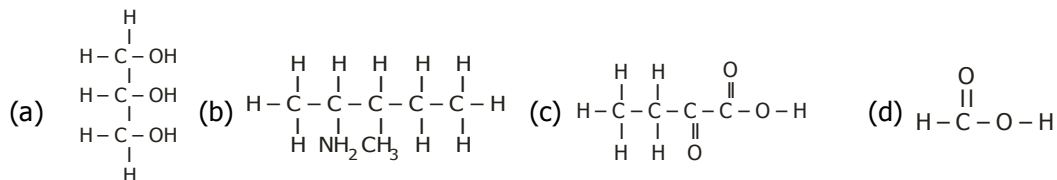
NALANDA OPEN UNIVERSITY
B.Sc. Chemistry, Part-I, PAPER-I (Subsidiary)
Annual Examination, 2023

Time : 3 Hours.

Full Marks : 80

*Answer any **Five** questions. All questions carry equal marks.*

- Distinguish between order of reaction and molecularity? Derive the expression of 2nd order of reaction ?
- Explain the application of phase rule in water system with neat phase diagram.
- Give IUPAC name of following organic compounds :—



- Explain the open chain and ring chain structure of Fructose.
- Explain the reaction mechanism of nitration and halogenations in Benzene.
- Write notes on any **Two** of following reactions :—
 (a) Perkin Reaction (b) Aldol Condensation (c) Friedal Craft Reaction
- Explain the following terms :—
 (a) Element of Symmetry (b) Energy of Activation (c) Tautomerism
- (a) State and explain second law of thermodynamics
 (b) What is entropy, explain ?
- (a) How nitrobenzene is prepared in Laboratory ?
 (b) Explain with mechanism the nitration of nitrobenzene by electrophilic substitution reaction ?
- Explain the optical isomerism of lactic acid ? How lactic acid react with
 (a) $\text{C}_2\text{H}_5\text{OH}$, (b) PdI_5 , (c) HI , (d) I_2 .

● ● ●

प्रायोगिक परामर्श कक्षा एवं प्रायोगिक परीक्षा का कार्यक्रम पार पृष्ठ पर देखें ।

Practical Counselling Classes and Practical Examination Programme, 2023 of

B.Sc., Part-I (Chemistry Subsidiary, Paper-I)

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

PRACTICAL COUNSELLING CLASS PROGRAMME

Date	Time		
	11:00 AM to 1:00 PM	1:00 PM to 3:00 PM	3:00 PM to 5:00 PM
29.09.2023	Enrollment No. of Zoology (Hons.) Students 200510001 to 200510700 210510001 to 210510700	Enrollment No. of Zoology (Hons.) Students 220510001 to 220510100	Enrollment No. of Zoology (Hons.) Students 220510101 to 220510200
03.10.2023	Enrollment No. of Zoology (Hons.) Students 220510201 to 220510270	Enrollment No. of Zoology (Hons.) Students 220510271 to 220510360	Enrollment No. of Zoology (Hons.) Students 220510361 to 220510450
05.10.2023	Enrollment No. of Zoology (Hons.) Students 220510451 to 220510700	All New & Old Student Botany (Hons), Geography (Hons.), Home Sc. (Hons) & Yoga (Hons).	Enrollment No. of Physics (Hons.) Students 200500001 to 200500400 210500001 to 210500400 220500001 to 220500050
07.10.2023	Enrollment No. of Physics (Hons.) Students 220500051 to 220500150	Enrollment No. of Physics (Hons.) Students 220500151 to 220500300	Enrollment No. of Mathematics (Hons.) Students 200490001 to 200490400 210490001 to 210490400 220490001 to 220490070
10.10.2023	Enrollment No. of Mathematics (Hons.) Students 220490071 to 220490170	Enrollment No. of Mathematics (Hons.) Students 220490171 to 220490300	-

PRACTICAL EXAMINATION PROGRAMME

Date	Time		
	11:00 AM to 1:00 PM	1:00 PM to 3:00 PM	3:00 PM to 5:00 PM
30.09.2023	Enrollment No. of Zoology (Hons.) Students 200510001 to 200510700 210510001 to 210510700	Enrollment No. of Zoology (Hons.) Students 220510001 to 220510100	Enrollment No. of Zoology (Hons.) Students 220510101 to 220510200
04.10.2023	Enrollment No. of Zoology (Hons.) Students 220510201 to 220510270	Enrollment No. of Zoology (Hons.) Students 220510271 to 220510360	Enrollment No. of Zoology (Hons.) Students 220510361 to 220510450
06.10.2023	Enrollment No. of Zoology (Hons.) Students 220510451 to 220510700	All New & Old Student Botany (Hons), Geography (Hons.), Home Sc. (Hons) & Yoga (Hons).	Enrollment No. of Physics (Hons.) Students 200500001 to 200500400 210500001 to 210500400 220500001 to 220500050
09.10.2023	Enrollment No. of Physics (Hons.) Students 220500051 to 220500150	Enrollment No. of Physics (Hons.) Students 220500151 to 220500300	Enrollment No. of Mathematics (Hons.) Students 200490001 to 200490400 210490001 to 210490400 220490001 to 220490070
11.10.2023	Enrollment No. of Mathematics (Hons.) Students 220490071 to 220490170	Enrollment No. of Mathematics (Hons.) Students 220490171 to 220490300	-

NALANDA OPEN UNIVERSITY

B.Sc. Chemistry, Part-II

PAPER—III (Honours)

(Physical Chemistry and Inorganic Chemistry)

Annual Examination, 2023

Time : 3 Hours.

Full Marks : 80

Answer any **Five** questions. All questions carry equal marks.

- (a) What is reversible cell and irreversible cell ?
(b) What is difference between primary cell and secondary cell ? Give examples.
- Write notes on any **Two** of the following :—
 - Carnot cycle and carnot theorem.
 - Electrode and electrode potential.
 - Gibb's Helmholtz equation.
- (a) What is entropy ? Explain entropy change in ideal gas ?
(b) What is work function ? Explain it with examples and give its units ?
- Determine the ground state term of d^2 system and d^7 system. What are the total number of microstates of these terms ?
- Write the IUPAC name of following compound :—
 - $K_4 [Fe(CN)_6]$
 - $[Co(NH_3)_4 Cl_2]^+$
 - $[Cr(H_2O)_6 Cl_2]^+$
 - $[Ni (CO)_4]$
 - $[Fe F_6]^{-3}$
 - $K_3[Fe (C_2O_4)_3]$
 - $[Cr(en)_4]^-$
 - $[Fe(CN)_6]^{-3}$
- Write down the formula of the following complex compounds :—
 - Hexa Amine Platinum (IV) Chloride
 - Tetra Carbonyl Nickel
 - Potassium tetracyano nickalate (III)
 - Triammines dicarbonyl chloro iron (III)ion
 - Tetra aqua dichloro chromium (III) ion
 - Tetra hydroxo chromate (III) ion
 - Tetra chloro cuprate (II) ion
 - Ammine sulfato chromium (II)
- (a) What is Werner's theory of coordination compound ?
(b) $[NiCl_4]^{-2}$ is paramagnetic while $[Ni(CO)_4]$ is diamagnetic though both are tetrahedral why ?
- Write notes of any **Two** of the following :—
 - Mass Defect.
 - Group Displacement Law
 - Dirty bomb
- Explain any **Two** of the following :—
 - Nuclear fission and fusion
 - Radio carbon-dating
 - Atom bomb
- What are transition elements ? Why they are called transition elements ? Explain the chemistry of d-block elements on the basis of
 - Complex formation.
 - Magnetic property.
 - Colour of complexes.

• • •

Programme of B.Sc. Part-II Chemistry (Hons.),

Practical Class and Practical Examination, 2023

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

(A) Practical Counselling Class

Date	Paper	Time	Roll No
22.08.2023	III & IV	11:00 AM to 5:30 PM	All Old & New Students

(B) Practical Examination

Date	Paper	Time	Roll No
23.08.2023	III	11:30 AM to 02:30 PM	All Old & New Students
	IV	02:45 PM to 5:45 PM	

NALANDA OPEN UNIVERSITY

B.Sc. Chemistry, Part-II

PAPER-IV (Honours)

(Physical Chemistry and Organic Chemistry)

Annual Examination, 2023

Time : 3 Hours.

Full Marks : 80

Answer any **Five** questions. All questions carry equal marks.

1. Explain the following :—
(a) Specific Conductance (b) Zeta Potential
(c) Origin of charge on colloids
2. What is Transport Number and explain its experimental determination ?
3. Define and explain the following :—
(a) Molar Conductance (b) Equivalent Conductance
(c) Gold Number
4. What are carbohydrates ? Explain the structure of D-glucose ?
5. Explain the mechanism of electrophilic substitution in Toluene and Benzene with electrophile of nitration and chlorination ?
6. How is Benzaldehyde prepared from ?
(i) Benzene (ii) Benzoyl Chloride
How Benzaldehyde reacts with Grignard reagent ? Why Benzaldehyde has no alpha hydrogen ?
7. Write note on any **Two** of the following :—
(i) Fries Rearrangements.
(ii) Polymerisation and Condensation Reaction
(iii) Perkin Reaction
8. How Benzene diazonium chloride is prepared ? How it exhibits replacement reaction with
(a) H₂O, (b) KI (c) C₂H₅OH,
9. How would you introduce the following in benzene ?
(a) Cl₂ (b) -CH₃ (c) -COOH (d) -NO₂ (e) -NH₂
10. How D-Glucose reacts with :
(a) HCN (b) Acetic anhydride
(c) Phenyl hydrazine (d) Formation of glucoside



*Programme of B.Sc. Part-II Chemistry (Hons.),
Practical Class and Practical Examination, 2023*

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

(A) Practical Counselling Class

Date	Paper	Time	Roll No
22.08.2023	III & IV	11:00 AM to 5:30 PM	All Old & New Students

(B) Practical Examination

Date	Paper	Time	Roll No
23.08.2023	III	11:30 AM to 02:30 PM	All Old & New Students
	IV	02:45 PM to 5:45 PM	

NALANDA OPEN UNIVERSITY

B.Sc. Chemistry, Part-II

PAPER-II (Subsidiary)

Annual Examination, 2023

Time : 3 Hours.

Full Marks : 80

Answer any **Five** questions. All questions carry equal marks. Question No. 1 is Compulsory.

- Write the IUPAC name of the following complex compounds:
 (a) $[\text{Co}(\text{NH}_3)_6]\text{Br}_2$ (b) $[\text{CrCl}_2(\text{N}_2\text{O})_4]\text{INO}_3$
 (c) $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3]$ (d) $[\text{Cr}(\text{NH}_3)_6]^{+3}$
- Explain why :-
 (a) Hg is liquid but all metals are solid.
 (b) F is the most electronegative element.
 (c) KMnO_4 is a good oxidising agent
 (d) d-block elements are called transition elements but f-block element are called inner transition element
- What are salient features of Werner's theory of coordination compound formation ? What are its merits and Weakness ?
- What are 3d-block elements ? Write their electronic configuration ? Explain the properties of transition elements on the basis of following
 (a) Magnetic Properties (b) Colour of complex compound (c) Complex formation
- What are the salient features of valence bond theory of coordination compound ? Determine the hybridisation, structure of following.
 (a) $[\text{Cr}(\text{NH}_3)_6]^{+3}$ (b) $[\text{Co}(\text{NH}_3)_6]^{+3}$
- What are the ores of Cobalt ? How cobalt in pure state is obtained from its ores ? Describe its (i) oxidation state (ii) its position in periodic table.
- Describe the principle involved in the determination of nickel ion in the solution gravimetrically.
- (a) How Fluoride present as a pollutants in drinking water can be removed principally ?
 (b) What are the injurious effect of Arsenic present in drinking water on human body.
- Write notes on any **Two** of the following :-
 (a) Double salt and coordination compound
 (b) Sidgwick theory of EAN rule (c) Noble gas elements
- Write the formula of coordination compounds of following nomenclature.
 (a) Tetraammine aqua cobalt (iii) chloride (b) Potassium tetracyanide nickelate (ii)
 (c) Iron (iii) hexa cyanido ferrate (ii) (d) Nickel carbonyl

• • •

B.Sc. Part-II Chemistry (Subsidiary)

Practical Counselling Class and Examination Programme, 2023

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

(A) Practical Counselling Class Programme

Date	11.00 AM to 01.00 PM	01.00 PM to 03.00 PM	03.00 PM to 05.00 PM
21.09.2023	Physics (Hons) Students 190500001 to 190500200 200500001 to 200500600	Physics (H) Students 210500001 to 210500400	All old & New Student Botany (H), Yoga (H), Geography (H), Home Science (H)
23.09.2023	Mathematics (Hons) Students 190490001 to 190490100 200490001 to 200490700 210490001 to 210490100	Math (Hons) Students 210490101 to 210490400	Zoology (H) Students 180510001 to 180510110 190510001 to 190510500 200510001 to 200510300
26.09.2023	Zoology (H) Students 200510301 to 200510700 210510001 to 210510100	Zoology (H) Students 210510101 to 210510300	Zoology (H) Students 210510301 to 210510700

(B) Practical Examination Programme

Date	10.00 AM to 12.00 Noon	12.00 Noon to 02.00 PM	02.00 PM to 04.00 PM
22.09.2023	Physics (Hons) Students 190500001 to 190500200 200500001 to 200500600	Physics (H) Students 210500001 to 210500400	All old & New Student Botany (H), Yoga (H), Geography (H), Home Science (H)
25.09.2023	Mathematics (Hons) Students 190490001 to 190490100 200490001 to 200490700 210490001 to 210490100	Math (Hons) Students 210490101 to 210490400	Zoology (H) Students 180510001 to 180510110 190510001 to 190510500 200510001 to 200510300
27.09.2023	Zoology (H) Students 200510301 to 200510700 210510001 to 210510100	Zoology (H) Students 210510101 to 210510300	Zoology (H) Students 210510301 to 210510700

NALANDA OPEN UNIVERSITY

B.Sc. Chemistry, Part-III

PAPER-V (Honours)

(Physical Chemistry)

Annual Examination, 2023

Time : 3 Hours.

Full Marks : 80

Answer any **Five** questions. All questions carry equal marks.

1. How would you explain the phase diagram of sulphur system ? Why does sulphur have three triple points ?
2. Explain the following terms :—
(i) Collision Frequency. (ii) Surface Tension and Parachor.
3. What do you mean by the void in the crystal lattice ? Explain the difference between tetrahedral void and octahedral void.
4. Derive the Kinetic equation of third order of reaction ? What are the characteristic of third order of reaction ?
5. What is heterogeneous catalysis? State the theory of heterogeneous catalysis and explain with examples the activity and selecting of heterogeneous catalysis.
6. What is adsorption isotherm ? Derive the equation of Langmuir Adsorption isotherm ?
7. What is doping in crystal lattice ? How does it work as semiconductor ? Explain p-type semiconductor.
8. Discuss between thermal and photochemical reaction ? Explain Einstein law's of photochemical Equivalence and derive the equation ?
9. Explain the following term :—
(a) Viscosity
(b) Component
(c) Molecular Refractivity
10. Write notes on any **two** of the following :—
(a) Radius Ratio Rule
(b) Enzyme Catalysis
(c) Degree of Freedom in Phase Rule



Programme of B.Sc. Part-III Chemistry (Hons.)

Annual Practical Counselling & Practical Examination - 2023

Venue : 4th Floor Biscomaun Bhawan, Patna - 800 001

Practical Counselling

Date	Paper	Time	Roll No
14.08.2023	V to VIII	11.00 AM to 05.30 PM	For All Old & New Students

Practical Examination

Date	Paper	Time	Roll No
16.08.2023	V	11.30 AM to 02.30 PM	For All Old & New Students
16.08.2023	VI	02.45 PM to 05.45 PM	For All Old & New Students
17.08.2023	VII	11.30 AM to 02.30 PM	For All Old & New Students
17.08.2023	VIII	02.45 PM to 05.45 PM	For All Old & New Students

NALANDA OPEN UNIVERSITY
B.Sc. Chemistry, Part-III
PAPER-VI (Honours)
(Inorganic Chemistry)
Annual Examination, 2023

Time : 3 Hours.

Full Marks : 80

*Answer any **Five** questions. All questions carry equal marks.*

1. (a) What are Lanthanide ?
(b) Write their electronic configuration of all Lanthanides ?
(c) What is Lanthanide contraction and its consequences ?
2. Write notes on the following :—
(a) Point Group (b) Element of symmetry (c) Symmetry of Operation
3. Derive Schrödinger wave equation for a particle in three dimension ?
4. Draw the MO energy level diagram of NO^+ , F_2 , N_2 , O_2^+ . Write their the magnetic properties and determine the Bond order and stability ?
5. What are the important ores of Vanadium ? Give the details of extraction of pure vanadium from the its ores.
6. Why liquid SO_2 is a good non-aqueous solvent ? Explain the following type of reaction in liquid SO_2 with example :—
(a) Solvolysis
(b) Oxidation-Reduction reaction
(c) Precipitation reaction
7. Write notes on any **two** of the following :—
(a) Chelates
(b) Significance of Wave Function
(c) Hund's Rule
8. Draw the radial probability distribution curve of electron of 1s, 2s and 2p electron. Label the curve with the determination of number of nodes ?
9. Explain the hybridization, structure and nature of complexes and magnetic moment of following complex compounds by VBT method :—
 $\text{K}_4[\text{Fe}(\text{CN})_6]$, $\text{K}_3[\text{Fe}(\text{CN})_6]$, $[\text{Cu}(\text{CN})_6]^{-3}$
10. (a) How d-orbital split in octahedral and tetrahedral field ?
(b) Determine the CFSE of d^5 , d^7 and d^9 configuration ?



Programme of B.Sc. Part-III Chemistry (Hons.)
Annual Practical Counselling & Practical Examination - 2023

Venue : 4th Floor Biscomaun Bhawan, Patna - 800 001

Practical Counselling

<i>Date</i>	<i>Paper</i>	<i>Time</i>	<i>Roll No</i>
14.08.2023	V to VIII	11.00 AM to 05.30 PM	For All Old & New Students

Practical Examination

<i>Date</i>	<i>Paper</i>	<i>Time</i>	<i>Roll No</i>
16.08.2023	V	11.30 AM to 02.30 PM	For All Old & New Students
16.08.2023	VI	02.45 PM to 05.45 PM	For All Old & New Students
17.08.2023	VII	11.30 AM to 02.30 PM	For All Old & New Students
17.08.2023	VIII	02.45 PM to 05.45 PM	For All Old & New Students

NALANDA OPEN UNIVERSITY

B.Sc. Chemistry, Part-III

PAPER-VII (Honours)

(Organic Chemistry)

Annual Examination, 2023

Time : 3 Hours.

Full Marks : 80

Answer any **Five** questions. All questions carry equal marks.

- How actual indigo obtained from plant ? Give two methods of its synthesis ? What are its important uses ?
- How is Xanthene prepared from uric acid ? How Xanthine is synthesized by Tramber's method ?
- Determine the constitution of uric acid and also give its synthetic evidence in favour of the accepted structure of uric acid.
- What is Azodyes ? How it is prepared ? How Methyl orange and Congo red is prepared ?
- Explain the concept of aromaticity and explain Huckel ($4n + 2$) rule with suitable examples ?
- Explain the application of following reagents in at least three reactions.
(i) H_2O_2 (ii) Pb (iii) Periodic acid
- (a) What are differences between SN_1 and SN_2 reaction ?
(b) Explain the mechanism of aromatic substitution reaction of phenol with an electrophiles.
(c) Explain the formation of alkene by elimination reaction.
- How furan is prepared ? Give the structure of Furan. How furan reacts with HNO_3 and Cl_2 ?
- (a) What do you understand by Heterocyclic compounds ? Explain with examples.
(b) How quinoline is prepared by Skraup synthesis? How it reacts with H_2SO_4 , $NaNH_2$, and KOH ?
- Explain any **Two** with mechanism of any two :—
(a) Stearic Hindrence
(b) Mechanism of addition to carbon double bond
(c) Perkin Reaction



Programme of B.Sc. Part-III Chemistry (Hons.)

Annual Practical Counselling & Practical Examination - 2023

Venue : 4th Floor Biscomaun Bhawan, Patna - 800 001

Practical Counselling

Date	Paper	Time	Roll No
14.08.2023	V to VIII	11.00 AM to 05.30 PM	For All Old & New Students

Practical Examination

Date	Paper	Time	Roll No
16.08.2023	V	11.30 AM to 02.30 PM	For All Old & New Students
16.08.2023	VI	02.45 PM to 05.45 PM	For All Old & New Students
17.08.2023	VII	11.30 AM to 02.30 PM	For All Old & New Students
17.08.2023	VIII	02.45 PM to 05.45 PM	For All Old & New Students

NALANDA OPEN UNIVERSITY

B.Sc. Chemistry, Part-III

PAPER–VIII (Honors)

(Introduction to Molecular Spectroscopy, Industrial Chemistry and Environmental Chemistry)

Annual Examination, 2023

Time : 3 Hours.

Full Marks : 80

*Answer any **Five** questions. All questions carry equal marks.*

1. What is Green House effect ? How it is caused ? What are the major gases causing Green House effect ? What are the adverse effect of Green House Effect ?
2. Discuss the following :—
(a) Biogas (b) Producer Gas (c) Octane Number
3. Explain the following :—
(a) Pesticides Pollutants (b) Acid Rain (c) Prevention and control of air pollution
4. How Urea fertilizer is manufactured. Explain its action as fertilizer.
5. What is Soil Pollution and Soil Pollutants ? What are the effects of Soil Pollutants ? How Soil pollution is prevented ?
6. Explain the following :—
(a) Radioactive Pollutants (b) Cause of Pollution by industrial waste (c) Water gas
7. Write notes on any **Two** of the following :—
(a) Floride as a pollutant in ground water.
(b) Relation between frequency, wave length and wave number
(c) Vibrational modes and Vibrational frequency.
8. Explain the following :—
(a) Sewage and Sewage treatment.
(b) Natural rubber and Vulcanization of rubber.
9. Discuss the chemistry of UV spectroscopy. Explain the following electronic transition in UV spectroscopy.
(a) $\sigma \rightarrow \sigma^*$ transition (b) $n \rightarrow \sigma^*$ transition (c) $\pi \rightarrow \pi^*$ transition
10. What are the types of Water pollution ? Give the classification of water pollution ? What are the injurious effects of Arsenic as a pollutant in ground water ?



Programme of B.Sc. Part-III Chemistry (Hons.)

Annual Practical Counselling & Practical Examination - 2023

Venue : 4th Floor Biscomaun Bhawan, Patna - 800 001

Practical Counselling

<i>Date</i>	<i>Paper</i>	<i>Time</i>	<i>Roll No</i>
14.08.2023	V to VIII	11.00 AM to 05.30 PM	For All Old & New Students

Practical Examination

<i>Date</i>	<i>Paper</i>	<i>Time</i>	<i>Roll No</i>
16.08.2023	V	11.30 AM to 02.30 PM	For All Old & New Students
16.08.2023	VI	02.45 PM to 05.45 PM	For All Old & New Students
17.08.2023	VII	11.30 AM to 02.30 PM	For All Old & New Students
17.08.2023	VIII	02.45 PM to 05.45 PM	For All Old & New Students