Nalanda Open University

Annual Examination - 2015

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. (a) What do you mean by Quantum number?
   (b) Write down all the four Quantum Number for $4s^1$, $5p^4$, $3d^7$, $5f^3$
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. How does gold occur in natur? How gold is extracted on large scale from auriferous quartz by cyanide method? What do you mean by 18 carats gold? Explain colloidal gold.
5. What are noble gases? How noble gases is isolated from atmospheric air? And how they are separated from each other? Xe ha closed shell or stable $ns^2.np^6$ configuration but is known to form compounds with fluorine why?
6. (a) Describe the characteristics to S-block and P-block elements.
   (b) Explain the diagonal relationship.
7. How H_2O_2 is prepared and concentrated? What do you mean by strength of H_2O_2? Suggest the structure of H_2O_2 on the basis of its chemical behaviour. Give atleast two reactions for oxidizing and reducing property given by H_2O_2.
8. 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 example.
9. What are the main postulates of valence bond theory (VET) purposed by Heitter and extended by Panling and Stater expression pie and sigma bounds by giving with diagram?
10. Writer notes on any two of the following:
    (a) Bragg's Law (b) Lattice energy (c) Borm Haber cycle.

Examination Programme, 2015

B.Sc (Part – I) All Honours Subjects

(Except Home Science and Geography Honours)

Date	Papers.	Time	Examination Centre
23/3/2015	(Hons) P-I	**3.30 to 6.30 pm**	Nalanda Open University, Patna
25/3/2015	(Hons) P-II	**3.30 to 6.30 pm**	Nalanda Open University, Patna
28/3/2015	Rastrabhsha-100 orHindi +Urdu 100-I	**3.30 to 6.30 pm**	Nalanda Open University, Patna
30/3/2015	Botany (Sub) P-I	8 to 11 am	Nalanda Open University, Patna
31/3/2015	Math (Sub) P-I	8 to 11 am	Nalanda Open University, Patna
01/4/2015	Geography (Sub) P-I	8 to 11 am	Nalanda Open University, Patna
02/4/2015	Chemistry (Sub) P-I	8 to 11 am	Nalanda Open University, Patna
03/4/2015	Home Scince (Sub)-P I	8 to 11 am	Nalanda Open University, Patna
04/4/2015	Zoology (Sub) P-I	8 to 11 am	Nalanda Open University, Patna
06/4/2015	Physics (Sub) P-I	8 to 11 am	Nalanda Open University, Patna

Nalanda Open University
Annual Examination - 2015
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 low and express the law mathematically. Describe Oswald and Walker method for the determination of relative lowering pressure.
2. (a) State and explain first law of thermodynamics.
   (b) Derive a relation between heat capacity at constant pressure and constant volume.
3. (a) Give the IUPAC names of the following compound :
   (i) $CH_3(CN)\cdot CH(CN)CH_2(CN)$ (ii) $CH_3CH_2 - CH = CHCOOH$
   (iii) $CH_3CH_2 - CH(CN) - CH_2COCH_2COOH$ (iv) $CH_2 = CH\cdot CH = CH\cdot COOH$
   (b) Write the structural formula of the following :
   (i) 2-Pentanone (ii) 2,Methoxy-4-Methylpentane
   (iii) 2-Methyl buta-1,3-dien (iv) 2,3-dimethyl butane-2-al
4. (a) What are primary, secondary and tertiary alcohals? How will you distinguish between them?
   (b) Describe the preparation and properties of a thiols.
5. What do you understand by elevation of boiling point. Deduce an expression for molecular weight of a solute with the elevation in boiling point of the solution.
6. Write down the structure of glycerol, its name according to IUPAC system. How glycerol is prepared industrially from oil & fat? Give its reaction with :
   (a) Oxalic acid (b) mixture of ionic H_2SO_4 & HNO_3 (c) Hg
7. How will you synthesize following compounds from malonic ester?
   (a) Succinic acid (b) Cinnamic acid (c) Aceto acetic acid
8. 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
9. How nitrogen is estimated by Duma method experimentally. Describe it with necessary reactions.
10. Write short notes on :
    (a) Addition reaction (b) Cannizzaro's reaction (c) Lassainges test

Practical Counselling and Examination Programme of B.Sc. Part-I Chemistry (Hons.)
Venue : Ist Floor Biscomaun Tower, Patna

Practical Counselling

Date	*Paper*	*Time*	*Roll No.*
13.04.2015 to 15.04.2015	I & II	11:30 AM to 3:30 PM	All Old Students & 140470001 to 140470030
16.04.2015 to 17.04.2015	I & II	11:30 AM to 3:30 PM	140470031 to 140470070

Practical Examination

Date	*Paper*	*Time*	*Roll No.*
18.04.2015	I	11:15 AM to 2:15 PM	All Old Students & 140470001 to 140470030
	II	2:30 PM to 5:30 PM	
20.04.2015	I	11:15 AM to 2:15 PM	140470031 to 140470070
	II	2:30 PM to 5:30 PM	

Nalanda Open University
Annual Examination - 2015
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. Explain water system on the basis of phase rule.
3. What is Kohlarausch's Law? How this law is applied to determine (a) the equivalent conductant of an weak electrolyte at in finite dilution and (b) Solubility product of a sprangly soluble electrolyte.
4. Write down the important Biological functions of Nucleic acid.
5. (a) State and explain first law of thermodynamics.
   (b) Explain the term
      (i) Isothermal change
      (ii) Adiabetic change
      (iii) Reversible process
6. Describe the general methods of preparation of acid anhydrides. Give its important reaction and uses.
7. What is Gibb's free energy? How is it related to entropy?
8. Explain the following:-
   (a) Degree of freedom in the phase rule.
   (b) Concentration cell.
9. What is protein? Describe the composition uses of Fibrous and Globular proteins.
10. Write notes on:
    (a) Peptides and their classification.
    (b) Addition reaction.
    (c) Rosenmund's reduction.

Nalanda Open University

Annual Examination - 2015

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. What is clausisus clapeyron equation? Derive thermodynamic derivation of expression for molal elevation constant.
2. Describe Thomson's experiment to determine e/m ratio of an electron.
3. Explain different types of isomerism shown in Co-ordination Chemistry?
4. How does lead occuer in nature? How it is extracted from Galena ore. Write three alloys of P_b with their composition and use.
5. Explain the terms :

   (a) Photon (b) Threshold Frequency (c) Quanta
6. What do you mean by Water pollution? Classify water pollutants. What is acid rain? How it is caused?
7. Write down the preparation and properties of the following :

   (a) Tel (b) Hydrazine (c) Hydorxylamine
8. Illustrate the characteristics of transition elements with respect to :

   (a) Complex compound formation

   (b) Oxidation state

   (c) Colour of their ion
9. What do you understand by Werner's theory for formation of Complex Compounds?
10. Write short notes on :
    (a) Common ion effect
    (b) Solubility product in Salt Analysis
    (c) Entropy

For Examination and Practical Programme See Back Page

Nalanda Open University

Annual Examination - 2015

B.Sc. Chemistry (Honours), Part-II

Paper-IV

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

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

1. Define and explain conformation. Explain the conformation of eathne and butane.
2. What are Carbohydrate? How are they classified? Establish the open chain structure of fructose.
3. Give important methods of introducing of –OH group in an aromatic ring. Distinguish between phenol and ethanol.
4. Define emulsion and Gel? Distinguish between them with examples. What do you mean by the weaping gel.
5. Distinguish between :
   (a) A globular protein and fibrous protein
   (b) Primary and secondary structure of protein
6. Explain the mechanism of electrophic substition in benzene and its homologue.
7. Write short notes on (a) RNA (b) DNA
8. Discuss the carbonium ion rearrangement by taking example of pinacot pinalolone.
9. Define and explain the following term:
   (a) Specific conductance
   (b) Molar conductance
   (c) Equivalent conductance
10. (a) State and explain the necessary condition for a compound to exhibit optical isomerism.
    (b) Discuss the optical isomerism exhibited by tartaric acid.

Nalanda Open University

Annual Examination - 2015

B.Sc. (Honours), Part-II

Paper -II Chemistry (Subsidiary)

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

*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 elements
   (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 halogen acid does not give precipitates with $AgNO_3$ Solution
   (a) HCl (b) Hf (c) HBr (d) HI
   (iv) Which of the following has the greatest affinity for haemoglobin
   (a) NO (b) CO (c) SO_2 (d) NH_3
   (v) Which of the following is present in minimum in acid rain
   (a) CH_3COOH (b) H_2SO_4 (c) HCl (d) CH_2COOH | CH_2COOH
   (vi) The effective atomic number of nickel in the complex $Ni(CO_2)$ is
   (a) 28 (b) 30 (c) 32 (d) 36
   (vii) Electron affinity increasing order is as
   (a) F<Cl<Br<I (b) F>Cl>Br>I (c) I<Br<F<Cl (d) I<Cl<Br<F
   (viii) All inert gases (Element) belong to
   (a) Zero group of P.T (b) 1^{st} group of P.T
   (c) III group of P.T (d) IV group of P.T
2. Why d-block element 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. What do you mean by the tereu transition element? What are special feature of transition metals?
4. Write the I.U.P.A.C name of the following complex
   (a) $[CO(NH_3)_6]Cl_3$ (b) $LiAlF_4$ (c) $Ni(CO)_4$ (d) $[pt(NH_3)_2Cl_4]$
5. What is water pollution? How are water pollutants classified? Discuss the various methods available for primary and secondary.
6. Explain:-
   (a) Hg is liquid
   (b) TiO_2 is white where as $TiCl_3$ is violet
   (c) $KmnO_4$ is a good oxidizing agent
7. What happen when
   (a) SiO_2 reacts with Hf (b) CO reacts with NaOH
   (c) Steam is passed over red hot iron (d) CO is passed over heated Ni at 80°c
8. Describe two of the air pollutants in respect of its
   (a) Sources (b) Harmful effects of preventive measure
9. What do you understand by Werner theory? What are its merit and weaknesses
10. Write short notes on
    (a) Per mono sulphuric acid
    (b) Sillicons

Nalanda Open University

Annual Examination - 2015

B.Sc. Chemistry (Honours), Part-III

Paper-V

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

Answer any five questions. All questions carry equal marks.

1. What do you mean by Bravais Lattices? Explain the Cubic System. How many particles are occupied by the unit cell of these lattics?
2. State and explain Lambert-Beer law governing photo chemical law of photo chemical equivalence.
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. State and explain phase rule and use it to discuss the phase diagram of Sulphur system.
5. What are the postulates of Collision theory? Derive the expression for rate constant in terms of a parameters of Collision theory?
6. Using X-rays beam of known frequency (or wave length) deduce Brag's equation for the measurement of the interplanar-distances in a crystal.
7. What is doping in crystal lattice? How does it work as semiconductor? Explain the difference between *n*-type and *p*-type semiconductor.
8. Deduce expression for the second order of reaction :

   $$A + B \longrightarrow \text{Product}$$

   Given that the initial concentration of both reactants are different.
9. What is heterogenous catalysis? State the theory of heterogenous catalysis. Explain with example the activity and selecting of heterogenous catalysis.
10. Write notes on the following :
    (a) Parachor
    (b) Polarizability of a molecule
    (c) Adsorption

Nalanda Open University

Annual Examination - 2015

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. What do you understand by the term symmetry element and symmetry operation? By giving suitable example differentiate a symmetry element from symmetry operation.
2. Construct and discuss M.O diagram of CO and NO molecules and predict their magnetic behaviour.
3. What are the important ores of Berrylium? Write down their formulas and the names. How is beryllium extracted from its ore? The first I.P value of beryllium is greater than that of lithium but the position is reserved in the second I.P explain. Why Beryllium halides are covalent where as magnesium halides are ionic?
4. What are lanthanides? Write down their electronic configuration. What do you mean by lanthanide contraction? What are the consequences of lanthanide contraction?
5. What are the important features of crystal field theory? What do you mean by 'splitting of a d-orbitals'. How does the d-orbitals split in an octahedral crystal field?
6. What do you mean by dual nature of particle? Describe an expression for de-Broglie relationship. Write down Schrödinger Wave Equation for hydrogen atom and explain it in brief.
7. Determine the magnetic susceptibility (ψM) experimentally by Gouy method.
8. Explain L-S coupling scheme. How would you drive the ground state term symbol. Calculate free ion ground for Cr^{3+}, CU^{++}, Fe^{++} and V^{3+}.
9. Explain the term : Probability and radial of an electron in an atom. Draw radial probability distribution curve for S and p-orbits.
10. Why liquid sulphur dioxide is a good non-aqueom solvent? Explain the following type of reaction in liquid sulphur dioxide with suitable examples:
    (a) Acid-Base reaction
    (b) Precipitation Reaction
    (c) Solvolysis

Nalanda Open University

Annual Examination - 2015

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. Discuss the degradative and synthetic method for ascertaining the structure of isoflovance. How is isoflovance is related to flovane?
2. Explain the mechanism of hydroboration of alkene ?
3. Explain the following why?
   (a) 2, 4, 6, Trinitrophenol is called picric acid.
   (b) Cyclopentadienyl rings is ferrocene ore aromatic.
   (c) Pyrrole is weakly acidic where as pyridine is weakly basic.
   (d) phenolphthalein is used as indicator in acid-base titration.
4. How conjured will you prove the pressure of two fused benzene rings in napthalene. How will you convert naphalene, into.
   (i) β-naphthol and (ii) α-naphthyl amine
5. How is pyridine prepared ? is it a base and its basicity is greater than that of pyrrole? why the electro phillic substitution in pyridine occurs chiefly in position-3?
6. (a) What are differences between SN_1 and SN_2 reactions.
   (b) Discuss the SN_2 reaction mechanism of substitution of alkyl halide.
7. On the basis of modern theory discuss the directive effect of –OH, –Cl, $–NO_2$ and –COOH group during the Eletrophillic aromatic substitution.
8. How is zanthine prepared from uric acid? How does athene react with $KClO_3$ in the presence of hydrochloric? How is xanthine synthesised by Trambe's method?
9. How was actual indigo obtained from plant? Give two methods for its (indigo) synthesis. Give its important uses.
10. Write Short notes on any two of the following
    (i) Steric Hinderence
    (ii) Molecular orbital
    (iii) Saytseff rule

Nalanda Open University

Annual Examination - 2015

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

2. What is meant by knocking? Why is ethylene bromide added when TEL is used an antiknocle?

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

4. What do you mean by electromagnetic spectrum? Discuss the basic principle of magnetic resonance spectroscopy.

5. Discuss the micro and macro element necessary for the growth of the plants. How does industrial waste and radio active pollutant affect them.

6. What is green house effect? How it is caused? What are the major gases causing it? What the adverse of green house effect?

7. What do you mean by rubber? Write the structure of recurring unit of natural rubber. What is vulcanization of rubber? Mention its uses.

8. Discuss the following :
   (a) Chromosphore (b) Bathchromic Shift
   (c) Hyper Chromic Shift

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

10. Write short notes on :
    (a) Fertilizer and pesticides use and effect
    (b) Swage treatment
    (c) Effect of acid-rain