



Solapur University,  
Solapur

B.Sc.-I (Chemistry)  
CREDIT-GRADING SYSTEM  
Syllabus- 2014

**SOLAPUR UNIVERSITY, SOLAPUR**  
**SYLLABUS FOR B.Sc – I (CHEMISTRY)**  
**(CREDIT-GRADING SYSTEM)**

**Structure of the Course:**

- Structure of B.Sc. course in faculty of science has total of 06 semesters for 3 years.
- B.Sc.-I comprises of total two semesters. Each semester will have one theory paper of 70 marks for university external examination and 30 marks for internal examination.
- At the end of academic year i.e. semester II the practical examination will be conducted. The Weightage of practical is of 70 marks for university external practical examination and 30 marks for internal practical examination.

Semester	Paper No.	Title of Paper	Total Lectures	Total Marks			Total Credit
				Univ. Exam	Internal Exam	Total	
Semester I	I	Physical and Inorganic Chemistry	75	70	30	100	05
Semester II	II	Organic and Analytical Chemistry	75	70	30	100	05
Practical	I	Chemistry		70	30	100	04

- Each theory paper has two sections of 35 marks for university external examination.  
 Paper –I: Section –I: Physical chemistry of 35 marks with 2.5 credits.  
                   Section –II: Inorganic Chemistry of 35 marks with 2.5 credits.  
 Paper –II: Section –I: Organic chemistry of 35 marks with 2.5 credits.  
                   Section –II: Analytical Chemistry of 35 marks with 2.5 credits
- Continuous Internal Assessment for chemistry:
  - 1) Each theory paper has 30 marks for internal examination. There will be 20 marks unit test and 10 marks home assignment.
  - 2) Practical paper has 30 marks for internal examination. There will be two practicals of 15 marks.
  - 3) Practical paper has 70 marks for external university practical examination. Duration of practical examination is one day. There will be three practicals, one from each physical, inorganic and organic practical work. Out of 70 marks for external university practical examination, the mark distribution is as follows.
    - Q. 1 Physical Chemistry experiment : 20 marks
    - Q. 2 Inorganic Chemistry experiment: 20 marks
    - Q. 3 Organic Chemistry experiment : 20 marks
    - Q. 4 Oral : 05 marks
    - Q. 5 Journal : 05 marks

-----  
 Total marks : 70 marks

**SOLAPUR UNIVERSITY, SOLAPUR**  
**SYLLABUS FOR B.Sc – I (CHEMISTRY)**  
**(CREDIT-GRADING SYSTEM)**

**SEMESTER-I**

**PAPER –I (Physical and Inorganic Chemistry)**

**(Total Credits: 5; Contact hrs: 75)**

**SECTION- I: Physical Chemistry**

**UNIT –I: Chemical Kinetics and Mathematical concepts**

**Contact hrs: 22.5**

**Credit- 1.5**

**A. Chemical Kinetics**

**(Contact hrs: 16.5)**

1.1 Chemical Kinetics and it's scope, Rate of reaction, Definition and units of rate constant.

Factors affecting rate of reaction. Concentration, pressure, temperature and catalyst.

1.2 Order and Molecularity of reaction.

1.3 First order reaction: Derivation of Rate constant. Characteristics of first order reaction.

Examples: Decomposition of  $N_2O_5$

1.4 Second order reaction: Derivation of rate constant for equal and unequal concentration of the reactants. Characteristics of Second order reaction.

Examples : i) Reaction between  $K_2S_2O_8$  and KI .

1.5 Pseudounimolecular reactions such as Hydrolysis of methyl acetate in presence of Acid.

1.6 Methods to determine the order of reaction:

a) Integration method,

b) Graphical method

c) Half change method,

d) Ostwald's isolation method

(Numerical Problems Expected)

**B. Mathematical Concepts**

**(Contact hrs: 06)**

2.1 Graphical representation : Graph paper, co-ordinates of a point, equation of straightline and intercept, plotting of graph based on experimental data.

2.2 Derivative : Rules of differentiation (without proof) pertaining to algebraic and exponential functions. Example related to chemistry.

2.3 Integration : Rules of Integration (without proof) pertaining to algebraic and exponential functions. Example related to chemistry.

(Numerical Problems not expected)

**UNIT – II: Thermodynamics and gaseous State Contact Hrs: 15**

**Credit- 1**

**A. Thermodynamics:**

**(Contact hrs: 05)**

3.1 Spontaneous & non spontaneous processes, Second law of thermodynamics and its different statements.

3.2 Carnot's Theorem (Heat engine), Carnot cycle and its efficiency.

(Numerical Problems Expected)

**B. Gaseous State:**

**(Contact hrs:10)**

4.1 a) Ideal and Non ideal gases, b) Deviation from ideal behaviour. (Only Boyle's law)

c) Causes of deviation, van der Waal's equation, explanation of real gas behavior by van der Waal's equation.

4.2 Critical Phenomena : PV-Isotherms of real gases (Andrew's isotherms), continuity of state, Relationship between critical constants and van der Waal's constants.

4.3 Liquefaction of gases, Joule-Thomson effect.

(Numerical Problems expected)

## Reference Books:

- 1) Mathematical preparation of Physical Chemistry : F. Daniel Mc-Graw Hill Book Com.
- 2) Elements of Physical Chemistry : S. Glasstone and D. Lewis (D. Van Nostrand Co. Inc)
- 3) Physical Chemistry : W. J. Moore (Orient Longman)
- 4) Principles of Physical Chemistry : Maron Prutton
- 5) University Chemistry : B. H. Mahan (Addison - Wesley Publ. Co.)
- 6) Chemistry Principle & Applications : P.W. Atkins, M. J. Clugsto, M.J. Fiazer, R. A. Y. Jone (Longman)
- 7) Physical Chemistry : G. M. Barrow (Tata Mc-Graw Hill)
- 8) Essentials of Physical Chemistry : B. S. Bahl & G.D. Tuli (S. Chand)
- 9) Physical Chemistry : A. J. Mee.
- 10) Physical Chemistry : Daniels - Alberty.
- 11) Principles of Physical Chemistry : Puri - Sharma (S. Nagin)
- 12) Text Book of Physical Chemistry : Soni Dharmarha
- 13) University General Chemistry : CNR. Rao (McMillan)
- 14) Chemistry : Sienko - Plane (Recent Edn.,)
- 15) Physical Chemistry Through problems : Dogra and Dogra (Wiley Eastern Ltd.,)
- 16) Physical Chemistry : S. Glasstone.
- 17) Basic Chemical Thermodynamics : V. V. Rao.

## SECTION-II: Inorganic Chemistry

**UNIT – III: Atomic Structure, periodic properties and Ionic Solids** Contact hrs: 17.5

**Credit- 1.17**

### A. Atomic Structure and periodic properties

**(Contact hrs:8.5)**

#### 1.1 Atomic Structure

- a) Shapes of s, p, d orbitals.
- b) Aufbau and Pauli's exclusion principle, Hund's rule of maximum multiplicity
- c) General electronic configuration of s and p block elements.

1.2 General Characteristics of s and p block elements w.r.t. Atomic and Ionic radii, Ionization energy, Electron affinity, Electronegativity, Reactivity, Melting and Boiling point

### B. Ionic Solids

**(Contact hrs:09)**

#### 2.1 Ionic Bonding

- a) Formation of ionic bond, Energetics of ionic bonding : Ionisation potential, Electron affinity and Lattice energy.
- b) Characteristics of ionic compounds.
- c) Born-Haber Cycle for Alkali metal halide (NaCl).  
(Numerical Problems are expected)
- d) Fajan's rules.

#### 2.2 Radius ratio and crystal structure.

- a) Definition: Radius ratio ( $r^+ / r^-$ ), Coordination number, Stoichiometry and unit cell.
- b) Concept and calculation of radius ratio ( $r^+ / r^-$ ) for ionic solid with octahedral geometry.
- c) Radius ratio effect on geometry.
- d) Crystal structure of NaCl and CsCl w.r.t. unit cell, radius ratio, coordination number and stoichiometry.

**UNIT – IV: Theories of Covalent Bonding** Contact hours- 20

**Credit- 1.33**

**A. Valence Bond Theory(VBT) Approach**

**(Contact hrs:10)**

3.1 Valence Bond Theory: Heitler – London Theory and Pauling Slater Theory

3.2 Limitations of VBT

3.3 Need of Hybridisation

3.4 Types of hybridization and shapes of simple inorganic molecules:  $\text{BeCl}_2$ ,  $\text{BF}_3$ ,  $\text{SiCl}_4$ ,  $\text{PCl}_5$ ,  $\text{SF}_6$ ,  $\text{IF}_7$ .

3.5 Valence Shell Electron Pair Repulsion (VSEPR) Theory w.r.t.  $\text{NH}_3$ ,  $\text{H}_2\text{O}$ ,  $\text{ClF}_3$

**B. Molecular Orbital Theory(MOT) Approach**

**(Contact hrs:10)**

4.1 Atomic and Molecular orbitals.

4.2 L.C.A.O. Principle

4.3 Bonding, Antibonding and Nonbonding Molecular orbitals.

4.4 Conditions for successful overlap

4.5 Different types of overlap (s-s, s-p<sub>x</sub>, p<sub>x</sub> - p<sub>x</sub> and p<sub>y</sub>- p<sub>y</sub> or p<sub>z</sub>- p<sub>z</sub>)

4.6 Energy level sequence of molecular orbitals for n = 1 and n = 2

4.7 M. O. Diagrams for: a) Mononuclear diatomic molecule.  $\text{H}_2$ ,  $\text{Li}_2$ ,  $\text{Be}_2$ ,  $\text{C}_2$ ,  $\text{N}_2$  and  $\text{O}_2$

b) Heteronuclear diatomic molecules  $\text{CO}$  and  $\text{NO}$  w.r.t. bond order stability and magnetic properties.

**Reference Books:**

- 1) Advanced Inorganic Chemistry - Cotton and Wilkinson
- 2) Inorganic Chemistry - J. E. Huheey
- 3) Concepts and models of Inorganic Chemistry - Douglas & Mc-Daniel
- 4) Principles of Inorganic Chemistry - Puri, Sharma
- 5) New Concise Inorganic Chemistry - (ELBS) - J. D. Lee
- 6) Text book of Inorganic Chemistry - P. L. Soni
- 7) Advanced Inorganic Chemistry - Satyaprakash, Tuli, Basu
- 8) Theoretical Principles of Inorganic Chemistry - G. S. Manku
- 9) Principles of Inorganic Chemistry - Puri, Sharma & Kalia

**SEMESTER-II**  
**PAPER II: (Organic and Analytical Chemistry)**  
**(Total Credits: 5; Contact hrs: 75)**  
**SECTION- I: Organic Chemistry**

**UNIT: - I:**

**Contact hours 22.5**

**Credit- 1.5**

**A. Fundamentals of organic reaction mechanism** **(Contact hrs:06)**

- 1.1 Meaning of reaction mechanism.
- 1.2 Curved arrow notation, Half headed and double headed arrows.
- 1.3 Types of bond breaking :Homolytic and Heterolytic.
- 1.4 Types of reagents : Electrophilic and Nucleophilic.
- 1.5 Types and sub-types of following organic reactions with definition and atleast one example of each. a) Substitution b) Addition c) Elimination d) Rearrangement.  
(Mechanism is not expected)
- 1.6 Reactive Intermediates with examples carbocations, carbanions (formation,structure, stability and reactions are expected). Carbon free radicals, carbenes,arenes, nitrenes  
(Definition with example only)

**B. Stereochemistry of organic compounds** **(Contact hrs:06)**

- 2.1 Types of stereo-isomerism - Optical isomerism, Geometrical isomerism and Conformational isomerism.
- 2.2 Chiral center[Explanation with lactic acid]
- 2.3 Elements of symmetry
- 2.4 Optical isomerism in lactic acid, tartaric acid and 2,3 - dihydroxybutanic acid
- 2.5 Enantiomers and diastereoisomers.
- 2.6 Racemic modification.
- 2.7 Geometrical isomerism-cause of geometrical isomerism.
- 2.8 Geometrical isomerism w.r.t. C = C  
Geometrical isomerism in maleic acid and fumaric acid.

**C. Alkanes and Cycloalkanes** **(Contact hrs:4.5)**

- 3.1 Alkanes : Methods of formation with special reference to Wurtz reaction, Kolbereaction, Corey-House reaction and decarboxylation of carboxylic acid.
- 3.2 Mechanism of free radical halogenation of alkanes.
- 3.3 Cycloalkanes - Nomenclature methods of formation
  - (a) Internal Wurtz reaction
  - (b) Distillation of calcium or barium salt of dicarboxylic acid.
- 3.4 Chemical properties of cyclopropane
  - (i) Free radical substitution of chlorine in presence of light.
  - (ii) Action of HBr and conc. H<sub>2</sub>SO<sub>4</sub> iii) Catalytic reduction by H<sub>2</sub>/Ni

**D. Aromaticity and Benzene** **(Contact hrs:06)**

- 4.1 Meaning of the terms - Aromatic, non-aromatic, antiaromatic and pseudoaromatic compounds.
- 4.2 a) Kekule structure of benzene  
b) Resonance structures of benzene.  
c) Molecular orbital picture of benzene.  
d) Representation of benzene ring.
- 4.3 Modern theory of aromaticity. Fundamental Concepts - delocalisation of electrons,

coplanarity and Huckel's  $(4n + 2) \pi$  rule. Applications of Huckel's rule tonaphthalene, pyrroleand pyridine.

4.4 Mechanism of electrophilic aromatic substitution in benzene w.r.t. nitration,sulphonation, halogenation and Friedel - Craft's reaction- alkylation and acylation.

**UNIT: - II:**

**Contact hours 15**

**Credit- 1**

**A. Alkenes, Dienes and Alkynes**

**(Contact hrs:08)**

5.1 Nomenclature of alkenes.

5.2 Methods of formation of alkenes with mechanism

i) By dehydration of lower alcohols.

ii) By dehydrohalogenation of lower alkyl halides.

5.3 Chemical reactions of alkenes - Hydrogenation, Electrophilic and free radical additions, Hydroboration, Oxidation, Epoxidation, Ozonolysis, Hydration, Hydroxylation, Oxidation with  $\text{KMnO}_4$ , Polymerisation of alkenes - ethylene and propylene

5.4 Nomenclature and classification of dienes.

5.5 Isolated, Conjugated and cumulated dienes.

5.6 Butadiene - Methods of formation, polymerisation, 1 : 2 & 1 : 4 additionsand Diels-Alder reaction.

5.7 Alkynes - Nomenclature, Acidity of alkynes.

5.8 Electrophilic and Nucleophilic addition reactions, Hydroboration, oxidation.

**B. Structure and Bonding**

**(Contact hrs:07)**

6.1 Hybridization:  $\text{sp}^3$ ,  $\text{sp}^2$ and  $\text{sp}$  w.r.t. methane, ethylene and acetylene respectively.

6.2 Bond length, Bond angle and Bond energy with factors affecting these properties w.r.t. :  $\text{sp}^3$ ,  $\text{sp}^2$ and  $\text{sp}$  hybridization

6.3 Resonance effect with respect to phenol, and nitrobenzene.

6.4 Hyperconjugation w.r.t. toluene.

6.5 Inductive effect w.r.t. + I and - I .

6.6 Steric effect w.r.t. mesitoic acid.

**Reference Books**

1) Organic Chemistry : Hendrickson, Cram, Hammond.

2) Organic Chemistry : Morrison & Boyd

3) Organic Chemistry : Volume I & II I.L. Finar

4) Organic Chemistry : Pine

5) Advanced Organic Chemistry :SachinkumarGhosh

6) Advanced Organic Chemistry : B.S. Bahl and ArunBahl

7) A Guide book to Mechanism in organic Chemistry : Peter Sykes

8) Stereochemistry of Organic Chemistry :Kalsi,

9) Stereochemistry of Carbon Compounds :Eliel

10) Text book of Organic Chemistry : P. L. Sony

11) Practical Organic Chemistry : By A. I. Vogel

12) Advanced Organic Chemistry - Reactions, Mechanism &Structure : Jerry March

13) Organic Chemistry : M.R. Jain

14) Organic Chemistry : J. M. Shaigel

## SECTION- II: Analytical Chemistry

**UNIT – III:**

**Contact hrs: 22.5**

**Credit- 1.5**

### **A. Physical properties of liquids**

**(Contact hrs:07)**

- 1.1 Introduction, additive & constitutive properties.
- 1.2 Viscosity, coefficient of viscosity, determination of viscosity by Ostwald's Viscometer.
- 1.3 Surface tension:- Determination of surface tension by Drop –Weight method
- 1.4 Parachor:-Macleod equation & its modification by Sugden, applications of parachor in the determination of molecular structures as benzene, NO<sub>2</sub> group (Numerical problems not expected).

### **B. Qualitative and Quantitative elemental analysis**

**Contact hrs:08**

- 2.1 Qualitative analysis of Carbon, Hydrogen, Nitrogen & Sulphur
- 2.2 Quantitative analysis of -
  - i) Carbon & hydrogen by Combustion method
  - ii) Nitrogen by Kjeldahl's method
  - iii) Halogen and by Carius method.
- 2.3 Determination of molecular weight of an acid by titration method.
- 2.4 Empirical formula and molecular formula determination. (Numerical Problems Expected)

### **C. Chemistry in day-to-day life**

**Contact hrs:7.5**

- 3.1 Types of water, desalination, Fresh water, Dissolved Oxygen and water quality.
- 3.2 Milk: Definition, Chemical composition of milk of different species such as cow, buffalo and goat.
- 3.3 Adulteration in milk like Sugar, Urea, Starch.
- 3.4 Essential nutrients for plants, Classification, Major, minor & trace their sources and forms.
- 3.5 Importance of Inorganic Compounds as Medicine- Antacid products Na<sub>2</sub>CO<sub>3</sub>, Al(OH)<sub>3</sub>, AlPO<sub>4</sub>, Mg(OH)<sub>2</sub>, Cis-Platin

**UNIT – IV:**

**Contact Hrs: 15**

**Credit- 1**

### **A. Distribution Law**

**Contact hrs:05**

- 4.1 Nernst distribution law, its limitations & modification with reference to association & dissociation of solute in one of the solvent.
- 4.2 Applications of distribution law in:
  - a) Process of extraction (derivation expected)
  - b) Determination of solubility
  - c) Distribution Indicators
  - d) Determination of molecular weight (Numerical problems expected)

### **B. Metallurgy**

**Contact hrs:06**

- 5.1 Introduction: - Terms used in Metallurgy, Metallurgy, Mineral, Ore, Gangue, Flux, Slag
- 5.2 Occurrence of metals: Types of Ores.
- 5.3 Steps Involved in Metallurgical Processes:
  - A) Concentration of Ores:
    - i) Physical Methods: a) Gravity separation method
    - b) Magnetic separation method
  - c) Froth floatation method.

ii) Chemical Methods: a) Calcination and b) Roasting

B) Reduction: Mention various methods of reduction. Extraction of Iron by blast furnace.

### **C. Environmental Chemistry**

**Contact hrs:04**

6.1 Introduction: Meaning of terms: Environment, Pollution, Pollutant, Threshold Limit Value (TLV), Dissolved Oxygen (DO), Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD)

6.2 Types of Pollution (Only Introduction): Air pollution, Water pollution, Sound pollution, Soil pollution, Automobile pollution and nuclear pollution.

6.3 Air Pollution: Classification of Air pollutants, Oxides of carbon, Sulphur and Nitrogen as air pollutants with respect to source and health hazards.

### **Reference Books**

- 1) Chemistry - Central Science, Brown, Lemay, Bursten 8<sup>th</sup> Edition.
- 2) Outline of Dairy Technology - Sukumar De Oxford university Press.
- 3) Introduction to Agronomy & soil water management - V. G. Vaidya, N.R.Sahastrabudhye.
- 4) Principles of Soil Science - M. M. Raj, Millian Co. of India, Bombay 1977
- 5) Inorganic Medicinal & Pharmaceutical Chemistry- Block, Roche, Soine –Wilson, Varghese Publishing House.
- 6) Environmental Chemistry - A.K. De
- 7) Environmental pollution analysis - S.M. Khopkar
- 8) Organic Chemistry : Hendrickson, Cram, Hammond.
- 9) Organic Chemistry : Morrison & Boyd
- 10) Organic Chemistry : Volume I & II I.L. Finar
- 11) Organic Chemistry : Pine
- 12) Advanced Organic Chemistry :SachinkumarGhosh
- 13) Advanced Organic Chemistry : B.S. Bahl and ArunBahl
- 14) A Guide book to Mechanism in organic Chemistry : Peter Sykes
- 15) Stereochemistry of Organic Chemistry :Kalsi,
- 16) Stereochemistry of Carbon Compounds :Eliel
- 17) Text book of Organic Chemistry : P. L. Sony
- 18) Practical Organic Chemistry : By A. I. Vogel
- 19) Advanced Organic Chemistry - Reactions, Mechanism &Structure : Jerry March
- 20) Organic Chemistry : M.R. Jain
- 21) Organic Chemistry : J. M. Shaigel
- 22) Industrial Chemistry : Rogers
- 23) Industrial Chemistry :R.K.Das

## B.Sc. – I (Chemistry Practical Course)

Credits: 4

Marks: 100(70+30)

**N.B.** i) Use of Digital balance is allowed.

ii) Use S.I. Units Wherever Necessary.

### A) Physical Chemistry.

1) Determination of viscosity of given liquids A and B. (Density data of liquids, viscosity of water to be given.) [Any two liquids from, Acetone,  $\text{CCl}_4$ , Ethyl alcohol, Ethylene glycol and n-propyl alcohol]

2) Determination of equivalent weight of Mg by Eudiometer.

3) Study of specific reaction rate of hydrolysis of methyl acetate in presence of HCl.

4) Study of specific reaction rate of hydrolysis of methyl acetate in presence of  $\text{H}_2\text{SO}_4$

5) Study of reaction between  $\text{K}_2\text{S}_2\text{O}_8$  and KI (Equal Concentrations)

6) Determination of heat of ionization of weak acid.

### Reference Books :

1) Practical book of Physical Chemistry :Nadkarni, Kothari &Lawande.

2) Experimental Physical Chemistry : A. Findlay.

3) Systematic Experimental Physical Chemistry : S.W. Rajbhoj, Chondhekar (Anjali Pub.)

4) Experiments in Physical Chemistry :R.C.Das and B. Behra. (Tata Mc. Graw Hill)

5) Advanced Practical Physical Chemistry : J. B. Yadav (Goel Publishing House)

6) Practical Physical Chemistry : B. D. Khosala ( R. Chand & Sons.)

7) Experiments in Chemistry : D. V. Jagirdar

## B) Inorganic Chemistry

### 1) Inorganic Quantitative Analysis :

1) Study of analytical balance and calibration of fractional weights.

2) Volumetric Analysis :

i) To prepare a standard solution of Oxalic acid and determine the strength of Potassium permanganate solution in terms of normality and  $\text{Kg}/\text{dm}^3$

ii) To prepare standard solution of Potassium dichromate and determine strength of Ferrous Ammonium Sulphate solution in terms of normality and  $\text{Kg}/\text{dm}^3$  (Use internal indicator)

iii) To prepare standard solution of calcium chloride from calcium carbonate and determine the total hardness of given water sample.

### 2) Qualitative Analysis:

1) Spot Tests: Detection of following cations using spot tests :  $\text{Cu}^{2+}$ ,  $\text{Co}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Al}^{3+}$ ,  $\text{Pb}^{2+}$ .

2) Chromatography :Separation and identification of cations by Paper Chromatographic technique from the following mixtures :

a)  $\text{Ni}^{2+} + \text{Cu}^{2+}$

b)  $\text{Ni}^{2+} + \text{Co}^{2+}$

c)  $\text{Cu}^{2+} + \text{Co}^{2+}$

### Reference Books :

1) Vogel's Text Book of Quantitative Chemical Analysis (Longman ELBS Edition)

2) Vogel's Text Book of Qualitative Chemical Analysis (Longman ELBS Edition)

3) Basic Concepts in Analytical Chemistry (Wiley Eastern Ltd.) : S. M. Khopkar.

## C) Organic Chemistry

### 1) Estimations :

- i) Estimation of aniline and ii) Estimation of acetamide

### 2) Organic Qualitative Analysis.

Identification of at least five organic compounds with reactions including one from acids, one from phenols, one from bases and two from neutrals from the list of the compounds given below-

- i) Acids : Oxalic acid, Benzoic acid and Cinnamic acid
- ii) Phenols :  $\beta$  - Naphthol, Resorcinol.
- iii) Bases : Aniline, p - toluidine.
- iv) Neutrals : Acetone, Ethyl acetate, Glucose, Chloroform, Chlorobenzene, m-dinitrobenzene, Thiourea.

**Note :** A systematic study of an organic compound involves the following operations which should be taught in details with reactions in the detection of elements and functional group.

- 1) Preliminary tests and physical examination.
- 2) Determination of physical constant.
- 3) Detection of Elements.
- 4) Determination of functional group.
- 5) A search into the literature.
- 6) Special Test.
- 7) Summary.
- 8) Result.

### 3) Organic Preparation: (Any one)

- i) Preparation of benzoic acid from benzamide.
- ii) Preparation of succinimide from succinic acid.

(Wt. of crude product is expected. M.P. of the recrystallized product is not expected.)

### Reference Books:

- 1) Vogel's Text Book of Quantitative Chemical Analysis, (Longman) ELBS. Edition
- 2) Vogel's Text Book of Qualitative Chemical Analysis, (Longman) ELBS. Edition
- 3) Hand book of Organic Qualitative Analysis : Clarke
- 4) Comprehensive Practical Organic Chemistry - Quantitative Analysis by V.K. Ahluwalia, SunitaDhingra, University Press. Distributor - Orient Longman Ltd.,
- 5) Comprehensive Practical Organic Chemistry preparation and Quantitative Analysis. : V.K. Ahluwalia, RenuAgarwal, University Press. Distributor - Orient Longman Ltd.,
- 6) A laboratory Hand-Book of organic Qualitative Analysis and separation :V. S. Kulkarni, DastaneRamchandra and Co. Pune

**Solapur University, Solapur**  
**Nature of Question Paper for Credit-Grading System Semester Pattern**  
**• Faculty of Science •**  
**(w.e.f. June 2014)**

**Time: - 3.00 hrs. Total Marks- 70**

**Instructions:**

1. Section **I and II** are compulsory
2. Answers to the **two sections** should be written in **separate** answer books
3. All questions are compulsory.
4. Draw **neat diagrams** and give **equations** wherever necessary.
5. Figures to the **right** indicate **full marks**.
6. Use of logarithmic table and calculator is allowed.

(At.Wts.: H=1, C=12, O=16, N= 14, Na =23, Cl = 35.5)

**Section - I**

**Q. No.1) Multiple choice questions**

(5)

- 1) -----  
a)    b)        c)        d)  
2)  
3)  
4)  
5)

**Q.No.2) Answer any Five of the following**

(10)

- i)  
ii)  
iii)  
iv)  
v)  
vi)  
vii)

**Q.No.3 A) Write short notes on any Two of the following**

(10)

- i)  
ii)  
iii)

**B) Answer any One of the following**

(10)

- i)  
ii)

**Section - II**

**Q. No.4) Multiple choice questions.**

(5)

- 1) -----  
a)    b)        c)        d)  
2)  
3)  
4)  
5)

**Q.No.5) Answer any Five of the following**

(10)

- i)  
ii)  
iii)

iv)

v)

vi)

vii)

**Q.No.6 A) Write short notes on any Two of the following** (10)

i)

ii)

iii)

**B) Answer any One of the following** (10)

i)

ii)