

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-I
(Physical Chemistry)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. What do you mean understand by Boltzmann distribution Law ? Derive its mathematical equation and general form.
2. What are partial molar properties ? Describe Gibbs Duhem equation thermodynamically. Show how this equation is useful.
3. What is activity ? What do you mean by term ionic strength ? Discuss the activity Co-efficient of ionic strength.
4. What is half wave potential ? What are its significance.
5. What are macromolecules ? What are methods employed for determination of the molecular weights of polymer ? Describe scattering method of defoat.
6. What are postulates of Lindemann's theory of unimolecular reaction ? Derive mathematical formula for Lindemann mechanism.
7. What are the basic differences between additive polymer and condensation polymer ? Explain by means of one example for each.
8. (a) What is butler Volmer equation ? Derive it.
(b) What is Tafel plot ? Explain clearly.
9. (a) Derive the activated Complex Theory and Compare with Arrhenius Theory.
(b) The hydrolysis of an ester in presence of dilute acid follows first order while that in the presence of dilute alkali follows 2nd order kinetics, explain.
10. Write notes any Two of the following :-
(a) Entropy (b) Polarography (c) Over Potential

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Examination Programme, 2017
M.Sc. Chemistry, Part-I

Date	Papers	Time	Examination Centre
11.05.2017	Paper-I	8.00 AM to 11.00 AM	Nalanda Open University, Patna
13.05.2017	Paper-II	8.00 AM to 11.00 AM	Nalanda Open University, Patna
15.05.2017	Paper-III	8.00 AM to 11.00 AM	Nalanda Open University, Patna
17.05.2017	Paper-IV	8.00 AM to 11.00 AM	Nalanda Open University, Patna
19.05.2017	Paper-V	8.00 AM to 11.00 AM	Nalanda Open University, Patna
23.05.2017	Paper-VI	8.00 AM to 11.00 AM	Nalanda Open University, Patna
25.05.2017	Paper-VII	8.00 AM to 11.00 AM	Nalanda Open University, Patna
27.05.2017	Paper-VIII	8.00 AM to 11.00 AM	Nalanda Open University, Patna

For Practical Counselling Class & Practical Examination Programme
Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-II
(Inorganic Chemistry)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. State and explain Bent rule with suitable examples. Apply bent rule in predication of bond angles in $H-C-H$ and in $CH_3-C \equiv CH$ molecule.
2. (a) Describe the shell-model and liquid-drop model of a nucleus.
(b) Write a note on G-M counter.
3. What are Boranes ? How they are classified ? Give the structure and bonding in any four of them.
4. Explain why the molecule of CO_2 and methane presses zero dipole moment.
5. Construct the character table for the point group C_{2v} and C_{3v} .
6. Write the Bohr theory of compound nucleus. Discuss the nuclear reaction of different types. Explain Q-value and cross-section of nuclear reaction.
7. Explain reducible and irreducible representation. Write the orthogonality theorem and consequences.
8. Describe the ways in which the actinides resemble their counterpart in lanthanides ? Give an account of the chemistry of Neptunium and Plutonium ? How are Neptunium and Plutonium Synthesized.
9. 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.
10. Write notes on the following :—
 - (a) Carboranes.
 - (b) Uses of some radioisotopes in medical science.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER—III
(Organic Chemistry)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Explain aromaticity and give details of Hückle molecular orbital theory.
2. Explain the conformations of Dimethyl Cyclohexanes.
3. (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.
4. What are Carbenes ? How are they generated ? Give the important reactions of Carbenes.
5. Explain the following :—
 - (a) $-\text{NH}_2$ group is ortho and para directing group.
 - (b) $-\text{NO}_2$ group is meta-directing group.
 - (c) Halogens are ortho and para directing group.
6. What do you mean by aromatic nucleophilic substitution ? Explain aromatic substitution unimolecular Nucleophilic reaction.
7. Explain conformation of cyclohexane and also discuss the effect of conformation on chemical reactivity.
8. Write notes on any **Two** of the following :—
 - (a) Aldol addition reaction.
 - (b) Mannich reaction.
 - (c) Benzoin Condensation.
 - (d) Perkin Reaction.
9. Discuss with suitable examples :—
 - (a) Plane of symmetry.
 - (b) Reflection symmetry.
10. Explain the mechanism of Elimination Bimolecular reaction with suitable examples.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-IV
(Solid State Chemistry & Quantum Chemistry)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Explain intrinsic and extrinsic semiconductors. What are the applications of semiconductors ? Explain hysteresis.
2. How the crystal planes are characterized ? How Miller indices help in determining the interplanar distance ? Calculate the interplanar distances of s.c., b.c.c. and f.c.c. crystals.
3. Discuss solid state defect with special reference to :—
 - (a) Schottky defects
 - (b) Frenkel defect
4. Derive the Schrödinger wave equation with respect to space.
5. Discuss the postulates of Quantum mechanics.
6. What are maximum electron density in H-atom in the 2s and 2p states.
7. Prove that an operator $\frac{h}{2\pi i} x \left(-\frac{d}{dx} \right)$ is not Hermitian.
8. Explain Slater determinants. Deduce the ground and excited state antisymmetric wave function for He atom in the Slater determinant form.
9. A hybrid orbital has 20% and 80% p character. Give the expressions for the hybrid orbital and determine the angle between them.
10. Generally organic solids are electrically insulators but few of them are electrically conductors, why ? Discuss the organic charge transfer complexes as superconductors.

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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-V
(Co-ordination Chemistry)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Discuss the reaction mechanism of substitution reaction in octahedral complex along with the factors that causes complication.
2. (a) Explain magnetic moment and magnetic susceptibility and establish relationship between them.
(b) Calculate the free ion ground term for :—
 $\text{Re}^{++}, \text{Mo}^{++}, \text{Mn}^{2+}, \text{Sc}^{++}$
3. Define stepwise and over all stability constant. How they are related to each other.
4. (a) A convincing evidence of metal-ligand overlap is obtained from Neptelaxetic effect. Explain it.
(b) How the conclusion obtained from Nephelaxetic effect is supported by Electron Paramagnetic- Resonance (EPR) and Nuclear Magnetic Resonance.
5. Explain the origin of magnetic moment in atom molecule or ion. Derive an equation to determine orbital magnetic moment value. Give its unit.
6. 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 $\Delta_{sp} > \Delta_0 > \Delta_t$.
7. Explain the multiplet width. Explain population of J level in context to KT.
8. Find out total microstate term and term symbols of d^2 system and determine the ground state term.
9. Explain Russel and Saunder's coupling scheme. Calculate free ion ground state term for the following :—
(a) Ni^{++} (b) Cr^{3+} (c) Tl^{2+} (d) Co^{2+}
10. Write notes on the following :—
(a) Limitation of Crystal Field Theory
(b) John & Teller Effect.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-VI
(Chemistry of Biomolecule)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Discuss the structure of DNA. In what ways the structure of DNA differs from that of RNA.
2. What is carbohydrate ? Establish the ring structure of glucose.
3. Discuss and derive the structure of atropine. Establish its structure by synthesis.
4. Write about **Two** essential function of tri-acylglycerols :—
 - (a) Hydrogenation of triacylglycerols.
 - (b) Biological function of triacylglycerols.
 - (c) Saponification of triacylglycerols.
5. What do you understand by the term terpenoids. Explain isoprene and special isoprene rule and their exception.
6. How will you establish the Primary, Secondary and tertiary structure of protein ?
7. Discuss the degradative and synthetic evidences leading to the structure of nicotine.
8. What is relation between in the following sets ?
 - (a) A nucleotide and nucleoside.
 - (b) Nucleotide and nucleic acid
 - (c) Ribose and Deoxyribose.
9. Name the important lipids. Write details about biological functions of Lipids and its metabolism.
10. Write notes on any **Two** of the following :—
 - (a) Inversion of sucrose.
 - (b) Peptides linkage
 - (c) Blanc rule.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-VII
(Reaction Mechanism and Supramolecular Chemistry)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Define photo substitution and explain with suitable example.
2. Describe the path way of optical inversion and isomerization.
3. Write notes on Helicate, Rosettes, Cage in Supramolecular chemistry.
4. Mention substitution reaction which undergoes without Cleavage of metal-ligand. Give mechanism with suitable examples.
5. Why certain electron transfer reaction proceed by inner sphere mechanism and some by outer sphere mechanism ? Explain.
6. Explain the following :—
 - (a) Bailar twist mechanism.
 - (b) Marcus-Husch theory.
7. How the supramolecular catalysts are similar to enzyme catalyst ? What are differences between them ?
8. Give two general methods of preparation of metal alkoxide. Draw the structure of dimeric and tetrameric alkoxides.
9. Describe the energy state of octahedral Chromium(III) complex and associated photo chemical process.
10. Write notes on the following :—
 - (a) S_NCB mechanism.
 - (b) Photochemical reaction.

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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-I
PAPER-VIII
(Natural Product)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. What are Vitamins ? Discuss the classification of vitamins. Write the important sources of vitamin and mentioned deficiency diseases.
2. Establish the structure of Vitamin B_2 . Give the synthesis of Vitamin B_2 .
3. What are porphyrins ? Write the degradative and synthetic evidence for the determination of structure of Haemin.
4. Write the Wood Synthesis of Chlorophyll-a and also give degradative evidences for the elucidation of the structure of Chlorophyll-a.
5. Discuss the structure of Phytol.
6. Give a systematic synthesis of estron and discuss its structure.
7. How is a flavone related to isoflavone ? Give critical account of the structure determination and synthesis of isoflavone.
8. Discuss the point linkage between quininic acid and meroquinene of quinine.
9. Discuss the structure of abietic acid and conformed by synthetic method.
10. Write notes on the following :—
 - (a) Pynidoxal and Pyridoxamine.
 - (b) Presence of Phenanthrene nucleans in morphine.

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NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER-IX
(Spectroscopy)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. State and explain the Franck-Condon principle. How is Franck-Condon principle helpful in predicting the relative intensities of vibronic transition ?
2. Distinguish between pure rotational spectrum and vibration rotational spectrum of molecule. How are they different from electronic spectrum ?
3. Answer the following :—
 - (a) Define infrared spectrum.
 - (b) Infrared active and inactive vibration.
4. Write in details the application of Mossbauer spectra to some of compounds of *Fe* .
5. Answer the following :—
 - (a) Explain d-d transition.
 - (b) In UV spectrum, the electronic band is usually broad.
 - (c) I.R. Selection rule in I.R. spectroscopy.
6. What are applications of ESR in the study of organic and simple Inorganic radicals ?
7. Discuss various type of electronic transition. Explain the effect of solvent in this transitions, if any. Identify the type of transition possible in following compounds :—
 - (a) Acetone
 - (b) Transition Metal Complex
 - (c) Aromatic Carbonyl.
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. Derive spectroscopic terms for p^2 configuration and write down Hund's rule to find out ground state term.
10. Write notes on any **Two** of the following :—
 - (a) Selection rule in I.R. Spectroscopy
 - (b) Quantum theory
 - (c) Vibrational Raman Spectra

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Examination Programme, 2017
M.Sc. Chemistry, Part-II

Date	Paper	Time	Examination Centre
01.06.2017	Paper-IX	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
03.06.2017	Paper-X	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
05.06.2017	Paper-XI	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
07.06.2017	Paper-XII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
09.06.2017	Paper-XIII	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
13.06.2017	Paper-XIV	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
15.06.2017	Paper-XV	12.00 Noon to 3.00 PM	Nalanda Open University, Patna
17.06.2017	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, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Discuss the effect of ionic strength and dielectric constant of the medium on the rate constant of the reaction.
2. (a) What is the activation energy role in explaining the catalysis reaction.
(b) Derive Bronsted Catalysis relation. Explain oscillatory reaction.
3. What is faradaic and non faradaic process ? Explain Stoichiometric number and transfer co-efficients ?
4. Answer the following :—
(a) General Mechanism of Catalytic reaction.
(b) Bronsted Catalysss reaction.
5. Explain the kinetics of reaction in liquid and gas phase. What is diffusion controlled reaction ?
6. Discuss the NMR method for study of fast reaction.
7. Explain Corrosion ? Describe the theories of Corrosion. How a metal can be protected from corrosion.
8. What is Kinetic salt effect ? Describe the Bronsted Bjerrum equation.
9. What do you understand by the dynamics of reaction ? What is mechanism of activation ? Discuss potential energy surfaces.
10. Write notes on the following :—
(a) Stoichiometric number and transfer co-efficients.
(b) Oscillatory reaction.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XI
(Molecular Thermodynamics)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Derive Boltzmann distribution law for non-degenerate energy level. What is condition of applicability of Boltzmann statistics ?
2. (a) Define canonical ensemble in statistical thermodynamics.
(b) Mentioned various types of ensembles.
3. Discuss the attempts which have been made to account quantitatively for the variation of atomic heat of solid with temperature.
4. 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 ?
5. What do you mean by entropy production ? Derive the expression for the rate of entropy production resulting from heat of mass flow in the system.
6. (a) What are stationary state of a system. Explain with examples.
(b) Show that the entropy production is minimum for stationary state system.
7. What are Onsager reciprocal relation ? What is basic of this relationship ? Discuss the unity of these relations in couples flow system.
8. Derive expression for any **Two** of the following :—
 - (a) Rotational partition function.
 - (b) Translational partition function.
 - (c) Vibrational partition function.
9. 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 ?
10. Write notes on any **Two** of the following :—
 - (a) Electronic partition function.
 - (b) Nuclear partition function.
 - (c) Entropy of ortho and Para hydrogen.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XII
(Ligand Field Theory)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Write the details about the application of IR spectroscopy in determining the structure of metal carbonyls.
2. (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.
3. Write notes on the following :—
(a) Explain Vibronic Coupling.
(b) Nephelauxetic Ratio.
4. Explain charge transfer Bands and their assignment in both octahedral and tetrahedral field.
5. Explain Jahn-Teller distortion and spectra with reference to $[Ti(H_2O)_6]^{3+}(d^1)$ and $[Cu(H_2O)_6]^{2+}(d^9)$.
6. Application of E.S.R. spectroscopy in study of Inorganic Chemistry.
7. Derive term symbol for d^2 electronic system and determine the ground state term.
8. What is condition for Mossbauer spectra to occur ? Discuss its important application.
9. How 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 metal separately.
10. Write short notes on the following :—
(a) Hund's Rule for determination of ground state term.
(b) Condon-Shortly parameter.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XIII
(Organotransition Metal Chemistry and Metal Clusters)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Write the general method of preparation of metal carbonyl and its properties.
2. Write notes on zental ion and chevrel phase.
3. Explain non-rigid co-ordination compound of different coordination number.
4. What are the different types of fluxional organic metallic compounds ? Describe them in brief.
5. Define and explain metal clusters. What are basis on which metal clusters have been categorized ? Give important methods of synthesis.
6. (a) Write the synthetic application of organocopper coumpounds.
(b) Why the aryl organometallic application of organocopper compounds.
7. What is ZSM-5 ? How methanol can be transformed into gasoline using ZSM-5 ?
8. Discuss the nature of bonding in following compounds,
(a) $Fe(\eta^5 - C_6H_5)_2$
(b) $Cr(\eta^6 - C_6H_5)_2$
9. What are the factors determining the stability of transition metal alkyls ? Why organometallic compounds are more stable than alkyl organometallic compounds.
10. Write notes on any **Two** of the following :—
 - (a) Classification of organometallic compounds.
 - (b) Bonding of π allyl complexes of transition metals.
 - (c) Fischer-Tropsch reaction.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER-XIV
(Photochemistry and Pericyclic Reaction)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. What do you mean by pericyclic reaction ? What are the types of pericyclic reaction ? Write them with suitable examples.
2. Explain and discuss the photo chemistry of intermolecular dimerisation of alkene by (2 + 2) Cyclo addition.
3. Write notes on the following :—
 - (a) Frank Condon principle.
 - (b) Quenching.
 - (c) Singlet and triplet state.
4. What do you understand by Frontier molecular orbital symmetry.
5. What is the endo-rule as applied to Diel-Alder reaction ?
6. Write down the explanatory notes on Cope-Rearrangement and Aza-Cope Rearrangement. Write down the selection rules for sigmatropic rearrangement.
7. Give π molecular diagram of
 - (a) 1, 3, Pentadiene
 - (b) 1, 3, 5 hatatriene
8. Explain photolysis of nitrates having primary δ -Carbon, Secondary σ -Carbon and *no* hydrogen at δ -Carbon.
9. Give mechanism of Norrish type I process. How many types of Carbonyl Compounds gives this reaction ?
10. Write notes on the following :—
 - (a) Photochemistry of Aromatic Compounds.
 - (b) A_{za} Cope Rearrangement.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

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

(Organic Synthesis)

Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Explain synthons and synthetic equivalent. Discuss Retrosynthetic analysis of C-C disconnection and C-N disconnection.
2. Write mechanism of each of following rearrangements :—
 - (a) Favorskii Rearrangement.
 - (b) Claisen Rearrangement.
 - (c) Wegner-Meerwein Rearrangement.
 - (d) Arndt EisAert Synthesis.
3. Explain the synthetic use of H_2O_2 and O_5O_4 in the oxidation of alkene to glycol.
4. 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.
5. Write notes on any **Three** of the following :—
 - (a) Sulpha drug
 - (b) Desulphururisation
 - (c) Mustard gas
 - (d) T.N.T.
6. Give your reasons, predict the structure of principal product from pinacol rearrangement of flowing glycol :—
 - (a) 2-Methyl-2, 3-Pentanediol.
 - (b) 2-Methyl-3-Phenyl-2, 3-butanediol.
 - (c) 3, 4-Diphenyl-3, 4-hexanediol.
 - (d) 1, 2-Diphenyl-2-Methyl-1, 2-prodpanediol.
7. Explain the synthetic use of $NaBH_4$. Compare reductions with $NaBH_4$ and $LiAlH_4$.
8. Explain the reduction reaction of the following compounds with examples :—
 - (a) Reduction of Aldehyde.
 - (b) Reduction of Ketones.
 - (c) Reduction of nitro Compounds.
9. What is silane ? How they are named ? Name the following compounds :—
 - (a) $CH_3HSi(NH_2)_2$
 - (b) $(CH_3)_2SiCl_2$
 - (c) $(C_2H_5)_2SiHCOOCH_3$
 - (d) $C_2H_5Si(OH)_3$
 - (e) $H_3Si(SiH_2)_3SiH_3$
10. Write notes on the following :—
 - (a) Eibs reaction
 - (b) Oppenauer oxidation
 - (c) Etard reaction
 - (d) Barton reaction

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.

NALANDA OPEN UNIVERSITY
M.Sc. Chemistry, Part-II
PAPER–XVI
(Environmental Chemistry and Analytical Chemistry)
Annual Examination, 2017

Time : 3 Hours.

Full Marks : 80

Answer any FIVE Questions.
All questions carry equal marks.

1. Explain defluorination and fluoridation ? How will you estimate the fluoride in the sample of water.
2. What is major regions of atmosphere ? What are the important chemical species in each region ? Explain the existence in the region.
3. What is different parameters which determine water quality ? How you will estimate total solid in water.
4. Explain composition of soil ? Discuss the organic and inorganic components of soil. Write a note on waste treatment of soil.
5. How will you estimate (a) Protein, (b) Ascorbic Acid in the given sample ? Describe it.
6. What do you understand by the term smog ? What is its mechanism ? How does its harm to human being and other living kingdoms.
7. Explain biogeochemical cycles in environments ? How do they sustain life in biosphere ?
8. Write the basic principle of Thermo Gravimetric Analysis (TGA) with example. How you will analyze DTA Curve ? Write its application.
9. What are the basis of following types of chromatography :—
 - (a) Paper Chromatography.
 - (b) TLC
 - (c) ION exchange chromatography.
10. Write notes on the following :—
 - (a) Micro and Macronutrient of Soil.
 - (b) Rf Value.

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For Practical Counselling Class & Practical Examination Programme Please See on Back Page.
