Nalanda Open University
Annual Examination - 2012
B.Sc. Chemistry (Honours), Part-I
Paper-I

Time: 3.00 Hrs. **Full Marks: 80**

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

1. What is common ion effect. How does common ion effect the solubility of salt? Describe the application of common and solubility product in the salt analysis.

2. State the postulates of Kinetic theory of gases. Deduce the Kinetic gas equation. Calculate the R.M.S velocity and average velocity of oxygen molecules at 273^0 K.

3. What do you understand by a buffer solution and buffer capacity? Deduce and expression for PH of
   (a) an acid buffer and (b) an alkaline buffer

4. Write notes on the following:
   (a) Meaning and significance of $\psi 2\ \psi^2$
   (b) Pauli's exclusion principle
   (c) HUND RULE

5. What are coinage metals? What are the important ores of silver. Extract silver in pure state from its important sulphide ore. How does silver reacts with
   (a) HNO_3 (b) H_2SO_4 (c) Halogens.

6. How would you prepare the following from colemannite ore?
   (a) Boron in pure state (b) Borax (iii) Boron tri fluoride

7. Explain the radius ratio rule and ratio of Lactice which Co-ordination number are useful in the determination of structure of crystal of large number of organic compound give its atleast two examples.

8. Answer the following:
   (i) The radius of cation is invariable smaller and that of anion is invariably larger the corresponding atom why ?
   (ii) Covalent radius in less than its Vander Waal radius why?
   (iii) Ionic compounds are soluble in polar solvents but not in non-polar solvents, why?
   (iv) $AgNO_3$ give white ppt with HCl which dissolves in NH_4OH solution why?

9. What are the main postulates of valence bond theory (VET) purposed by Heitler and extentended by panling and stater Expression pie and sigma bounds by giving examples with diagram?

10. (a) Write down values of all the four quantum numbers of the following:
    (i) 28th electron of Ni
    (ii) $4f^1$ configuration
    (iii) 23rd electron of varadium.
    (iv) Calculate the frequency, wave number and energy associated with photon of radiation having Wave Length 6000 A^u.

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Nalanda Open University
Annual Examination - 2012
B.Sc. Chemistry (Honours), Part-I
Paper-II

Time: 3.00 Hrs. **Full Marks: 80**

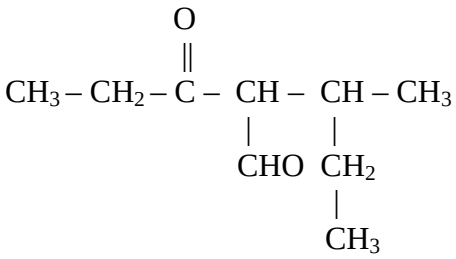
Answer any *Five* Questions. All questions carry equal marks.

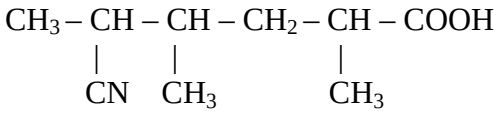
1. What do you understand by lowering of vapour pressure? State Raoult's law and express the law mathematically. Describe Oswald and Walker method for the determination of relative lowering pressure.

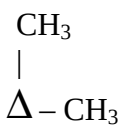
2. Why does a solution exhibit abnormal osmatic pressure? What is Van't Hoff's factor and how is it related to degree of dissociation of an electrolyte? What is relation between osmotic pressure and lowering of vapour pressure.

3. What do you understand by heat capacity of a gas. How is it related with internal energy and enthalpy?

4. (a) Write I.U.P.A.C names of the following.

(i)


(ii)


(iii)


(iv)


(v) $CH_3 - CH = CH - CH_2 - C = C - CH_3$

(b) What is meant by hybridisation? Illustrate by giving suitable examples for the sp, sp^2 and sp^3 – hybridisation in carbon atom.

5. Write notes on any two of the following:
(a) Inductive effect (b) Electromeric effect (c) Hyper conjugation.

6. (a) What are primary, secondary and tertiary alcohols? How will you distinguish between them?
(b) Describe the preparation and properties of a thiols.

P.T.O

7. (a) What is the chief source of citric acid? How is it obtained in pure state? Establish the structure of citric acid.
   (b) Discuss the stereochemistry of lactic acid.

8. How will you synthesize following compounds from malonic ester?
   (a) Succinic acid (b) Cinnamic acid (iii) Aceto acetic acid.

9. Explain the following:
   (a) $(Me)_2NH$ is more basic than $(Me)_3N$ & CH_3NH_2 in water, why?
   (b) Formic acid is stronger acid than acetic acid, why?
   (c) CH_3COOH is a weaker acid than $ClCH_2COOH$, why?
   (d) Citric acid does not exhibit optical activity, why?

10. How are urea prepared? Explain why urea is basic? How would you identify urea in laboratory? How does urea react with (i) hydrazine (ii) nitrous acid.

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Programme of B.Sc. Part-I Chemistry (Hons.) Practical Counselling Classes and Examination 2012

Practical Counselling Class

Date	***Paper***	***Time***	***Batch***	***Enrollment No.***
13.04.12 to 16.04.2012	I & II	11:15 A.M. to 03:15 P.M.	C1	090470127, 100470015 to 100470090 110470002 to 110470024
17.04.2012 to 20.04.2012	I & II	11:15 A.M. to 03:15 P.M.	C2	110470029 to 110470085

Venue : 4th Floor, Chemistry Lab, Biscomaun Bhawan

Practical Examination

Date	***Time***	***Paper***	***Batch***	***Enrollment No.***
21.04.12	11:15 A.M. to 02:15 P.M.	I	C1	090470127, 100470015 to 100470090 110470002 to 110470024
21.04.12	02:30 A.M. to 5:30 P.M.	I	C2	110470029 to 110470085
22.04.2012	11:15 A.M. to 02:15 P.M.	II	C1	090470127, 100470015 to 100470090 110470002 to 110470024
22.04.2012	02:30 A.M. to 5:30 P.M.	II	C2	110470029 to 110470085

Venue : 4th Floor, Chemistry Lab, Biscomaun Bhawan

Nalanda Open University
Annual Examination - 2012
B.Sc. Chemistry (Subsidiary), Part-I
Paper-I

Time: 3.00 Hrs. **Full Marks: 80**

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

1. Deduce an expression for work done in ideal gas:
   (a) in an reversible isothermal process and
   (b) in an adiabetic reversible process.

2. What do you understand by concentration cell? How is it constructed? Deduce expression for a concentration cell prepared by silver electrodes using different concentration in anode and cathode.

3. (i) How is tartaric acid prepared on large scale? How does tartaric acid react with:–
   (a) Tollen's reagent (b) Fenton reagent
   (ii) Discuss the optical isomerism of tartaric acid.

4. Describe laboratory and also an industrial method for preparation of oxalic acid. Why oxalic acid is the strongest of all dicarboxylic acids? How does oxalic acid react with:
   (i) Glycerol (ii) H_2SO_4 (iii) Ethylene glycol.

5. Write down the important Biological functions of Nucleic acid.

6. What happens when:–
   (a) lactic acid treated with HI
   (b) Nitrobenzene is reduced in alkaline medium
   (c) glucose reacts with phenyl hydrazine
   (d) Phenol is treated with CO_2 and NaOH at 125^0C under 6–atmosphere
   (e) Benzene diazonium chloride is treated with $Cu_2(CN)_2$ and KCN.
   (f) When adipic acid is *heated alone at* 300^0C or distilled with acetic anhydride.

7. Write three methods for preparation of aniline. Why aniline is a base? How does aniline react with (a) Benzaldelyde (b) nitrous acid (c) chloroform in the presence of alcoholic KOH.

8. Explain sulphur system on the basis of phase rule.

9. What is Gibb's free energy? How is it related to entorpy?

10. Write notes on:–
    (i) Peptides and their classification
    (ii) Addition reaction
    (iii) Rosenmund's reduction.

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Nalanda Open University
Annual Examination - 2012
B.Sc. Chemistry (Honours), Part-II
Paper-III

Time: 3.00 Hrs. **Full Marks: 80**

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

1. (a) Derive Gibb's Helmholtz equation. What important conclusion can be drawn from this equation.
   (b) Entropy of universe is increasing. Explain.

2. Derive the expression for the E.M.F. of a concentration cell with transport.

3. Describe either the potentiometric method (Bjerrum Method) or Spectrophoto metric method (Job method) of determining the step wise and overall stability constant of a complex compound. What are the factors upon which formation constant of a complex compound depends.

4. Write down the preparation, properties and uses of the following:
   (a) Hydrazine (b) Hydroxylamine (c) Tel.

5. Name the important ores of chromium. How can you obtaine chromium is pure state from chromite iron ore? What is chrome alum?

6. How does tin occur in nature? Obtain tin from its ore and prepare stannous chloride from tin. What are the important properties and uses of stannous chloride?

7. (a) What do you mean by water pollutant? Classify water pollutants.
   (b) What is acid rain? How it is caused?

8. Write the formulae for the following according to PUPAC rules.
   (i) Potassium trioxalato cobaltate (III)
   (ii) Diamnine chloro methyle amine nickel (II) chloride
   (iii) Potassium hexa cynoferrate (II)
   (iv) Tetra carbonyl nickel (O)

   Write I.U.P.A.C names of following complexes
   (i) $[Fe(H_2O)_5NO] SO_4 . 2H_2O$
   (ii) $[CO(NH_3)_6] [Cr(CN)_6]$
   (iii) $Na_2[PtCl_4]$
   (iv) $[Ni(CN)_4]^{-2}$

9. Explain the terms :
   (a) Photon (b) Quanta (c) Threshold energy

10. Illustrate the characteristics of transition elements with respect to
    (a) oxidation state
    (b) complex compound formation
    (c) colour of their ion.

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Nalanda Open University
Annual Examination - 2012
B.Sc. Chemistry (Honours), Part-II
Paper-IV

Time: 3.00 Hrs. **Full Marks: 80/75**

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

1. Define emulsion and gel? Distinguish between them with examples. What do you mean by O/W and W/O type emulsion. What do you mean by the weaping gel?

2. Write notes on:
   (i) Tyndal effect
   (ii) Brownian movement
   (iii) Wheat stone bridge principle

3. Define and explain conformation. Explain the conformation of (i) eathne and (ii) Butane.

4. What is Grignard reagent? How it is prepared? Can it be isolated and kept in pure state? Give reasons for your answer. What happens when Garignard reagent react with
   (a) 2^0-alcohol (b) nitryles

5. Discuss the structure of D-glucose. How will you synthesize (a) fructose from glucose and
   (b) glucose from Arbinose.

6. What are polypeptides? Write series of equations to show peptide glycoglalanine can be synthesized from alanine and glycine.

7. Explain the mechanism of electrophilic substitution in benzene and its homologue.

8. How is nitro benzene prepared in Laboratory? What are the products when nitro benzene treated with:-
   (a) Fe in dil HCl
   (b) Zu dust in Aqueous NH_4Cl
   (c) Electrolytic reduction in dilute H_2SO_4.

9. Write short notes on
   (a) Perkin Reaction
   (b) Cannizaro's Reaction
   (c) Kolbe Reaction

10. Distinguish between:
   (a) A globular protein and fibrous protein.
   (b) Primary and secondary structure of protein.

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Nalanda Open University
Annual Examination - 2012
B.Sc. Chemistry (Subsidiary), Part-II
Paper-III

Time: 3.00 Hrs. **Full Marks: 80/75**

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

1. Choose correct answer from the following statements:
   (i) Transition elements are
   (a) S-block elements (b) p block element (c) d-block elements (d) None of these

   (ii) Chromium has electronic configuration:
   (a) $Ar3d^4\ 4S^2$ (b) $Ar\ 3d^5\ 4S^1$ (c) $Ar\ 3d^6$ (d) None of these
   (iii) Which of the following has maximum number of unpaired electrons.
   (a) Zn (b) Fe^{++} (c) Ni (d) Cu^+
   (iv) The atomic number of Cobalt is 27 and effective atomic number in the complex $[Co(NH_3)_6]Cl_3$ is 24, the O-N. of Coblat in the complex will be
   (a) +1 (b) +2 (c) +3 (d) +6
   (v) Which of the halogen acid does not give precipitates with $AgNO_3$ solution
   (a) HCl (b) Hf (c) HBr (d) HI
   (vi) Which of the following has the greatest affinity for haemoglobin.
   (a) NO (b) CO (c) SO_2 (d) NH_3
   (vii) Which of the following is present in maximum in acid rain
   (a) CH_3COOH (b) H_2SO_4 (c) HCl (d) $\begin{matrix} CH_2COOH \\ | \\ CH_2COOH \end{matrix}$
   (viii) The killer in Bhopal Disaster was:
   (a) methyl isocynide (b) Thionyl chloride (c) CO (d) SO_2
2. Why d-block elements are called as transition metals. How do the following properties vary in a transition metal series.
   (a) atomic radius (b) density (c) m.p & b.p.
3. Explain:–
   (a) Hg is liquid
   (b) TiO_2 is white where as $TiCl_3$ is violet
   (c) $KMnO_4$ is a good oxidising agent
4. Write the I.U.P.A.C name of the following complexes
   (i) (a) $[CO(CO)_6]$ (b) $K_2[PtCl_4]$ (c) $[Fe(H_2O)_5NO]SO_4.2H_2O$
   (ii) Distinguish between Double salt and complex compound.
5. How sodiumthio sulphate is prepared? Write its properties, uses and structure.
6. What are the important ores of Nickel. How is nickel obtained from in pure state from its ore? Give the reaction of nickel with the following:
   (i) HNO_3 (ii) H_2SO
7. What is water pollution? How are water pollutants classified? Discuss the various methods available for primary and secondary.
8. Give the principle involved in gravimetric estimation of barium in a given solution. Describe its procedure.
9. How can you prepare potassium dichromate from chromit iron ore? Give its reaction with
   (a) Acidified $FeSO_4$
   (b) H_2S in acid medium
10. Write short notes on:
    (a) Permono sulphuric acid (b) Silicons

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Nalanda Open University
Annual Examination - 2012
B.Sc. Chemistry (Honours), Part-III
Paper-V (Physical Chemistry)

Time: 3.00 Hrs. **Full Marks: 80**

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

1. What do you understand by term 'adsorption'. Write Gibb's adsorption equation for binary system. How is Gribb's adsorption is measured experimentally?

2. What are the postulates of theory of absolute rate of reaction? Deduce expression for the rate constant.

3. What is meant by bond moment and group moment? Discuss the structure of H_2O and NH_3 molecule from the knowledge of dipole moment.

4. What do you understand by 'Void' in crystal lattice. Explain the difference between "tetra- hedral void and octahedral void". Describe the experiment for the determination of crystal structure of diamond.

5. State and explain Lambert - Beer law governing photo chemical law of photo chemical equivalence.

6. Discuss the application of phase rule to the equilibrium of different phases of water with the help of a neat diagram. Explain the meaning of the area, line and point in the diagram.

7. Distinguish between
   (a) fluorescence and phosphorence
   (b) Photo Chemical and Thermo Chemical reaction.

8. (a) What is miller indices of plane of a crystal lavice? Show that all prarallel planes of any crystal lattice have same miller indices.
   (b) What do you mean by Co-ordination number of the constituent of a crystal?

9. What is meant by polarizability of a molecule? Derive clausis- Mossotti equation for determining molar Polarisation in terms of relative permittivity of the medium and induced polarizability of the medium and induced polarizability to molecule.

10. Deduce expression for the second order of reaction.
    $A + B \longrightarrow$ Product
    Given that the initial concentration of both reactants are different.

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Nalanda Open University
Annual Examination - 2012
B.Sc. Chemistry (Honours), Part-III
Paper-VI

Time: 3.00 Hrs. **Full Marks: 80**

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

1. Explain L-S coupling scheme. How would derive the ground state term symbol? Calculate free ion ground term for Cr^{3+}, Cu^{++}, Fe^{++} and V^{3+}.

2. What are the important features of crystal field theory? What do you mean by 'splitting of d- orbitals'. How does the d-orbital split in an octahedral crystal field?

3. Discuss the reasons which make Liquid ammonia suitable medium for carrying out reaction. Explain the following type of reaction in liquid ammonia with suitable examples.
   (a) Precipitation reaction (b) acid-base reaction.

4. Write down the names of ores of vanadium. Give one method of extraction by which Vanadium is obtained from its ore in pure state. Explain the various oxidation states of Vanadium on the basis electronic configuration. Why the compounds of Vanadium are generally coloured?

5. Platinum is called a noble metal, why? Describe the method of extraction of Platinum from Sudbury ore. Give the chart and explain the various steps. Explain, why all complexes of Pt(IV) are octahedral and diamagnetic.

6. What do you mean by the term:
   (a) Element of symmetry (b) centre of symmetry
   (c) plane of symmetry (d) symmetry group

7. What do you mean by dual nature of particle? Describe an expression for de-Broglie relationship. Write down Schrodinger wave equation for hydrogen atom and explain it in brief.

8. Discuss the formation of N_2, O_2, and F_2 molecules with the help of MO theory. How does the theory differnciate in reactivity among N_2, O_2, and F_2.

9. Determine the magnetic susceptibility ((ψ_M) experimentally by GOUY method.

10. Write short notes on :
    (i) Crystal field stablisation energy
    (ii) Para magnetism shown d-block elements
    (iii) Ammonium molbydate

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Nalanda Open University
Annual Examination - 2012
B.Sc. Chemistry (Honours), Part-III
Paper-VII

Time: 3.00 Hrs. **Full Marks: 80**

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

1. What are flavones? How is flavone related to an isoflavone and flavanol? Give synehetic and degradative evidence to establish the structure of flavone.

2. Explain the following, why?
   (a) 2, 4, 6, Trinitrophenol is called picric acid.
   (b) Cyclopentadienyl rings is ferrocene are aromatic.
   (c) Pyrrole is weakly acidic where as Pyridine is weakly basic.
   (d) Phenolphthalein is used as indicator in acid-base titration.

3. How has constitution of uric acid been determined? Give synthetic evidence in favour of the structure of uric acid.

4. Give synthetic and uses of any **three** of the following:
   (a) Malachite Green (b) Indigo
   (c) Phenolthalin (d) Congored

5. How conjured will you prove the pressure of two fused benzene rings in naphthalene. How will you convert naphthalene, into
   (i) β - naphthol and (ii) α - naphthyl amine.

6. Write short notes on:
   (a) Hydrogen Peroxide
   (b) Lithium aluminium hydride
   (c) Periodic acid

7. (a) Explain interms of inductive effect on acidity order as given below:
   $ClCH_2COOH > HCOOH > CH_3COOH$.
   (b) Comment on the aromaticity of the following:
   (i) Furan (ii) Tropine (iii) Naphthalene

8. On the basis of modern theory discuss the directive effect of -OH, -Cl, $-NO_2$ and -COOH groups during the electrophilic aromatic substitution.

9. Discuss the mechanism of addition of halogen and hypohalous acids to olefins.

10. Write short notes on any two of the following:
    (i) Steric hinderence
    (ii) Molecular orbital
    (iii) Saytseff rule.

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MOST IMPORTNAT NOTICE

: अत्यन्त महत्वपूर्ण सूचना :

बी0एस0सी0(प्रतिष्ठा)पार्ट-III एवं मनोविज्ञान(प्रतिष्ठा)पार्ट- III के सभी विद्यार्थियों को सूचित करना है कि उनके सामान्य एवं पर्यावरणीय अध्ययन **(G.S)** की परीक्षा 2012 जो पूर्व से दिनांक-23.02.2012 को द्वितीय पाली समय 12 से 3 बजे, अपराह्न में निर्धारित थी, **अब यह परीक्षा दिनांक 24.02.2012 को द्वितीय पाली समय 12 से 3 बजे, अपराह्न में संचालित होगी** । तदनरूप परीक्षा में उपस्थित होवें।

Nalanda Open University
Annual Examination - 2012
B.Sc. Chemistry (Honours), Part-III
Paper-VIII

Time: 3.00 Hrs. **Full Marks: 80**

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

1. (a) What are different regions of electromagnetic spectrum according to wave number range and wave length in A^0.
   (b) What is difference between atomic and molecular spectroscopy.

2. Give one method of synthesis of following:
   (a) Polystyrene (b) Terylene (c) Teflon.

3. What do you understand by the position of signal in an nmr spectrum? Describe the splitting of signals with suitable examples.

4. What is biogas? Give its composition. How it is prepared on large scale? What are their uses?

5. Discuss the following:
   (i) Chromosphore (ii) Bathochromic shift (iii) Hyper chromic shift.

6. How water pollutants classified. Discuss and give their description with example.

7. (a) Explain the effect of anharmonicity on the vibrational spectra of diatomic molecule.
   (b) How many fundamental vibrational frequencies would you expect to observe in IR absorption spectrum of H_2O?

8. Discuss the micro and macro elements necessary for the growth of the plants. How does Industrial waste and radio active pollutant affect them.

9. Discuss the harmful effects and prevention of CO_2 pollution. What do you understand by ozone depletion?

10. Write short notes on:
    (i) Fertilizer and pesticides use and effect
    (ii) Swage treatment
    (iii) Vulcanziation of rubber

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Programme of B.Sc Part-III Chemistry (Hons.) Practical Counselling Class and Examination 2012

Practical Counselling Class

Date	***Time*** ***11:15 AM to 1:15 PM***	***Time*** ***1:15 PM to 3:15 PM***	***Time*** ***3:15 PM to 5:15 PM***
10.03.12	**Paper-V**	**Paper-VI**	**Paper-VII**
12.03.12	**Paper-V**	**Paper-VI**	**Paper-VII**
13.03.12	**Paper-V**	**Paper-VIII**	**Paper-VIII**

Practical Examination

Date	***Time*** ***11:15 AM to 2:15 PM***	***Time*** ***2:30PM to 5:30 PM***
14.03.12	**Paper- V**	**Paper-VI**
15.03.12	**Paper- VII**	**Paper-VIII**

Venue- Chemistry Lab 4th Floor Biscomaun Bhawan, Patna