PREVIOUS YEARS QUESTION PAPERS

OSMANIA UNIVERSITY
DEGRE FIRST YEAR

B. Sc. Chemistry

Year's : 2011 to 1999

FACULTY OF SCIENCE
B.Sc. I Year Examination, March/April 2012
Paper – I : CHEMISTRY

12041459005

Time : 3 Hours]

[Max. Marks : 100

SECTION – A
(Essay Answer Type)

(4×15=60 Marks)

Note : Answer all questions by choosing any two bits from **each** question. **Each** bit carries 7½ marks.

1. a) Write the structures with examples of different types of interhalogen compounds.

   b) Write the preparations and reactions of Hydrazine.

   c) Explain the nature of bonding in Organometallic compounds with examples.

   d) How are the oxides classified on the basis of amount of oxygen present in a compound ? Explain with suitable examples.

2. a) Explain the Nitration and Friedel crafts alkylation of benzene with mechanism.

   b) i) Write Diels Alder reaction with a suitable example.

      ii) Write any one method for the preparation of cycloalkanes.

   c) Discuss the sulphonation and nitration of Napthalene.

   d) Discuss the acidity of Acetylene.

3. a) Discuss the critical state of gas. Derive the relationship between critical constants and Vanderwaal's constants.

   b) What is critical solution temperature ? Explain the critical solution temperatures of

   i) Water-Phenol   ii) Water-Triethylamine

   c) Write Nernst Distribution Law and its applications.

   d) Explain Langmuir adsorption isotherm.

4. a) Explain the four quantum numbers and their importance.

   b) Draw the molecular orbital energy diagram of N_2 explaining the bond order and magnetic character.

   c) Discuss the conformational isomerism of n-butane.

   d) Define solubility product and common ion effect with an example.

(This paper contains 4 pages)   1   P.T.O.
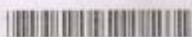
SECTION – B

(Short Answer Type)

Note : Answer all questions.   (8×5=40 Marks)

5. a) Write the preparation and structure of Borazole.

OR

b) Explain the structure of B_2H_6.

6. a) Write the preparation and applications of silicones.

OR

b) Mention any four synthetic uses of Organolithium compounds.

7. a) Write a short note on Andrew's isotherms for carbon dioxide and discuss the phenomenon of continuity of states.

OR

b) How are liquid crystals classified ?

8. a) Explain Schottky and Frenkel defects.

OR

b) Explain the following :

i) Tyndall effect   ii) Gold number

9. a) Arrange the following acids in the increasing order of their acidities and justify your answer.

i) CH_3COOH ii) FCH_2COOH

iii) $ClCH_2COOH$ iv) CH_3CH_2COOH

OR

b) Explain the mechanism of chlorination of methane.

10. a) Explain the chair and boat conformations of cyclohexane.

OR

b) Write a note on Markonikov's rule.

11. a) Write a note on Photoelectric effect.

OR

b) Write the structure of the following on the basis of Valence Bond Theory. $Ni(CO)_4$; XeF_2

12. a) Write a note on Fischer and Newman projection formulae with an example.

OR

b) What are Asymmetric and Disymmetric molecules ? Explain with one example each.

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FACULTY OF SCIENCE

B.Sc. I-Year Examination, March/April 2011

Subject : CHEMISTRY
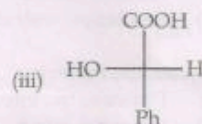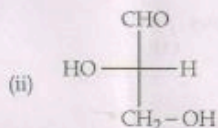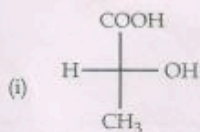
Paper : I

Time : 3 Hours]   [Max. Marks : 100

SECTION - A   (4x15=60 Marks)
(Essay Answer Type)

Answer all questions by choosing any two bits from each question. Each bit carries 7½ marks.

1. (a) Explain the 'diagonal relationship' between Li and Mg.
    (b) Write two preparation methods for Borazole and draw its structure.
    (c) Give an account on Grignard Reagent with two preparations and two properties.
    (d) What are Silicones ? Write any two preparation methods and their applications.

2. (a) Explain Bayer's strain theory in cyclo alkanes.
    (b) Write the following chemical equations on Benzene with mechanism.
         (i) Nitration and   (ii) Friedal crafts alkylation
    (c) Give an account of addition, substitution and elimination reactions with an example.
    (d) Define Markonikov's rule and explain by taking an example.

3. (a) Explain Joule-Thomson effect.
    (b) Write the classification of liquid crystals.
    (c) Distinguish between physical adsorption and chemisorption.
    (d) State the Nernst distribution law and write it's applications.

4. (a) Write about Heisenberg's uncertainity principle.
    (b) Explain the salient features of molecular orbital theory and draw the molecular orbital diagram of O_2.
    (c) Explain the solubility product and common ion effect.
    (d) Give R, S configuration for the chiral centres in following structures according to Cahn-Ingold-Prelog's rule.

(i)
```
        COOH
         |
   H ——— OH
         |
        CH₃
```

(ii)
```
        CHO
         |
   HO ——— H
         |
       CH₂-OH
```

(iii)
```
        COOH
         |
   HO ——— H
         |
        Ph
```

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SECTION - B   (8x5=40 Marks)
(Short Answer Type)

Answer all questions.

5.   (a)   What is 'Banana bond' ? Explain its existence in electron deficient molecule.

OR

     (b)   Give an account on different types of inter halogens.

6.   (a)   What are organo metallic compounds ? Explain their classification.

OR

     (b)   Write the preparation of $1°$ and $2°$ alcohols from Grignard reagent.

7.   (a)   What is inductive effect ? Compare the acidic nature of trichloro acetic acid with acetic acid.

OR

     (b)   Arrange the following in increasing order towards electrophilic substitution reactions :
           (i)   Benzene   (ii)   Chlorobenzene
           (iii) Toluene   (iv)   Nitrobenzene

8.   (a)   Write any two electrophilic substitution reactions in Napthalene.

OR

     (b)   Write the Major product formed in the following reactions and explain the reason.

           $$CH_3 - CH = CH_2 + HBr \xrightarrow{ROOR} ?$$

9.   (a)   Explain about the types of defects in solids.

OR

     (b)   What are colloids and explain Tyndall effect of colloids.

10. (a)   Write about n-type and p-type semiconductors. Give an application for each.

OR

     (b)   Write a note on azeotropic mixtures.

11. (a)   Write about de Broglie's hypothesis.

OR

     (b)   Derive bond order in CO by constructing molecular orbital diagram.

12. (a)   Define the following :
           (i)   Racemic mixture
           (ii)   Resolution with examples

OR

     (b)   Explain the following :
           (i)   Photoelectric effect
           (ii)   Compton effect

B. Sc. (Regular & Vocational) I - Year Examination, March / April 2011

Subject : **Industrial Chemistry**

Paper – I

Time : 3 Hours

Max. Marks : 100

Note : Answer **all** questions.

Section – A (4x15 = 60 Marks)
(Essay Answer Type)

Note : Answer any **two bits** from each question. Each bit carries 7½ marks.

1.(a) Explain the extraction of Iron from hematite ore.

   (b) Describe the manufacture of port land cement.

   (c) What are the raw materials used in the manufacture of glass ? What is annealing of glass ?

   (d) What is Electrochemical theory of corrosion? Describe briefly any one method for prevention of corrosion .

2.(a) Describe briefly climbing film and wiped film evaporators used in industry.

   (b) Write about rotary frame filter press.

   (c) Describe agitated crystallisers

   (d) Explain the principle involved in selection of solvent in extraction process.

3.(a) Mention different types of boilers and their functions.

   (b) What are the specifications for water for industrial use ?

   (c) Describe various heat exchangers used in industry.

   (d) What are the specifications for air for industrial use?

4.(a) Describe the manufacture of Ammonium Nitrate and its uses.

   (b) Explain the distillation of crude petroleum.

   (c) Define permanent and temporary hardness of water. Describe the treatment of water for municipal purposes.

   (d) Define calorific value of a fuel and describe a method for its determination.

Section – B (8x5 = 40 Marks)
(Short Answer Type)

5.(a) Describe extraction of Aluminum from bauxite.

OR

   (b) Explain how zinc is extracted from its principal ore.

6.(a) Write a note on dry corrosion.

OR

   (b) What are the raw materials used in manufacture of ceramics ?

7.(a) What is batch and continuous distillation ?

OR

(b) Write note on fluid bed dryers.

8.(a) Write about short tube evaporators.

OR

(b) Describe rotary drum filter.

9.(a) Write about (i) blowers (ii) compressors used in industry.

OR

(b) Write note on Vacuum pumps.

10.(a) Describe centrifugal pumps used in industry.

OR

(b) Mention various methods in the treatment of water for industrial purposes.

11.(a) Explain BOD and COD .

OR

(b) Describe preparation of producer gas.

12.(a) Describe manufacture of NPK fertilizers.

OR

(b) Describe manufacture of urea.

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FACULTY OF SCIENCE

B. Sc. I Year Examination, March/April, 2010

CHEMISTRY

Paper – I

Time : 3 Hours]   [Max. Marks : 100

Answer **all** questions.

SECTION – A (Essay Answer Type)   (Marks : 4 × 15 = 60)

Note : Answer any **two** bits from each question :

1. (a) What are interhalogen compounds ? Discuss about the structure of CIF_3 and IF_5.

    (b) Discuss about the preparation, properties and structure of Hydrazine and Hydroxylamine.

    (c) Give two general methods of preparation and two synthetic applications of organolithium and organomagnesium compounds.

    (d) What are electron deficient molecules ? Explain the structure of Diborane.

2. (a) How do you prepare the following compounds from benzene ? Give the mechanism.

    (i)   Toluene

    (ii) Acetophenone

    (b) Discuss the mechanism of addition of HBr on propene in the presence of peroxides.

    (c) Draw various conformations possible for cyclohexane. Arrange them in increasing order of their stabilities.

    (d) Give a brief account of the following with suitable examples :

    (i)   Inductive effect

    (ii) Mesomeric effect

    (iii) Hyperconjugation

3. (a) State and explain Raoult's law of Ideal solutions. What are its limitations ?

(b) State Nernst's Distribution law. Derive the modified expression, when the solute associates in one of the solvents.

(c) Explain the terms :

   (i) Electrophoresis

   (ii) Dialysis

   (iii) Gold Number

(d) What are the semiconductors ? Distinguish between p-type and n-type semiconductors and mention their applications.

4. (a) What is radial probability function ? Draw the radial distribution curve for 1s and 2s orbitals.

(b) Define the terms plane of symmetry, centre of symmetry and simple axis of symmetry with suitable examples.

(c) Draw the MOED for CO and explain its bond order.

(d) What is solubility product and common ion effect ? How are they useful in the separation of IInd and IVth group cations ?

SECTION – B (Short Answer Type)   (Marks : 8 × 5 = 40)

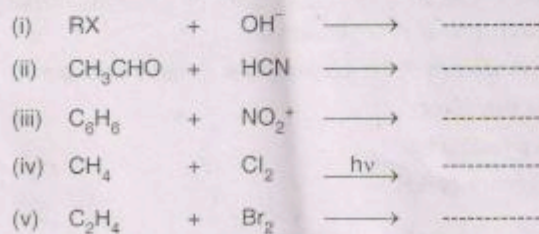5. (a) Discuss the preparation and properties of Silanes.

OR

(b) Describe the diagonal relationship between Lithium and Magnesium.

6. (a) Write a note on Phosphazenes.

OR

(b) Explain the significance of Grignard reagent with examples.

7. (a) Complete the following and indicate the type of the reaction :

   (i) RX + OH^- $\longrightarrow$ ------------

   (ii) CH_3CHO + HCN $\longrightarrow$ ------------

   (iii) C_6H_6 + NO_2^+ $\longrightarrow$ ------------

   (iv) CH_4 + Cl_2 $\xrightarrow{h\nu}$ ------------

   (v) C_2H_4 + Br_2 $\longrightarrow$ ------------

OR

(b) Explain Markownikoff's addition with suitable example.

8. (a) Discuss the mechanism of addition of Bromine to 1,3 butadiene.

OR

(b) How do you prepare the following from acetylene ?
   (i) Propyne
   (ii) Acetaldehyde

9. (a) State and explain Henry's Law. What are its limitations ?

OR

(b) Discuss the principle involved in steam distillation.

10. (a) Write a note on azeotropic mixtures.

OR

(b) What are Frankel and Schottky defects ? Explain.

11. (a) Draw Fisher projection formulae of
   (i) D-glyceraldehyde
   (ii) L-alanine
   (iii) L-Lactic acid

OR

(b) CO_2 and SO_2 have dipole moments of zero and 1.6 D – State the reason for this.

12. (a) What are bonding, anti-bonding and non-bonding molecular orbitals ?

OR

(b) Write a note on Heisenberg's uncertainty principle.

12/4/10

FACULTY OF SCIENCE

B. Sc. I Year Examination, March/April, 2010

CHEMISTRY

Paper – I

Time : 3 Hours]   [Max. Marks : 100

Answer all questions.

SECTION – A (Essay Answer Type)   (Marks : 4 × 15 = 60)

Note :   Answer any **two** bits from each question :

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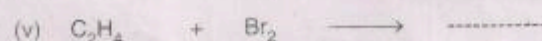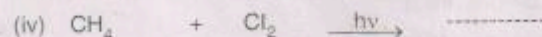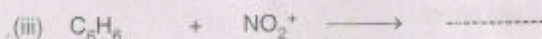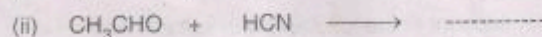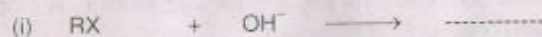5. (a) Discuss the preparation and properties of Silanes.

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(iv) CH_4 + Cl_2 $\xrightarrow{h\nu}$ ------------

(v) C_2H_4 + Br_2 $\longrightarrow$ ------------

OR

(b) Explain Markownikoff's addition with suitable example.

2

8. (a) Discuss the mechanism of addition of Bromine to 1,3 butadiene.

OR

(b) How do you prepare the following from acetylene ?
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11. (a) Draw Fisher projection formulae of
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OR

(b) CO_2 and SO_2 have dipole moments of zero and 1.6 D – State the reason for this.

12. (a) What are bonding, anti-bonding and non-bonding molecular orbitals ?

OR

(b) Write a note on Heisenberg's uncertainty principle.

_____

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Code No. 6024/O/ET

FACULTY OF SCIENCE
B.Sc. I Year (Old) Examination, March/April, 2009
CHEMISTRY
Paper—I

Time : Three Hours]

[Maximum Marks : 100

Answer all questions.
SECTION—A
(Marks : 4×15=60)

Answer any **TWO** bits from each question. Each bit carries 7½ marks.

1. (a) Write a note on the formation and reactivity of different types of Alkali Metal Oxides.
   (b) How is Diborane prepared ? Discuss its properties and structure.
   (c) What are carbonyls ? How are they prepared ?
   (d) What are superoxides ? Explain their basicity and oxidising nature.

2. (a) What are Substitution Reactions ? Explain different types with suitable examples.
   (b) Exemplify different Dienes, explain Diels-Alder reaction with an example.
   (c) Draw different conformers of cyclohexane. Arrange them in the increasing order of their stabilities and justify.
   (d) What are Activating and Deactivating groups ? Explain with suitable examples.

3. (a) Define critical constants. How are they determined experimentally ?
   (b) Describe the Cottrell's method of determining the Elevation of Boiling Point.
   (c) Define Physical and Chemical Adsorption and describe their differences.
   (d) Write an account on elements of symmetry with special reference to Sodium Chloride Crystal.

4. (a) State and explain de Broglie's Hypothesis and derive de Broglie's Equation.
   (b) Explain paramagnetic nature of Oxygen Molecule with the help of MOED of molecular orbital theory.
   (c) Explain Ostwald's theory of Acid-Base Indicator. How Acid-Base Indicator is selected in Acid-Base Titrimetric analysis ?
   (d) Define Common Ion Effect and Solubility Product. Explain their role in the Qualitative Analysis of Cations.

PCR—8665

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(Contd.)

SECTION—B

(Marks : 8×5=40)

5. (a) What is meant by Electron Affinity ? How does it vary in a group and in a period of the periodic table ?

    OR

    (b) Write a note on Inter Halogen Compounds.

6. (a) What are Oxoacids of Phosphorous ? Explain the structures of any two of them.

    OR

    (b) Write a note on Silicones.

7. (a) How carbenes are generated ? Write the structure of a carbene.

    OR

    (b) Exemplify Markonikoff's Rule.

8. (a) Write a note on the Industrial importance of Acetylene.

    OR

    (b) Explain the orientation of Nitro-group and Hydroxyl-group when attached to Benzene.

9. (a) Write a note on Joule Thomson's Effect.

    OR

    (b) What are the important applications of Liquid Crystals ?

10. (a) Give a note on Semi Permeable Membrane.

    OR

    (b) Explain Tyndall Effect.

11. (a) Write a note on Photoelectric Effect.

    OR

    (b) Explain the application of Fajan's Rule.

    (a) What are the differences between Post-Precipitation and Co-precipitation ?

    OR

    (b) Distinguish Accuracy from Precision.

FACULTY OF SCIENCE

B.Sc. (I-Year) (New) Examination, March/April, 2009

CHEMISTRY

Paper—I

Time : Three Hours]

[Maximum Marks : 100

Note :—Answer ALL questions.

SECTION—A (Marks : 4×15=60)

(Essay Type)

Answer any **TWO** bits from each question. Each bit carries 7½ marks.

1. (a) Describe the diagonal relationship between Lithium and Magnesium and their compounds.

   (b) What are Hydrides ? Classify and describe.

   (c) What are Silicones ? Write and explain their types.

   (d) What are pseudohalogens ? Write preparation and properties of dicyanogen.

2. (a) What is Inductive Effect ? Explain +I and −I groups and how do they affect the acidities of Carboxylic Acids ?

   (b) Chlorination of Methane. What type of reaction is this ? Explain the steps and mechanism involved in it.

   (c) What is Aromacity ? Define Huckel's Rule. Predict the Aromacity in cyclopropane cyclopropenyl cation, cyclopentadiene and cyclo penta dienyl anion.

   (d) Explain the Electrophilic substitution reactions of Naphthalene taking Nitration and Sulphonation as examples.

3. (a) Deduce the relation between critical constants and van der Waals' constants.

   (b) Describe broadly the structural differences between solids, liquids and gases.

   (c) What is meant by crystal defect ? Explain the types of crystal defects.

   (d) What are Ideal and Non-ideal solutions ? How do you account the deviation of Ideal nature in Non-ideal solution with reference to the changes in vapour pressure against the function of composition ?

4. (a) State and explain Heisenberg's uncertainty principle. Also explain how it lead to the concept of probability ?

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(Contd.)

(b) Describe Molecular Orbital Theory. Explain the formation of different Molecular Orbitals involving S and P orbitals.

(c) What are different projection formulae used in the representation of Molecules ? Explain with suitable examples.

(b) Into how many groups the Analysis of Cations is divided ? Explain the group reagents, reactions involved in the group identification and the corresponding precipitates.

SECTION—B (Marks : 8×5=40)
(Short Type)

5. (a) What are Boron Halides ? Arrange in ascending order of their acidity and justify the order.

OR

(b) Write preparation and properties of Hydroxyl Amine.

6. (a) How oxides are classified basing on the chemical behaviour ? Explain.

OR

(b) Explain the structures of IF_5 and IF_7.

7. (a) What do you mean by Resonance and Resonance Hybrid ? Explain.

OR

(b) What are electrophiles and Nucleophiles ? Give examples.

8. (a) Explain Saytzeff's Rule with an example.

OR

(b) What are ring activating and deactivating groups ? Explain with examples.

9. (a) Write a note on Liquefaction of Gases.

OR

(b) What is adsorption ? Explain its types.

10. (a) Define Critical Solution Temperature. Explain the solution system with reference to Lower Critical Solution Temperature.

OR

(b) Explain Tyndal Effect.

11. (a) Explain Planck's Radiation Law.

OR

(b) What is Dipole moment ? Explain the Orientation of Dipoles in an External Electric Field.

12. (a) What is meant by Geometrical Isomerism ? What are its types ? Explain the distinction between the types.

OR

(b) What is the ion identified by Brown Ring Test ? Explain the test and write the corresponding equations.

FACULTY OF SCIENCE
B.Sc. I Year (Old) Examination, March/April, 2009
CHEMISTRY
Paper—I

Time : Three Hours]   [Maximum Marks : 100

Answer all questions.

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SECTION—B

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(b) Explain the orientation of Nitro-group and Hydroxyl-group when attached to Benzene.

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12. (a) What are the differences between Post-Precipitation and Co-precipitation ?

OR

(b) Distinguish Accuracy from Precision.

FACULTY OF SCIENCE

B.Sc. I Year Examination, March/April 2006

CHEMISTRY

Paper I

Time : 3 Hours]

[Max. Marks : 100

Answer **all** questions from Sections A and B.

Answer all the bits of a question together.

Section A – (Marks : 4 × 15 = 60)

1. (a) What are Silicones? Discuss their preparation.

9

   (b) Write a note on oxides of Nitrogen.. N_2O, N_2O_4, N_2O_5

6

Or

   (c) Compare the acidic strength of oxyacids of Chlorine.

9

   (d) What are complex hydrides? Discuss the properties and structure of borohydrides.

6

2. (a) What is the predominant product obtained by dehydrohalogenation of 2 - chloropentane? Give equations and explain.

8

   (b) Illustrate Diels-Alder reaction with a suitable example.

7

Or

   (c) Write a note on conformations of cyclohexane. Explain the stability of chair form over the boat form of cyclohexane with the help of energy diagram. 10

   (d) Arrange the following in the increasing order of their acidic strength and justify. Propanoic acid, Acetic acid, Chloroacetic acid and Fluoroacetic acid.

5

3. (a) Derive van der Waals' equation of state for a real gas.

6

   (b) Using van der Waals' equation explain the deviation of real gas from ideal behaviour.

6

   (c) Calculate the van der Waals' pressure of 2 moles of ammonia kept in a 10 litre flask at 27°C. For ammonia $a = 4.17$ atm. lit^2 mol^{-2} and $b = 0.0371$ lit mol^{-1}. 3

Or

[P.T.O.

(d) Derive the relationship between depression of freezing point and molecular weight of a solute.   6

(e) When are abnormal molecular weights of solutes observed? Explain.   4

(f) What is the osmotic pressure of a solution of 10 gm of cane sugar in 100 ml water at 25°C? (Molecular weight of cane sugar = 342).   5

4. (a) Write Schrödinger's wave equation. Explain the significance of ψ and ψ^2.   6

(b) State and explain Heisenberg's uncertainty principle.   5

(c) Calculate the uncertainty in position of an electron if the uncertainty in its velocity is 5.7×10^{-5} m sec^{-1} ($h = 6.6 \times 10^{-34}$ Joule sec and $m = 9.1 \times 10^{-31}$ Kg).   4

Or

(d) What are bonding and antibonding orbitals?   4

(e) Draw the molecular orbital energy level diagram for O_2 and explain the bond order and magnetic behaviour.   6 + 5

Section B – (Marks : 8 × 5 = 40)

5. What are electron deficient compounds? Discuss the structure of Diborane.

Or

Write the structure and hybridisation of IF_7 and $XeOF_2$.

6. Write a note on basic nature of Iodine.

Or

Discuss the trend in electropositivity and basic nature across a period in periodic table.

7. Starting from Benzene. how would you obtain meta nitro toluene. Give necessary steps and conditions.

Or

An alkene 'A' on ozonolysis gives propanaldehyde and formaldehyde. What is the structure of 'A' ? Give necessary equations.

8. How will you differentiate the following pairs of compounds?

(a) 1 – Butyne and 2 – Butyne

(b) n – Butane and 1 – Butene.

Or

What is the major product obtained when the Hcl is added to 3-methyl-1-butene?

9. What are intrinsic and extrinsic semi-conductors? How can silicon be made a p-type semiconductor?

Or

Derive Braggs' equation.

10. What are protective colloids? Write a note on gold number of protective colloids.

Or

Write a note on Langmuir's theory of unilayer adsorption isotherm.

11. Explain how the pH of the solution changes during the titration of KOH with Hcl. Indicate your choice of indicator.

Or

Define the following:

(a) Indicator   (b) Titration error   (c) Primary standard

(d) Accuracy   (e) Metal ion indicator.

12. Write a note on co-precipitation.

Or

State and explain Fajan's rules.

[P.T.O.

FACULTY OF SCIENCE

B.Sc. I Year Examination, March/April 2006

CHEMISTRY

Paper I

Time : 3 Hours] [*Max. Marks :* 100

Answer **all** questions from Sections A and B.

Answer all the bits of a question together.

Section A – (Marks : 4 × 15 = 60)

1. (a) What are Silicones? Discuss their preparation. 10   9

    (b) Write a note on oxides of Nitrogen.   6

Or

    (c) Compare the acidic strength of oxyacids of Chlorine.   9

    (d) What are complex hydrides? Discuss the properties and structure of borohydrides.   6

2. (a) What is the predominant product obtained by dehydrohalogenation of 2 - chloropentane? Give equations and explain.   8

    (b) Illustrate Diels-Alder reaction with a suitable example.   7

Or

    (c) Write a note on conformations of cyclohexane. Explain the stability of chair form over the boat form of cyclohexane with the help of energy diagram. 6   10

    (d) Arrange the following in the increasing order of their acidic strength and justify. Propanoic acid, Acetic acid, Chloroacetic acid and Fluoroacetic acid.   5

3. (a) Derive van der Waals' equation of state for a real gas. 7   6

    (b) Using van der Waals' equation explain the deviation of real gas from ideal behaviour.   6

    (c) Calculate the van der Waals' pressure of 2 moles of ammonia kept in a 10 litre flask at 27°C. For ammonia $a = 4.17$ atm. $\text{lit}^2 \text{ mol}^{-2}$ and $b = 0.0371$ lit mol^{-1}. 3

Or

[P.T.O.

(d) Derive the relationship between depression of freezing point and molecul
weight of a solute.

(e) When are abnormal molecular weights of solutes observe
Explain.

(f) What is the osmotic pressure of a solution of 10 gm of cane sugar
100 ml water at 25°C? (Molecular weight of cane sugar = 342).

4. (a) Write Schrödinger's wave equation. Explain the significance of ψ and ψ^2.

(b) State and explain Heisenberg's uncertainty principle.

(c) Calculate the uncertainty in position of an electron if the uncertai
in its velocity is $5.7 \times 10^{-5} m\ sec^{-1}$ (h = 6.6×10^{-34} Joule sec a
m = 9.1×10^{-31} Kg).

Or

(d) What are bonding and antibonding orbitals?

(e) Draw the molecular orbital energy level diagram for O_2 and explain the b
order and magnetic behaviour.

Section B – (Marks : 8 × 5 = 40)

5. What are electron deficient compounds? Discuss the structure of Diborane.

Or

Write the structure and hybridisation of IF_7 and $XeOF_2$.

6. Write a note on basic nature of Iodine.

Or

Discuss the trend in electropositivity and basic nature across a period in pe
table.

7. Starting from Benzene, how would you obtain meta nitro toluene. Give necessary steps and conditions.

Or

An alkene 'A' on ozonolysis gives propanaldehyde and formaldehyde. What is the structure of 'A' ? Give necessary equations.

8. How will you differentiate the following pairs of compounds?

   (a) 1 – Butyne and 2 – Butyne

   (b) n – Butane and 1 – Butene.

Or

What is the major product obtained when the Hcl is added to 3-methyl-1-butene?

9. What are intrinsic and extrinsic semi-conductors? How can silicon be made a p-type semiconductor?

Or

Derive Braggs' equation.

10. What are protective colloids? Write a note on gold number of protective colloids.

Or

Write a note on Langmuir's theory of unilayer adsorption isotherm.

11. Explain how the pH of the solution changes during the titration of KOH with Hcl. Indicate your choice of indicator.

Or

Define the following:

   (a) Indicator   (b) Titration error   (c) Primary standard

   (d) Accuracy   (e) Metal ion indicator.

12. Write a note on co-precipitation.

Or

State and explain Fajan's rules.

[P.T.O.

FACULTY OF SCIENCE

B.Sc. (I Year) Examination, March/April, 2005

CHEMISTRY

Paper—I

Time : Three Hours]   [Maximum Marks : 100

Note :— (1) Answer ALL questions from Sections A and B.

(2) Answer all the bits of a question together.

SECTION—A

(Marks : 4×15=60)

1. (a) What are electron deficient compounds ? Discuss the structure and bonding in diborane.

2+7

(b) Explain the relative strength of Lewis acid character of Boron tri-halides.

6

OR

(c) What is bond order ? Draw the molecular orbital energy level diagram for O_2 and explain its bond order and magnetic property.

2+4+2+2

(d) With the help of molecular orbital theory, show that He_2 molecule does not form while He_2^+ molecule ion will be formed.

5

2. (a) What are carbides ? How are they classified ? Give one example to each type of carbide.

2+2+3

(b) What are carbonyls ? How is $Ni(CO)_4$ prepared ? Explain its structure and bonding.

2+2+4

OR

(c) What are interhalogen compounds ? How are they classified ? Write the structure and hybridisation of IF_5.

2+3+4

(d) Explain the basic character of Iodine. 6

3. (a) How is cyclopentane obtained by :

    (i) Freund's method

    (ii) Wislicenus method

    (iii) Dieckmann's method ? 3+3+3

(b) Write the shapes of various conformations of cyclohexane. Comment on their stability.

    3+3

OR

(c) Explain the following with examples :

    (i) Mesomeric effect

    (ii) Electromeric effect. 9+6

4. (a) Write the Schrodinger wave equation and explain the terms involved. 4

(b) Derive de Broglie equation showing the dual nature of an electron. 7

(c) What is the wavelength associated with a particle of mass 1×10^{-27} gm moving with a velocity of 10^5 cm/sec ?

    (Planck's constant, $h = 6 \cdot 625 \times 10^{-27}$ erg. sec.) 4

OR

(d) Define critical constants. 6

(e) Describe an experiment to determine the critical temperature and critical pressure of a gas. 6

(f) Show the relation between Critical constants and Van der Waals' constants. 3

SECTION—B

(Marks : 8×5=40)

5. Write a short note on clathrate compounds of noble gases. 5

OR

Explain why methyl orange is used as an indicator for a strong acid-weak base titration.

    5

6. What is a peroxy acid ? Write the structures of peroxy acids of Sulphur.   1+2+2

OR

Give the preparation and structure of XeF_6.   2+3

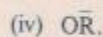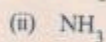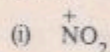7. Construct molecular orbital energy level diagram for CO.   5

OR

Give the preparation and structure of Hydrazine.   2+3

8. Explain the Hybridisation and shape of SF_6.   5

OR

Give the structure and bonding in $(PNCl_2)_3$.   5

9. What are electrophiles and nucleophiles ? Classify the following into nucleophiles or electrophiles :

   (i) $\overset{+}{N}O_2$

   (ii) NH_3

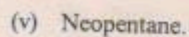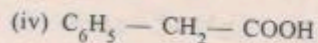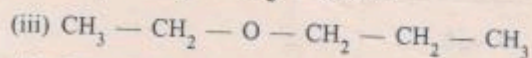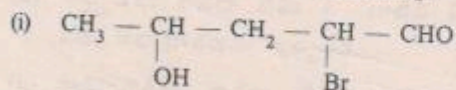   (iii) BF_3

   (iv) $O\bar{R}$.   3+2

OR

Write the mechanism for the halogenation of methane.   5

10. Write the IUPAC names of the following :—

   (i) $CH_3 - CH - CH_2 - CH - CHO$
                 | |
                 OH   Br

   (ii) $CF_3 - CF_2 - CF_2 - COOH$

   (iii) $CH_3 - CH_2 - O - CH_2 - CH_2 - CH_3$

   (iv) $C_6H_5 - CH_2 - COOH$

   (v) Neopentane.   5

OR

In the addition reaction of HBr to isobutene, which is the major product ? Give reason.

2+1+2

11. Write a note on Ostwald's dilution law. 5

OR

State and explain Henry's Law. What are it limitations ? 3+2

12. Explain the terms :—

  (i) Azeotropic mixtures

  (ii) Critical solution temperature. 2½+2½

OR

State and explain the law of Equipartition of energy. 5

FACULTY OF SCIENCE

B.Sc. I Year Examination, March/April 2005

CHEMISTRY

Paper I

Time : 3 Hours]

[Max. Marks : 100

Answer **all** *questions from Sections A and B.*
Answer all the bits of a question together.

Section A – (Marks : 4 × 15 = 60)

1. (a) What are Interhalogen compounds? Discuss the structure of ICl_2, ICl_4 and I_3^-.

15

Or

(b) (i) Compare the Lewis acid strength of Boron trihalides.   8

(ii) How are oxides classified? Discuss the structure of N_2O_5.   7

2. (a) How do you prepare the following, starting from Benzene? Give the mechanism.

(i) Toluene

(ii) Benzophenone.   8

(b) Explain the term aromaticity taking Benzene as an example.   7

Or

(c) Discuss the mechanism of peroxide initiated addition of HBr on propene.   8

(d) Discuss the mechanism of addition of Bromine to 1, 3 Butadiene.   7

3. (a) Derive the relationship between elevation of boiling point and molecular weight of a solute.   6

(b) State and explain Roult's law for a solution of a non-volatile solute in a volatile solvent.   4

[P.T.O.

(c) What would be the osmotic pressure at 17°C of an aqueous solution containing
1.75 gm of sucrose ($C_{12}H_{22}O_{11}$) per 100 ml of solution?   5

Or

(d) Define Critical temperature, critical pressure and critical volume of a gas.   6

(e) Derive the relationship between critical constants and Van der Waals' constants
of a gas.   6

(f) The critical temperature and critical pressure of ethane are 305.1 K and
48.1 atm. respectively. Calculate its Van der Waals' constants a and b.   3

4. (a) Write a note on the following :

   (i) Planck's Radiation law   5

   (ii) Photoelectric effect   5

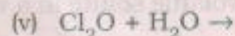   (iii) De Broglie's hypothesis.   5
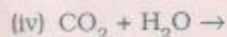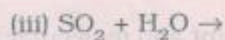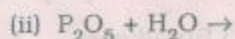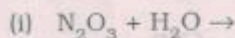
Or

(b) Draw the molecular orbital energy level diagram for N_2 and explain its bond
order and magnetic behaviour.   6 + 2 + 2

(c) Explain how He_2^+ can be formed but not He_2 on the basis of Molecular orbital
theory (MOT).   5

Section B – (Marks : 8 × 5 = 40)

5. (a) Discuss the different types of carbides.

Or

(b) Give the products along with names of the following reactions:

   (i) $N_2O_3 + H_2O \rightarrow$

   (ii) $P_2O_5 + H_2O \rightarrow$

   (iii) $SO_2 + H_2O \rightarrow$

   (iv) $CO_2 + H_2O \rightarrow$

   (v) $Cl_2O + H_2O \rightarrow$

6. (a) Describe Mulliken's method for the measurement of electronegativity of an atom.

Or

(b) What is inorganic Benzene? Discuss its structure.   2 + 3

7. (a) Draw the Newman projections for all the conformers of n-butane. With the help of energy diagram discuss their stabilities.

Or

(b) Explain why Phenol is acidic and Ethanol is almost neutral.

8. (a) How do you prepare the following from acetylene?

     (i) Propyne

     (ii) Acetaldehyde.

Or

(b) What is hyperconjugation? How is it applicable to the stability of carbonium ions?   2 + 3

9. (a) Define the following terms :

     (i) Centre of symmetry

     (ii) Space lattice

     (iii) Unit cell.

Or

(b) What is mesomorphic state?   2

(c) Write a short note on smectic and nematic liquid crystals.   3

10. (a) Write note on Freundlich adsorption isotherm.

Or

(b) What are emulsions and gels?   2

(c) Discuss the different types of emulsions.   3

11. (a) What are determinate and indeterminate errors?

Or

(b) Justify your choice of indicator in a titration of a strong acid with a strong base.

12. (a) Discuss the hybridisation and shape of SF_6 and $BeCl_2$.

Or

(b) What is Lattice energy? Discuss the factors affecting it.   2 + 3

FACULTY OF SCIENCE

B.Sc. I Year Examination, October/November 2004

CHEMISTRY

Paper I

Time : 3 Hours]

[Max. Marks : 100

Answer **all** questions from Section A and B.
Answer **all** the bits of a question together.

Section A – (Marks : 4 × 15 = 60)

1. (a) Draw the molecular orbital energy level diagram for N_2 and explain its bond order and magnetic property.

   6 + 2 + 2

   (b) What are the differences between bonding and antibonding molecular orbitals.

   5

   Or

   (c) What are pseudohalogens ? Compare the properties of pseudohalogens with those of halogens.

   2 + 7

   (d) Write the structure and hybridisation of IF_7.

   6

2. (a) What are Silicates ? How are they classified ? Give one example for each type with suitable structure.

   2 + 2 + 5

   (b) What are Silicones ? How are they classified ? Write the preparation of linear silicones.

   2 + 2 + 2

   Or

   (c) Give one method of preparation, three properties and structure of hydroxylamine.

   3 + 3 + 3

   (d) Name the important oxyacids of selinium and give their structures. 2 + 4

[P.T.O.

3. (a) How are organic reactions classified ? Explain briefly with suitable examples.

$3 + 4 + 4 + 4$

Or

(b) · Explain Diel's-Alder reaction with mechanism. $4 + 5$

(c) Explain with mechanism the 1,4 addition reaction of HBr to 1, 3 butadiene.

$2 + 4$

4. (a) What is radial probability function ? Draw the radial distribution curve for 1S and 2S orbitals.

$2 + 4$

(b) State and explain Heisenberg's uncertainty principle. 5

(c) Calculate the uncertainty in the position of a particle when the uncertainty in the momentum is 0.01 gm. cm./sec.

(Planck's constant $h = 6.625 \times 10^{-27}$ erg. sec.) 4

Or

(d) State and explain Nernst's Distribution law. What are the applications of distribution law ?

$4 + 5$

(e) Write a brief note on azeotropic mixtures. 6

Section B – (Marks : $8 \times 5 = 40$)

5. (a) Explain the terms Co-precipitation and Post-precipitation. $2\frac{1}{2} + 2\frac{1}{2}$

Or

(b) What happens when Diborane is :

(i)   Treated with water

(ii) Burnt in presence of O_2

(iii) Treated with Cl_2 at 25° C.

(iv) Treated with excess of NH_3 at low temperature. Give equations. 5

6. (a) What are oxygen fluorides ? Give one method of preparation for each of them.

$1 + 2 + 2$

Or

(b) What are Polyhalides ? Give the structure of ICl_2^-. $2 + 3$

7. (a) Define common ion effect. Explain how it is useful in the separation of Cu^{+2} from Zn^{+2} in qualitative analysis.

2 + 3

Or

(b) Give the preparation and structure of XeF_4.

2 + 3

8. (a) Describe the structure of tetrasulphur tetranitride (S_4N_4).

5

Or

(b) Write notes on the ionic carbides.

5

9. (a) What is Hyper Conjugation ? What is its importance ?

3 + 2

Or

(b) What are Conformers ? Draw the conformations for *n*-butane using Newmann projection formulae.

1 + 4

10. (a) What is Hybridisation ? Indicate the type of hybridisation of each carbon in the following :

2 + 3

$$CH_3 - CH = CH - CHO.$$
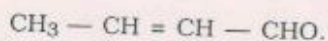
Or

(b) How is cyclobutane prepared from Wislicenus method ? Give equations. 5

11. (a) How does the C_p and C_v values vary for mono-atomic and diatomic gaseous molecules ?

5

Or

(b) Define solubility product and explain with two examples.

2 + 3

12. (a) Derive the general expression for the law of corresponding states.

5

Or

(b) Explain the principle involved in steam distillation.

5

(MR)

Code No : 9019/ET

FACULTY OF SCIENCE

B.Sc. I - Year Examination, March / April 2003
Subject - Chemistry

Paper - I

Time : Three Hours

Max. Marks : 100

Note : 1. Answer all questions from Section A and B.
2. Answer all the bits of a question together.

SECTION - A
(Marks : 4 x 15 = 60)

1. What is peroxide ion ? Construct the molecular orbital energy level diagram for peroxide ion and explain its bond order and magnetic properties.   2+7+3+3

OR

a) What are phosphazenes ? Discuss the structure and bonding in $(Cl_2PN)_3$.   2 + 6

b) Write one method of preparation, two properties and structure of hydroxyl amine.   2 + 2 + 3

2. a) Give the preparation and structures of oxygen fluorides.   2 + 3 + 3

b) Write a note on the structures of xenon trioxide and xenon difluoride.   3 + 4

OR

a) What are electron deficient molecules ? Give the structures of Diborane and Borazole.   2 + 3 + 2

b) How is Cl_2O_6 prepared ? Explain its magnetic behaviour.   4 + 4

3. a) Draw the different conformations of methyl cyclohexane and explain their stabilities.   4 + 4

b) Write a short note on Diels-Alder reaction.   7

OR

1

(P.T.O.)

Two unknown compounds A and B with the same molecular formula $C_5H_{11}Br$ give isopentane when reduced with $HI + P$ when refluxed over sodium metal A gives 3, 3, 4, 4 tetramethyl hexane and B gives 2, 7 dimethyl octane. What are the structural formulas of A and B ? $3 + 6 +$

4. Derive the relationship between critical constants (P_c V_c T_c) and van der Waal's constants (a and b). $8 +$

OR

What are the characteristics of an ideal solution ? How are the components of an ideal completely miscible liquid mixture separated ? $6 +$

SECTION - B
(Marks : 8 x 5 = 40)

5. Distinguish between coprecipitation and post precipitation. $2\frac{1}{2} + 2$

OR

Give the reactions for the identification of Ag^+ and pb^{+2} in a qualitative analysis $2\frac{1}{2} + 2$

6. Write a short note on silicates.

OR

Explain the hybridisation and shapes of SF_4 and SF_6. $2\frac{1}{2} + 2\frac{1}{2}$

7. Explain how the pH of the solution changes during the titration of a strong base ($NaOH$) with a strong acid (HCl). Indicate which indicator is suitable for this titration.
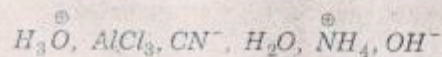
OR

Explain the acid strength of Halogen acids.

8. How do you justify the term "pseudohalogens" ? How are they prepared ?

OR

Briefly describe the different types of molecular orbitals.

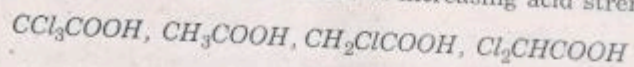9. What are Electrophiles and Nucleophiles ? Classify the following into their respective class $2 +$

$H_3\overset{\oplus}{O}, AlCl_3, CN^-, H_2O, \overset{\oplus}{NH_4}, OH^-$

OR

Write a short note on Inductive effect.

5

10. Arrange the following in the order of increasing acid strength

5

CCl_3COOH, CH_3COOH, $CH_2ClCOOH$, $Cl_2CHCOOH$

OR

Write the structural formulae of the following :

5

a) 2, 4 Hexadiene

b) 4 Bromo 2, 2 dimethyl, 3-hexanone

c) 3 methyl 2 pentene-4-yne

d) Butanone

e) 4-Hydroxy 3 chloro pentenoic Acid

11. Write the Schrodinger wave equation and explain the terms involved. 5

OR

Explain Heisenberg's uncertainty principle.

5

12. State Nernst's Distribution Law. Derive the modified expression $2 + 2 + 1$ when solute associates in one of the solvents. What are the applications of Distribution law ?

OR

a) What is critical solution temperature ?

$2\frac{1}{2}$

b) What is an azeotropic mixture ?

$2\frac{1}{2}$

3