

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-I
(Physical Chemistry)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. What do you mean by partial molar properties ? How the partial molar properties are determined by Dilatometry method.
2. What is half wave potential ? What are its significance.
3. What do you understand by Boltzmann distribution law ? Derive its mathematical equation and general form.
4. Explain clauses in equality and verify it.
5. What is activity ? What do you mean by term ionic strength ? Discuss the activity co-efficient of ionic strength.
6. (a) What is Butler Volmer equation ? Derive it.
(b) What is tafel plot ? Explain clearly.
7. What are postulates of lindemann's theory of unimolecular reaction ? Derive mathematical formula for Lindemann mechanism.
8. What are the basic differences between additive polymer and condensation polymer ? Explain by means of one example for each.
9. Derive an equation relating the internal energy and the molecular partition function of monoatomic gas.
10. Write notes on any **Two** of the following :—
 - (a) Over potential.
 - (b) Concept of Ensembles.
 - (c) Corrosion.

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Examination Programme, 2015
M.Sc. Chemistry, Part-I

Date	Paper	Time	Examination Centre
12.05.2015	Paper-I	3.30 PM to 6.30 PM	Nalanda Open University, Patna
14.05.2015	Paper-II	3.30 PM to 6.30 PM	Nalanda Open University, Patna
16.05.2015	Paper-III	3.30 PM to 6.30 PM	Nalanda Open University, Patna
18.05.2015	Paper-IV	3.30 PM to 6.30 PM	Nalanda Open University, Patna
20.05.2015	Paper-V	3.30 PM to 6.30 PM	Nalanda Open University, Patna
22.05.2015	Paper-VI	3.30 PM to 6.30 PM	Nalanda Open University, Patna
26.05.2015	Paper-VII	3.30 PM to 6.30 PM	Nalanda Open University, Patna
28.05.2015	Paper-VIII	3.30 PM to 6.30 PM	Nalanda Open University, Patna

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-II
(Inorganic Chemistry)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Write down electronic configuration of all lanthanide on the basis of their electronic configuration of lanthanide place them in the periodic table and give justification. What is lanthanide contraction ?
2. What are Boranes ? How then are classified ? Give the structure and bonding in any four of them.
3. 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.
4. Explain the following term :—
 - (a) Reactor shielding.
 - (b) Moderator and reflector.
 - (c) Reactor and Reactor coolant.
5. Explain reducible and irreducible representation. Write the orthogonality theorem and consequences.
6. Draw molecular orbital diagram of CO_2 and CO_3^- . Explain the bond pair and magnetic property on the basis of the M. O. diagram.
7. What do you understand by term transuranic elements ? What are main nuclear reactions by which transuranic elements are synthesized ? Give an account of chemistry of Naptunium and plutonium.
8. Write the Bohr theory of compound nucleus. Discuss the nuclear reaction of different types. Explain Q-value and cross-section of nuclear reaction.
9. Explain why the molecule of CO_2 and methane possess zero dipole moment.
10. Write short note on any **Two** of the following :—
 - (a) Wade rule.
 - (b) Scintillation.
 - (c) Paramagnetic behaviour of Lanthanide.

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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-III
(Organic Chemistry)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. What are Carbenes ? How are they generated ? Give the important reactions of Carbenes.
2. What do you mean by aromatic nucleophilic substitution ? Explain aromatic substitution unimolecular Nucleophilic reaction.
3. Explain conformation of cyclohexane and also discuss the effect of conformation on chemical reactivity.
4. Explain the following with suitable examples :—
 - (a) Hydroboration.
 - (b) Hyper Conjugation.
 - (c) Michal addition.
5. Explain the mechanism of following reaction :—
 - (a) Perking reaction.
 - (b) Benzoin Condensation.
6. Explain aromaticity and give details of Huckle molecular orbital theory.
7. Discuss with suitable examples :—
 - (a) Plane of symmetry.
 - (b) Reflection symmetry.
8. Explain the following :—
 - (a) Aniline is a base.
 - (b) Phenol is acid.
 - (c) Phenol reacts with Cl_2 to give ortho chlorophenol and para chlorophenol.
 - (d) Nitrobenzene gives meta dinitrobenzene on nitration.
9. Explain the conformations of Dimethyle Cyclohexanes.
10. Write short note on any **Two** of the following :—
 - (a) Hammond Postulate.
 - (b) Marconiff's Rule.
 - (c) Regioselectivity.

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Revised Examination Programme, 2015
M.Sc. Chemistry, Part-I

Date	Paper	Time	Examination Centre
14.05.2015	Paper-II	3.30 PM to 6.30 PM	Nalanda Open University, Patna
16.05.2015	Paper-III	3.30 PM to 6.30 PM	Nalanda Open University, Patna
18.05.2015	Paper-IV	3.30 PM to 6.30 PM	Nalanda Open University, Patna
20.05.2015	Paper-V	3.30 PM to 6.30 PM	Nalanda Open University, Patna
22.05.2015	Paper-VI	3.30 PM to 6.30 PM	Nalanda Open University, Patna
26.05.2015	Paper-VII	3.30 PM to 6.30 PM	Nalanda Open University, Patna
28.05.2015	Paper-VIII	3.30 PM to 6.30 PM	Nalanda Open University, Patna
30.05.2015	Paper-I	3.30 PM to 6.30 PM	Nalanda Open University, Patna

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-IV
(Solid State Chemistry & Quantum Chemistry)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Discuss solid state defect with special reference to :—
(a) Schottky defects (b) Frenkel defect in crystals
2. How the crystal planes are characterized ? How Miller indices helps in determining the interplaner distance ? Claculate the inter planner distances of s.c., b.c.c. and f.c.c. crystals.
3. Genrally organic solid are electrically insulators but few of them conducts electrically, why ? Discuss the organic charge transfer complexes as superconductor.
4. What is maximum electron density in H-atom in the 2s and 2p states.
5. Write the Hamiltoniun of Li atom ignoring inter electronic repulsion. Give wave function.
6. Discuss the postulates of Quantum mechanics.
7. Explain Slater determinants. Deduce the ground and excited state antisymmetric wave function for He atom is the Slater deterinantal form.
8. Discuss the Schrödinger's equation and derive Schrödinger wave equation with respect to time.
9. Write the valence bond Eigen function under perfect pairing scheme for BcH₂ molecule.
10. Write short note on any **Two** of the following :—
(a) Hermitian operators.
(b) Intrinsic and extrinsic semiconductor.

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Revised Examination Programme, 2015
M.Sc. Chemistry, Part-I

Date	Paper	Time	Examination Centre
14.05.2015	Paper-II	3.30 PM to 6.30 PM	Nalanda Open University, Patna
16.05.2015	Paper-III	3.30 PM to 6.30 PM	Nalanda Open University, Patna
18.05.2015	Paper-IV	3.30 PM to 6.30 PM	Nalanda Open University, Patna
20.05.2015	Paper-V	3.30 PM to 6.30 PM	Nalanda Open University, Patna
22.05.2015	Paper-VI	3.30 PM to 6.30 PM	Nalanda Open University, Patna
26.05.2015	Paper-VII	3.30 PM to 6.30 PM	Nalanda Open University, Patna
28.05.2015	Paper-VIII	3.30 PM to 6.30 PM	Nalanda Open University, Patna
30.05.2015	Paper-I	3.30 PM to 6.30 PM	Nalanda Open University, Patna

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-V
(Co-ordination Chemistry)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. What are the important Features (Postulates) of crystal field theory ? How it is different from valence bond theory ? How does the d-orbital split in octahedral field ?
2. Calculate Free ion ground term for Mn^{2+} , Co^{2+} , Ni^{2+} , Cu^{2+} and Cr^{3+} .
3. Explain the origin of magnetic moment in atom molecule or ion. Derive an equation to determine orbital magnetic moment value. Give its unit.
4. Calculate μ_y value of any three of lanthanide (III) ion.
5. Discuss molecular orbital theory of metal ligand bonding in octahedral complexes containing no π bond.
6. Write notes on the following :—
 - (a) Spectro Chemical Series.
 - (b) Limitation of Crystal Field Theory.
7. Discuss the reaction mechanism of substitution reaction in octahedral complex along with the factors that causes complication.
8. Define stepwise and over all stability constant. How they are related to each other.
9. Explain the multiplet width. Explain population of J level in context to KT.
10. Find out total microstate term and term symbols of d^2 system and determine the ground state term.

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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-VI
(Chemistry of Biomolecule)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Discuss and derive the structure of atropine. Establish its structure by synthesis.
2. What is relation between in the following sets ?
 - (a) A nucleotide and nucleic acid.
 - (b) Ribose and Deoxy Ribose.
 - (c) Chromosome and DNA.
3. What do you understand by the term terpenoids. Explain isoprene and special isoprene rule and their exception.
4. Discuss the structure of DNA. In what ways the structure of DNA differs from that of RNA.
5. Establish the structure of camphor by degradation and synthetic methods.
6. Write notes on the following :—
 - (a) β -oxidation of fatty acid.
 - (b) Blane's rule.
 - (c) Wagner Murwein rearrangements.
7. What are disaccharides ? Establish the structure of sucrose and also write about its inversion properties.
8. What is peptides linkage ? Give examples and explain them. How will you proceed to assign the structure to a poly-peptides.
9. How will you establish the Primary, Secondary and tertiary structure of protein ?
10. Discuss the degradative and synthetic evidences leading to the structure of nicotine.

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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-VII
(Reaction Mechanism and Supramolecular Chemistry)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Describe the energy state of octahedral Chromium(III) complex and associated photo chemical process.
2. How the supramolecular catalysts are similar to enzyme catalyst ? What are differences between the two ?
3. Define photo substitution and explain with suitable example.
4. How does the reactivity and catalysis represent major Feature of Functional properties of Supramolecular system.
5. Write notes on Helicate, Rosettes, Cage in Supramolecular chemistry.
6. Describe the path way of optical inversion and isomerization.
7. Give two general methods of preparation of metal alkoxide. Draw the structure of dimeric and tetrameric alkoxides.
8. Name the two stoichiometric mechanism of redox reaction suggested by Henry Taube. Discuss of them with suitable examples.
9. Write notes on the following :—
 - (a) Bailar twist mechanism.
 - (b) Optical inversion.
10. What are complimentary and non-complimentary reactions ? What are the main differences between complementary and non complementary reactions. Explain by give up example.

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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-VIII
(Natural Product)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Discuss the conversion of Vitamin A_1 to Vitamin A_2 . Explain the role of Vitamine A in our life.
2. Establish the structure of Vitamin B_2 . Give the synthesis of Vitamin B_2 .
3. Discuss the structure of Phytol.
4. Discuss the structure of abietic acid and conformed by synthetic method.
5. Discuss the degradative and synthetic evidences leading to the structure of anthocydins.
6. Give a systematic synthesis of estron and discuss its structure.
7. Discuss the point linkage between quininic acid and meroquinene of quinine.
8. Elucidate the structure of a fat-soluble Vitamin having molecular formula $C_{20}H_{18}O$ and deficiency of which in human diet causing night blindness.
9. What are porphyrins ? Write the degradative and synthetic evidence for the determination of structure of Haemin.
10. Write short notes on the following :—
 - (a) Steroids.
 - (b) Flavone.

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नालन्दा खुला विश्वविद्यालय के **M.Sc. Chemistry, Part-I** के सभी विद्यार्थियों को सूचित किया जाता है कि दिनांक 12.05.2015 की परीक्षा जो भूकम्प के कारण स्थगित कर दी गयी थी, अब दिनांक 30.05.2015 को अपने पूर्व निर्धारित समय एवं स्थान पर आयोजित होंगी ।

Revised Examination Programme, 2015

M.Sc. Chemistry, Part-I

Date	Paper	Time	Examination Centre
28.05.2015	Paper-VIII	3.30 PM to 6.30 PM	Nalanda Open University, Patna
30.05.2015	Paper-I	3.30 PM to 6.30 PM	Nalanda Open University, Patna

For Practical Counselling Class & Practical Examination Programme
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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER-IX
(Spectroscopy)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. Derive spectroscopic terms for p^2 configuration and write down Hund's rule to find out ground state term.
2. Write in details the application of Mossbauer spectra to some of compounds of ^{57}Fe .
3. State and explain the Franck-Condon principle. How is Franck-Condon principle helpful in predicting the relative intensities of vibronic transition ?
4. Discuss the various types of electronic transitions. Name the molecules which undergo $n \rightarrow \pi$, $n \rightarrow \pi^*$ and π to π^* electron transitions. How can 1, 3 butadiene and 1, 4 butadiene be distinguished by UV spectroscopy.
5. Which of the following can show pure rotational spectra and which can show non rotational spectra ? Also the name of molecule which can not show any of two spectra. Give justification for your answer.
Hcl, H₂O, Co₂, CH₄, Ccl₄, BF₃, C₆H₆ and Cl₂
6. Answer the following :—
 - (a) Describe quantum theory of Raman Spectra.
 - (b) Write the differences between Raman Spectra and I.R. Spectra.
7. What are applications of ESR in the study of organic and simple Inorganic radicals ?
8. What is meant by the chemical shift in *nmr* spectroscopy. Describe the factors affecting chemical shift. Explain the fine structure (Spin-Spin-Coupling).
9. Discuss the application of UV spectroscopy in :—
 - (a) Identification of functional group
 - (b) Study of Strain
 - (c) Geometrical isomeric
 - (d) Hydrogen body
10. Write notes on any **Two** of the following :—
 - (a) Lambert's Law
 - (b) Selection rule in I.R. Spectroscopy
 - (c) Vibrational Raman Spectra

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Examination Programme, 2015
M.Sc. Chemistry, Part-II

<i>Date</i>	<i>Papers</i>	<i>Time</i>	<i>Examination Centre</i>
06.06.2015	Paper-IX	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
08.06.2015	Paper-X	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
10.06.2015	Paper-XI	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
12.06.2015	Paper-XII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
16.06.2015	Paper-XIII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
18.06.2015	Paper-XIV	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
20.06.2015	Paper-XV	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
22.06.2015	Paper-XVI	12.00 Noon to 3.00 PM	Nalanda Open University, Patna

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER-X
(Advance Chemical Dynamics)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. What is faradaic and non faradaic process ? Explain Stoichiometric number and transfer co-efficients ?
2. Define and explain electrocatalysis. Discuss the rate of electrocatalysis. Describe the mechanism of electrocatalysis.
3. (a) What is the activation energy role in explaining the catalysis reaction.
(b) Derive Bronsted Catalysis relation. Explain oscillatory reaction.
4. Describe the Kinetics of Photochemical reaction. Discuss kinetically the photochemical decomposition of H₂.
5. Discuss the NMR method for study of fast reactions.
6. What do you understand by rate of electrochemical reaction ? Describe the factors affecting rates of electrochemical reaction.
7. Explain the transition state theory of reactions in solutions. Describe the collisions on the solution counter.
8. Explain the Kinetics of reaction in liquid and gas phase. What is diffusion control reaction ?
9. What is Kinetic salt effect ? Describe the Bronsted Bjerrum equation.
10. Write notes on the following :—
 - (a) Bronsted Catalysis Law.
 - (b) Belousov-Zhabatinskii Reaction.

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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XI
(Molecular Thermodynamics)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. Define and explain molecular partition function. What is its physical significance ? What is use of this function ?
2. Derive Boltzmann distribution law for non-degenerate energy level. What is condition of applicability of Boltzmann statistics ?
3. What is specific heat of solid ? Describe the Einstein theory of specific heat of solid and derive Einstein equation for specific heat of solid. What are merits and limitation of the Einstein theory ?
4. What is an ensemble ? Discuss various type of ensembles ? Compare them with each other. What is the importance of ensembles concept ?
5. What are Onsager reciprocal relation ? What is basic of this relationship ? Discuss the unity of these relations in couples flow system.
6. Derive expression for vibrational partition function for diatomic molecule. How does temperature affect the value of vibrational partition function ?
7. Discuss the attempts which have been made to account quantitatively for the variation of atomic heat of solid with temp.
8. What is meant by the term flux used in transport phenomenon ? Give expression for the various phenomenological law involved in transport phenomenon. What do these law describe ?
9. (a) Compare among Maxwell-Boltzmann, Bose-Einstein and Fermi Dirac Statics.
(b) How the values of Boltzmann constant α and β are evaluated.
10. Write notes on the following :—
(a) Canonical ensembles in statistical thermodynamics.
(b) Lagrangian Multiplier.

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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER-XII
(Ligand Field Theory)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. Explain charge transfer bands and their assignment in both octahedral and tetrahedral field.
2. Derive term symbol for d^2 electronic system and determine the ground state term.
3. (a) Write selection rules observed in IR spectra of diatomic molecules.
(b) How IR spectra can be used to distinguish Fe(II) and Fe(III) ions.
4. Chromium (II) Fluoride and Magnesium (II) Fluoride have central metal ion surrounded by six fluoride ligand. In magnesium complex all Mn-F bond length are equidistance but in case of chromium complex four of Cr-F bond length are long and two are short, why?
5. Write the details about the application of IR spectroscopy in determining the structure of metal carbonyls.
6. How does nephelauxetic effect. Explain the limitation of crystal field theory and is an evidence for ligand field theory for complex formation? Write down the nephelauxetic series for the ligands and metals separately and explain them.
7. Explain charge transfer Bands and their assignment in both octahedral complexes.
8. What is condition for Mossbauer spectra to occur? Discuss its important application.
9. (a) Draw correlation diagram for d^8 electronic system in octahedral.
(b) Cu (II) has only one free ion energy term. Explain.
10. Write notes on the following :—
(a) Condon-Shroterly parameters.
(b) Vibronic Coupling.

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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XIII
(Organotransition Metal Chemistry and Metal Clusters)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. How you can prepare chromium. Benzene complex ? Write its properties and bonding.
2. What are the different types of fluxional organic metallic compounds ? Describe them in brief with examples.
3. (a) Explain non-regid co-ordination compound of different co-ordination number.
(b) Predict the proton NMR spectral resonances expected for n^5 and $n' - C_3H_5$ Ligands.
4. Write notes on zental ion and chevrel phase.
5. What is ZSM-5 ? How methanol can be transformed into gasoline using ZSM-5 ?
6. How the metal carbonyl hydrides are synthesized ? Write general properties of metal carbonyl hydride and what are uses of it.
7. Define and explain metal clusters. What are the basis on which metal clusters have been categorized ? Give important methods of synthesis.
8. Discuss fluxionality in cyclopentadienyl complex. How will you judge that molecule is stereo chemical non regid.
9. (a) Predict the following reaction :—
(i) $FeCl_2 + 2Na^+C_5H_5^- \xrightarrow{THF}$
(ii) $Fe(n^5 - C_5H_5) + n - C_4HgLi \longrightarrow$
(b) Write the structure and properties of ferrocene.
10. What are the factors determing the stability of transition metal alkyls ? Why organometallic compounds are more stable than alkyl organometallic compounds.

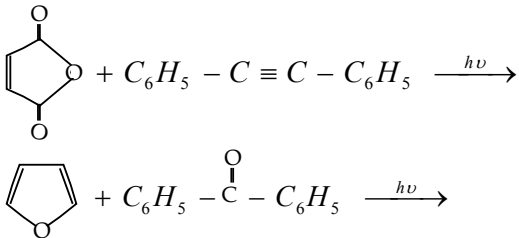
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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER-XIV
 (Photochemistry and Pericyclic Reaction)
 Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. What is the endo-rule as applied to Diel-Alder reaction.
2. Explain photolysis of nitrates having primary δ -Carbon, Secondary σ -Carbon and *no* hydrogen at δ -Carbon.
3. Write down the explanatory notes on Cope-Rearrangement and Aza-Cope Rearrangement. Write down the selection rules for sigmatropic rearrangement.
4. (a) Write a note on suprafacial and antarafacial overlapping of orbitals.
 (b) Explain, why [1, 3], suprafacial migration of alkyl group proceed with inversion of configuration of chiral centre while [1, 5] suprafacial migration of same group followed retention of configuration.
5. What do you mean by pericyclic reaction ? What are the types of pericyclic reaction ? Write them with suitable examples.
6. Explain and discuss the photo chemistry of intramolecular demerisation of alkene by (2 + 2) cyclo addition.
7. (a) Explain photochemistry of butadiene in S_1 State.
 (b) Irradiation of *m*-xylene gives a mixture of *m* and *p*-xylene. Propose suitable mechanism of these alkyl shift.
8. What do you understand by Frontier molecular orbital and orbital symmetry.
9. (a) Explain the stereochemistry of [3, 3] sigmatropic rearrangement under thermal and photochemical method.
 (b) Complete the following reaction :—

10. Write notes on the following :—
 (a) Controtatory Motion.
 (b) Barton Reaction.

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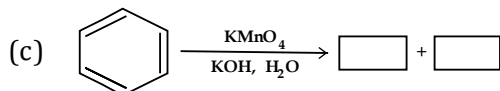
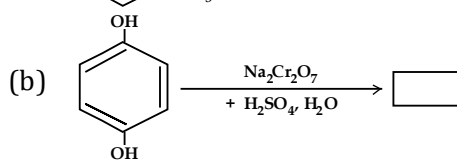
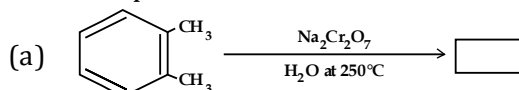
NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER-XV
 (Organic Synthesis)
 Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

- Write the synthetic use of following reagents :—
 (a) SeO_2 (b) $\text{Pb}(\text{OAc})_4$
- Explain the reduction reaction of the following compounds with examples :—
 (a) Reduction of nitro Compounds.
 (b) Reduction of Aldehyde.
 (c) Reduction of Ketones.
- Explain, why an α -Monobromo Carbonyl Compounds can not be prepared by treating a Carbonyl Compound.
- Explain synthons and synthetic equivalent. Discuss Retrosynthetic analysis of C-C disconnection and C-N disconnection.
- (a) Discuss the mechanism of Baeyer-Villiger oxidation and Dakin reaction.
 (b) What is haloform reaction? How methyl ketones are converted into carboxylic acid?
- How thio alcohol may be prepared from alcohol? How does it react with (a) Acetone, (b) Mercuric oxide, (c) Lead acetate and (d) Acetyl Chloride.
- Write notes on any **Three** of the following :—
 (a) T.N.T. (b) Desulphurisation
 (c) Sulpha drug (d) Mustard gas
- Explain the synthetic use of NaBH_4 . Compare reductions using NaBH_4 and LiAlH_4 .
- Explain the mechanism of following :—
 (a) Benzil-Benzilic acid arrangement.
 (b) Arndt Eistert synthesis.
- Name the products with structure :—



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**For Practical Counselling Class & Practical Examination Programme
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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XVI
(Environmental Chemistry and Analytical Chemistry)
Annual Examination, 2015

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions. All questions carry equal marks.

1. How will you estimate (a) Protein, (b) Ascorbic Acid in the given sample ? Describe it.
2. What do you understand by environment ? What are its segments. Name them and describe in detail.
3. What are different parameters which determine water quality ? How you will estimate total solid in water.
4. What are major regions of atmosphere ? What are the important chemical species in each region ? Explain their existence in the region.
5. Explain Dissolved Oxygen (Do) in Water, Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). Write a method for determination of dissolved oxygen in water.
6. What are the basis of following types of chromatography :—
 - (a) Paper Chromatography.
 - (b) TLC
 - (c) ION exchange chromatography.
7. What do you understand by the term smog ? What is its mechanism of formation ? How does it harm to human being and other living kingdom.
8. What do you understand by micro and macronutrient soil ? Explain the role of these two type nutrients in the soil.
9. Write the instrumental detail of single beam colorimeter and double beam colorimeters. What are the advantages of double beam colorimeters over single beam colorimeter.
10. Write the basic principle of Thermo Gravimetric Analysis (TGA) with example. How you will analyze DTA Curve ? Write its application.

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