

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

B.Y.B.Sc. Botany Syllabus.

(to be implemented with effect from June, 1992)

COURSES:-

- Paper I: BO.1.1. Lower Cryptogams and Higher Cryptogams  
Lower Cryptogams (First Term)  
Higher Cryptogams (Second Term)
- Paper II: BO.1.2.- Morphology of Angiosperms (External and  
Internal), Gymnosperms and Taxonomy of  
Angiosperms.
- Morphology of Angiosperms  
(External and Internal ) (First Term)
  - Gymnosperms and Taxonomy of  
Angiosperms (Second Term)
- Paper III:BO.1.3.- Practicals based on Theory Paper-I & Paper-II  
i.e. BO.1.1 \* BO.1.2.

- [N.B.: i) Local excursions should be arranged.  
ii) Properly prepared minimum five herbarium  
Sheets from the area visited should be  
submitted along with excursion report]

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F.Y.B.Sc.  
Paper-I:BO-1.1=Lower Cryptogams and Higher Cryptogams

First Term

Lower Cryptogams

(Viruses, Bacteria, Algae, Fungi and Lichens)  
(Total Periods=36)

- A- Viruses- (3)
- A-1. Introduction-
- i) Nature
  - ii) Ultrastructure
  - iii) Reproduction
  - iv) Economic importance of Viruses  
(including at least two diseases each of plant/animal/  
man)
- B- Bacteria- (5)
- B-1. Introduction (General characters)
- i) Classification of bacteria on the basis of shape
  - ii) Nutrition
  - iii) Reproduction
  - iv) Economic importance of bacteria (Positive and Negative)
- C- Algae- (4)
- C-1. Introduction:
- i) General characters of Algae
  - ii) Habit and habitat
  - iii) Structure of thallus
  - iv) Reproduction
  - v) Economic importance (in brief)
- C-2. Classification of algae with reasons according to G.M.Smith upto classes giving at least two examples of each class. (2)
- C-3. Study of Life Cycle of :
- a) Nostoc (3)
  - b) Sargassum (4)
- D- Fungi-
- D-1. Introduction: (4)
- i) General characters of Fungi
  - ii) Habit and habitat
  - iii) Structure
  - iv) Nutrition
  - v) Reproduction
  - vi) Economic importance of fungi
- D-2. Classification of fungi with reasons according to G.M.Smith upto classes giving at least two examples of each class. (2)
- D-3. Study of Life Cycle of:
- i) Rhizopus (3)
  - ii) Agaricus (4)
- E- Lichens: (2)
- E-1. General account with reference to-
- i) Occurrence
  - ii) Structure of thallus (external and internal)
  - iii) Types of lichens
  - iv) Economic importance of lichens.

Second Term

HIGHER CRYPTOGAMS

(Bryophytes and Pteridophytes)  
(Total Periods=36)

A: Bryophytes-

A-1- Introduction:

- i) Distinguishing features of the group (6)
- ii) Alternation of generations.
- iii) Outline Classification of Bryophytes with reasons according to G.M.Smith upto Classes mentioning at least two examples of each class.

A-2- Study of Life Cycle of:

- a) Riccia (6)
  - b) Funaria (6)
- With reference to:

- i) Classification with reasons
- ii) Habit and habitat
- iii) External and Internal structure of gametophytes
- iv) Vegetative reproduction.
- v) Sexual reproduction and structure of sex organs
- vi) Fertilization
- vii) Structure of mature sporophyte
- viii) Structure and germination of spores
- ix) Alternation of generations (Development not expected)

B: Pteridophytes:

B-1. Introduction: (6)

- i) Distinguishing features of the group.
- ii) Alternation of generations.
- iii) Outline classification of Pteridophytes with reasons according to G.M.Smith upto classes mentioning at least two examples from each class.

B-2. Study of Life Cycle of:

- a) Selaginella (6)
- b) Equisetum (6)

with reference to -

- i) classification with reasons
- ii) Habit and habitat
- iii) External and internal structures of sporophyte.
- iv) Vegetative reproduction.
- v) A sexual reproduction
- vi) Position and structure of strobilus and sporangium
- vii) Germination of spores
- viii) Structure of mature gametophyte
- ix) Position and structure of sex organs
- x) Fertilization
- xi) Structure of mature embryo
- xii) Alternation of generations.  
(development not expected)

(External and Internal) ;

Gymnosperms and Taxonomy of Angiosperms

First Term :- Morphology of Angiosperms (External and Internal)  
(Total periods= 38)

A. Morphology (External)-

A.1) Introduction, distinguishing features of the group, Alternation of generations. (2)

A.2) Root system-Definition, Types of root-Primary, Secondary & Tertiary;

-Adventitious roots- fibrous, foliar.

-Modifications - a) Modified tap roots-fusiform, napiform, conical & tuberous.

b) Modified branch root- pneumatophore

c) Modified adventitious roots - tuberous, fasciculated, nodulose, moniliform, annulated, prop or stilt roots, climbing, sucking or haustoria, respiratory, epiphytic, assimilatory roots. (3)

A.3) Stem:- Definition.

a) Forms of stem-i) Erect or strong ii) weak stems - prostrate, decumbent, diffuse, creeping, twining, climbing

- Modifications-

a) Underground modification-rhizome, tuber, bulb, corm.

b) Sub-aerial modification- runner, stolon, offset, sucker.

c) Aerial modification-Stem tendril, thorn, phylloclade, cladode, bulbils. (3)

A.4) Leaf -

a) Definition & parts of leaf, stipules and kinds of stipules, apex, margin, surface, shape & venation of leaf, simple and compound leaves.

b) Modification of leaves- leaf tendril, leaf spines, scale leaves, phyllode, pitcher and bladder.

c) Phyllotaxy- alternate, opposite & whorled. (3)

- A.5) Inflorescence- Definition, types including special types (2)
- A.6) Flower - Definition, parts, flower as a modified shoot,  
Calyx and aestivation; Corolla types and  
aestivation; Androecium, cohesion and adhesion;  
Gynoecium - position of ovary, placentations (6)
- A.7) Fruit - Definition, classification and dispersal of (3)  
seeds and fruits.
- B. Morphology (Internal) -
- B.1. Tissue - Definition, classification of meristematic tissue (3)  
on the basis of position and origin.
- B.2. Primary permanent tissues -
- a) Simple Tissues - Parenchyma, Collenchyma, Sclerenchyma.  
b) Complex tissues - Xylem and Phloem  
c) Types of vascular bundles. (5)
- B.3) Primary Structure of Dicotyledonous -
- a) Stem  
b) Root  
c) Leaf (3)
- B.4) Primary Structure of Monocotyledonous (3)
- a) Stem  
b) Root  
c) Leaf

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Second Term: Gymnosperms and Taxonomy of Angiosperms.  
(Total periods = 36)

A- Gymnosperms:

A-1 Introduction -

- i) Distinguishing features of the group
- ii) Alternation of generation.
- iii) Out line classification according to Chamberlain's classification upto classes with reasons giving at least two examples in each class. (5)

A-2 Study of Life Cycle of Lycas with reference to :

- i) Classification with reasons
- ii) Habit and habitat
- iii) External morphology-root, stem and leaf.
- iv) Anatomy of -
  - a) Normal root & coralloid root
  - b) rachis
  - c) leaflet
- v) Vegetative reproduction
- vi) Morphology of male cone & male gametophyte
- vii) Morphology of female reproductive body (megasporophyll) and female gametophyte.
- viii) Ovule and embryo
- ix) Pollination and fertilization.  
(Development not expected) (10)
- x) Seed structure and germination.  
(Development not expected)

B- Angiosperms:

B-1.

- a) Definition and scope of Taxonomy.
- b) Binomial nomenclature.
- c) Outline classification of Bentham and Hooker upto series (5)

B-2. Study of families with reference to :

- i) Classification with reasons
  - ii) General morphological characters
  - iii) Distinguishing characters
  - iv) Floral formula
  - v) Floral diagram
  - vi) Economic importance
- |                  |                             |
|------------------|-----------------------------|
| 1: Anonaceae     | 2: Papilionaceae (Fabaceae) |
| 3: Rubiaceae     | 4: Convolvulaceae           |
| 5: Acanthaceae   | 6: Nyctaginaceae            |
| 7: Euphorbiaceae | 8: Amaryllidaceae           |
- (14)

B-3. Herbarium's techniques and scope. (2)

Paper III. BO.1.3.- Practical Course [Based on Theory Paper-I  
(Bo.1.1.) and Paper-II (Bo.1.2.)]

(Total Practicals-24)  
FIRST TERM

[Lower Cryptogams, Morphology of Angiosperms (External and Internal)]

P.S.= Permanent Slide.

1. a) Viruses: Observation of following any two virus-affected plants (Demonstration)
  - i) Yellow vein disease of Lady's Finger/Papaya
  - ii) Little leaf of Brinjal.
  - iii) Witches broom
- b) Bacteria: Gram staining of bacteria.

2. Algae:

Study of Nostoc.

3. Study of Sargassum

i) T.S.of axis

P.S.- { i) T.S.of secondary lateral (leaf)  
          { ii) T.S.-male conceptacle.  
          { iii) T.S.-female conceptacle.

4. Fungi:

Study of Rhizopus

i) Observation of Mycelium, Stolon & Sporangiochore.

P.S. i) Sexual stages- (zygospore).

5. Study of Agaricus

i) Morphology of Sporocarp  
ii) T.S.of gills.

P.S. i) L.S.of Sporocarp.  
      ii) T.S. of gills.

6. Lichens: [Demonstration]

i) Forms of lichens - a) Crustose.  
                          b) Foliose  
                          c) Fruticose

P.S. i) T.S.of thallus  
      ii) V.S.of apothecium

Demonstration Practicals (Practical Numbers 7-11)

7. Morphology of root and it's modifications (as per syllabus)
8. Morphology of stem and it's modifications (as per syllabus)
9. Morphology of leaf and it's modifications (as per syllabus)
10. Study of Inflorescence and its types including special types.
11. Morphology of Flower with reference to
  - i) Calyx
  - ii) Corolla
  - iii) Androecium
  - iv) Gynoecium

P.S. i) Placentation.  
ii) Aestivation.
12. Study of tissues (Demonstration)

P.S. i) Meristem (L.S.)  
ii) Xylem and phloem (T.S. & L.S.)  
iii) Types of vascular bundles.
13. Anatomy: Primary structure of ....
  - a) Stem - Sunflower & Maize
  - b) Root - Sunflower & Maize

P.S. i) Leaf- Sunflower & Maize (T.S.)

Second Term

[Higher Cryptogams Gymnosperms and Taxonomy of Angiosperms]

Bryophytes:

14. Study of Riccia
  - i) Mounting of rhizoids and scales.
  - ii) T.S. of thallus

P.S. { i) T.S. of thallus showing antheridia and archegonia  
{ ii) T.S. of thallus showing sporophyte.
15. Study of Eunaria
  - i) Mounting of rhizoids
  - ii) T.S. of stem

P.S. { i) V.S. of antheridial head.  
{ ii) V.S. of archegonial head  
{ iii) V.S. of capsule.

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16 Pteridophytes:

Study of Selaginella

- i) T.S. of stem (ii) Mounting of Spores
- P.S. i) T.S. of root (ii) T.S. of rhizophore
- iii) V.S. of strobilus.

17. Study of Equisetum

- i) T.S. of stem passing through the internode.
- ii) Mounting of Sporangiphore and Spores.
- P.S. { i) T.S. of root.
- { ii) T.S. of rhizome
- { iii) V.S. of Strobilus.

18,19. Gymnosperms:

Study of Cycas

- i) T.S. of rachis
- ii) T.S. of pinna
- iii) Structure of male cone, microsporophyll, microsporangium and mounting of pollen grains.
- iv) Observation of megasporophyll.
- P.S. { i) T.S. of coralloid root
- { ii) V.S. of ovule.

20,21,22 & 23. Taxonomy of Angiosperms:

Study of families (as per syllabus)

24. Herbarium techniques.

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F.Y.B.Sc. - PHYSICAL CHEMISTRY PAPER-I (Section-I)  
PART- B. (Second Term)

4. DISTRIBUTION LAW :-

Statement and explanation of vernet's distribution law(thermodynamic derivation is not expected), applicability and limitations of distribution law, modification of distribution law with reference to association and disassociation of solute, Applications of distribution law and theory of extraction.

Lectures (6)

Ref-I :- Chapter 8, Pages 298-302.

Ref-II:- Chapter 18, Pages 531-538, 542-552.

5. Transference and transference numbers, Hittorf's rule and determination of transference numbers by Hittorf's method using unattackable electrodes.

Electrolytic conductance, determination of conductance, variation of conductance with concentrations, Equivalent conductances at infinite dilution, Kohlrausch's law and its applications, Effect of other factors on conductance, Application of conductance measurements:(a) solubility of difficultly soluble salts (b) Determination of degree of ionisation (c) Conductometric titrations and their advantages.

Lectures-(8)

Ref-I:- Chapter 18-405-411, 414-424, 431-434.

Ref-II-Chapter 24- 704-710.

Chapter-25- 716-722, 725-733.

6. Mathematical Preparations

- (i) Logarithm - rules of logarithms (Without proof) characteristics and mantissa, negative logarithms, application to pH calculations and solving numerical problems involving change of base of logarithm.

Ref. 3 chapter 2 pages 7-16

- (ii) Graphical representation- Graph papers, co-ordinates of a point, equation of a st.line, slope and intercepts. Characteristics of st.line. Plotting of graphs based on experimental data of chemical origin.

Ref.3 - Chapter 4 Pages 23-30.

- (iii) Differential calculus - rules of differentiation.

PART- A (First Term)

1. ATOMIC STRUCTURE :-

Rutherford's  $\alpha$ -particle scattering experiment, Rutherford's atomic model and its drawbacks, Moseley's work and its importance (no numerical problems), Discovery of neutron, Line spectra of atoms, Balmer's formula, Hydrogen spectrum, Ritz combination principle,

Bohr's atomic model, Derivation of radius of orbit, Derivation of energy of an electron, origin of hydrogen spectrum and explanation, failure of Bohr's model, Sommerfeld's modification of Bohr's model, quantum numbers, assigning quantum numbers to electrons upto atomic number 18.

Ref.1 Chap.14-- Pages- 608-610,613-622

Ref.2 Chap.1 - Pages- 9-14,15-32,50-57 Lectures- (8)

2. THE GASEOUS STATE :-

Gas constant R and its values in different units, kinetic theory of gases, Assumptions of kinetic theory, RMS velocity, Derivation of kinetic gas equation, Deduction of Boyle's Charles, Avogadro's, Dalton's and Graham's law from kinetic gas equation, velocities of gas molecules (only definitions and inter-relationship), The kinetic energy of translation, Applicability of the ideal gas laws, compressibility factor, vander waal's equation of state, critical phenomena in liquids, The P-V-T relations of gases and liquids, The principle of continuity of states, Application of vander waal's equation to isothermals of  $\text{CO}_2$ , Determination of vander waal's constants, law of corresponding states.

Lectures-12

Ref. 1:- Chapter 1, Pages 10-12. 15-31. 47-55.

Ref. 2:- Chapter 2, Pages 301,302, 306-317, 322-336.

3. ADSORPTION :-

Adsorption of gases by solids, Types of adsorption, Adsorption isotherms, Freundlich's equation, Langmuir's adsorption isotherm and its derivation, Applications of adsorption with reference to chromatography.

Lecturer- 4

Ref. 1:- Chapter 20, pages 810-817.

Ref. 2:- Chapter 23, Pages 686-695.

(without proof), partial differentiation (without proof) pertaining to algebra, exponential and logarithmic functions examples related to chemistry.

Ref.3 Chapter 7, pages 72-82

8 pages 83-90.

iv) Integral calculus - Rules of integration (Without proof) pertaining to algebra, and exponential function. Integration between limits. Examples related to chemistry.

Ref.3 Chapter - 11 pages - 115 - 125.

v) Significance of  $e$  - application to the compound interest law to physical chemistry. Exponential equations. Examples related to chemistry.

Ref. 3 Chapter - 12 pages 132 -140

Lectures - (10)

Ref.1 Principles of physical chemistry by S.H. Maron and prut  
IVth Edition.

II Essentials of physical chemistry by B.S. Bahl and G.D. Tuli.

III Mathematical preparation of physical chemistry  
by F. Daniels.

Magrow Hill book Company.

INORGANIC CHEMISTRY PAPER - I

SECTION - II Part - A (First Term)

(1) Volumetric Analysis :-

(3)

I-21 Volumetric Analysis

I-22 Classification of reactions in volumetric Analysis.

I-23 Equivalent weights. Normal solutions.

I-24 Advantages of the use of the equivalent system for the preparation of standard solutions.

I-25 Preparation of standard solutions

I-26 Primary standard substances

Ref.-1 pages 38 to 50.

(2) Technique of volumetric (titrimetric Analysis)

(3)

II-17 Unit of volume

II-19 Volumetric Apparatus

II-20 Volumetric Flasks

II-21 Pipettes

II-22 Burettes

II-25 Storage and preservation of solutions for volumetric Analysis.

Ref.-1 pages 191 to 207.

(3) Experimental technique Inorganic Analysis

(3)

II-1 Balance, weights and weighting

II-2 Description of typical Analytical balance

II-3 Requirements of good balance

II-5 Care and use of balance

II-6 Methods of weighing

II-7 Errors in weighing

II-8 Calibration of weights

Ref. 1 pages 140 to 159

Ref.-1 Quantitative Inorganic Analysis

by- A. I. Vogel (Third Edn)

(4) Symmetry elements and Symmetry operations

(3)

Ref.- (2) Concepts and Models of Inorganic Chemistry

by Douglas and Mc Daricl

Pages 476 to 479

(3) Chemical applications of group theory  
by F.A. Cotton.

INORGANIC CHEMISTRY

Paper - I      Section - II      Part - E      (Second Term)

- I) Bonding in molecules and structure. (7)
- i) Attainment of stable configuration.
  - ii) Types of bond (a) Ionic (b) Covalent (c) Coordinate (d) metallic (only introduction and definitions.)
  - iii) Valence bond theory.
    - a) Heitler London theory (assumption)
    - b) Pauling Slater theory
    - c) Concept of atomic orbital overlap and bond formation sigma and pi bonds
    - d) Non-polar and polar covalent bonds
  - iv) Bonding in the following molecules using pure S & P orbitals  $H_2$ ,  $F_2$ ,  $HF$ ,  $O_2$ ,  $N_2$
  - v) Hybridization :- (a) Need of concept of Hybridization to explain the observed covalency and to explain the shapes of some molecules.
    - (b) Definition of Hybridization.
    - (c) Shapes of molecules involving  $sp$ ,  $sp^2$ ,  $sp^3$ ,  $dsp^2$ , or  $sp^3d$ ,  $d^2sp^3$  or  $sp^3d^2$ ,  $d^3sp^3$  hybrid orbitals.
    - (d) Bonding and shapes of the following molecules  $ClF_2$ ,  $BF_3$ ,  $CH_4$ ,  $PCl_5$ ,  $SF_6$ ,  $IF_7$ ;  $(Ni(CN)_4)^{-2}$
- II VI) Co-ordination chemistry :- Co-ordination numbers and geometries Types of ligands, Isomerism in Co-ordination compounds, Nomenclature for Co-ordination complexes. (5)

Ref.-1-A New concise Inorganic chemistry-  
by- J.D. Lee Third Ed<sup>n</sup>.

Pages 24 to 31, 49 to 58, 59 to 61

2- A New guide to Modern Valency Theory.  
by - G.I. Brown Third Ed<sup>n</sup>

Pages - 106 to 114, 162 to 164.

3- Basic Inorganic chemistry Cotton & Wilkinson  
(Third Edition)

Pages- 125 to 138

4- Concept and Models of Inorganic chemistry  
by - Douglas and Daniels Third Edition 1976

Pages- 52 to 56

Paper II Section:- I ORGANIC CHEMISTRY PART:-A

(First Term)

- 1) Structure and properties of Organic compounds  
  - 1.1 Atomic orbitals (Ref. 1.5) (12 Lectures)
  - 1.2 Electronic configuration and Pauli Exclusion principle. (Ref. 1- 1.6)
  - 1.3 Molecular orbitals (Ref. 1- 1.7)
  - 1.4 Covalent bond (Ref.1- 1.8)
  - 1.5 Hybridization with examples of Methane, Ethane, Ethene, and Ethyne. (Ref. 1:-1.9,1.10,1.11, Ref.2:-3.3)
  - 1.6 Bond length, Bond Energy, Bond angle. (Ref.2:-3.4,3.5) Bond Polarity and Polarity of molecules. Ref. 1:-1.15,1.16)
  - 1.7 Quantitative analysis of Carbon, Hydrogen, Nitrogen, Sulphur, and Halogen (Mention the names only for different methods of estimation) Ref.1:-2.27,13.12.
  - 1.8 Problems related to empirical, molecular and structural formula of Organic Compounds (Ref.1:-2.28,2.29)
- 2) Nomenclature of Organic Compounds. (4 Lectures)  
  - 2.1 Trivial System.
  - 2.2 IUPAC System (Students should only be able to know the name and structural formula of Organic Compounds:- Alkanes, Alkenes, Alkynes, Alkyl, Halides, alcohols, Aldehydes, Ketones, Acids, Ester Ethers & amines) Ref. 2:-1,2.2)
- 3) Hydrocarbons.. (8 Lectures)  
  - 3.1 Industrial Source of alkanes. (Ref.1-3.13)
  - 3.2 Industrial source VS Laboratory preparation (Ref. 1- 3.14, 3.15)
  - 3.3 Reaction of alkanes (Ref.1- 3.18)
  - 3.4 Alkanes Preparation and Reactions (Ref. 1-7.11, 8.1, 8.2)
  - 3.5 Alkynes Preparation and Reactions. (Ref.- 1-11.6, 11.7)

ORGANIC CHEMISTRY PART:- B (Second Term)

- 4) Synthesis and Reactions (10 Lectures)
- 4.1 Alkyl halides (Ref. 1-5, 3, 5.7, 5.8)
  - 4.2 Alcohols. (R f. 1-17, 1, 17.2, 17.3, 17.8, 18.2)
  - 4.3 Aldehydes and ketones (R f. 1-21.4, 21.7)
  - 4.4 Carboxylic acid and their derivatives.  
(R f. 1-23.6, 23.9, 24.6, 24.7, 24.9, 24.10, 24.11, 24.12, 24.15, & 24.16)
  - 4.5 Amines (R f. 1-26.8, 27.1)
- 5) Aromatic Compounds (6 Lectures)
- 5.1 Structure of Benzene (R f. 1-13.2, 13.3)
  - 5.2 Reactions of Benzene (R f. 1-13.4)
  - 5.3 Nomenclature of benzene derivatives (R f. 1-13.11)
  - 5.4 Phenol-Preparation and Reactions (R f. 28.5, 28.6)
- 6) Structure and Reactivity (8 Lectures)
- 6.1 Inductive Effect.
  - 6.2 Electromeric Effect,
  - 6.3 Resonance effect-
  - 6.4 Hyperconjugation
  - 6.5 Tautomerism
  - 6.6 Hydrogen bonding.
  - 6.7 Steric effect.  
(ref. 3 & 4- relevant pages)

R f. 1:- Organic Chemistry by Morrison & Boyd (Edition 5th)

R f. 2 :- Organic Chemistry by Pin, Nindrickson, orom and Hammond

R f. 3 :- Organic Chemistry by I.L.Finer Vol.-I Edition.

R f. 4 :- A Guide book of reaction mechanism by p. t. Sykes.

NORTH MAHARASHTRA UNIVERSITY, JALGAON.  
F.Y.B.Sc. Chemistry Syllabus  
( INORGANIC CHEMISTRY) PAPER II ( SECTION - II)

Part -A (FIRST TERM).

- 1) Electronic configuration of elements -
  - (i) Aufbau Principle
  - (ii) Hund's rule of Maximum multiplicity
  - (iii) Shapes of S, P, d orbitals(3)
  
- 2) Long form of the Periodic table and periodic properties-
  - i) Out line of long form of periodic table...
  - ii) Classification of elements in terms of S,P,d f block elements, inert gas elements, representative elements, transition elements and inner transition elements.
  - iv) Periodic law, periodicity in properties throughout the periodic table (only general trends in each blocks are expected, trend in any particular group or any particular period is not expected.
    - (a) Size of atom and ions
    - (b) Ionization energy
    - (c) Electron affinity
    - (d) Electronegativity
    - (e) Metallic character
    - (f) Reactivity.(9)

- Ref. (1) Concise Inorganic chemistry - by J.D.Lee  
Pages - 92 to 103. Page No.16 IIIrd Ed.
- (2) A new guide to Modern Valency Theory by-  
by- G.I. Brown (Third Ed.)  
Pages - 25 to 31.
- 93) Basic Inorganic chemistry by Cotton-Wilkinson  
Pages 43 to 46

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

F.Y.E.Sc. Chemistry Syllabus.

Chemistry Paper II Section II

( Inorganic Chemistry ) Part-B (Second Term)

1. III) Chemistry of Hydrogen :- Position in the periodic table, Isotopes of Hydrogen, Ortho and Para Hydrogen; properties of Molecular Hydrogen;

The bonding of Hydrogen Hydrogen bond; Hydrides.

Acids and Bases Arrhenius Bronsted and Lewis theory

Ref:- 1) A new concise Inorganic Chemistry by J.D. Lee  
(Third Edition)

(Pages. 117-122)

2) Basic Inorganic Chemistry by Cotton and Wilkinson  
(Third Edition) (Pages.200-215) (191-92) (5)

2. IV) S-Block Elements:-

Alkali-metals :- Electronic structure. General properties; Chemical properties; solubility and Hydration solutions of metals in liquid ammonia; stability of oxy-salts; Halides; extraction of metals; compounds with carbon; Organic compounds complexes. Anomalous- behaviour of lithium and its diagonal relationship.

Alkaline Earth Metals:- Electronic structure; General properties Anomalous behaviour of Beryllium; Solubility and Lattice energy, Chemical properties, Organometallic compounds; complexes; extraction of metals; Difference between Beryllium and other group II elements. (7)

Ref.-1- Concise Inorganic chemistry by J.D. Lee  
(Third Edition)

(Pages 128 to 151)

2- Basic Inorganic chemistry by Cotton and  
Wilkinson (Third Edition) (Pages 217 to 229)

Ref.:- Basic Inorganic chemistry by cotton and Wilkinson  
(192 to 197)

F.Y.B.Sc. Chemistry Practical Syllabus

- (a) Physical Experiments:- (Any Five)
- 1) Determination of Molecular Weight by Victor Meyer's method.
  - 2) Determination of heat of neutralisation of weak acid & hence its heat of ionisation.
  - 3) Heat of solution of  $\text{KNO}_3 / \text{NH}_4\text{Cl}$ .
  - 4) To study the adsorption of acetic acid on activated charcoal and to verify Langmuir adsorption isotherm.
  - 5) Determination of dissociation constant of acetic acid by conductometric measurements.
  - 6) Determination of equivalent weight of Mg/Al by eudiometer.
  - 7) Partition coefficient of benzoic acid between benzene & water.

OR

$\text{I}_2$  in  $\text{CCl}_4$  and water.

(B) ORGANIC CHEMISTRY:-

- 1) Organic estimations (Any Two)  
(a) Aniline (B) Phenol (C) Acetone
- 2) Determine physical constants MP/HP of given compound. Determine the type of organic compounds (Acid, base, neutral) Identification of groups such as  $-\text{COOH}$ ,  $-\text{OH}$  (alcohol),  $-\text{OH}$  (Phenol)  $-\text{COOR}$  (ester),  $-\text{C}=\text{O}$ ,  $-\text{CHO}$  (aldehyde), Amines,  $-\text{NO}_2$

At least nine organic compounds to be studied.

(C) INORGANIC CHEMISTRY.

- 1) Qualitative Analysis:- Powders containing one cation and one anion (excluding phosphates and borates)  
Minimum 10 powders.
- 2) Volumetric Analysis
  - i) Preparation of standard  $\text{Na}_2\text{CO}_3$  solution and standardisation of given HCl solution.
  - ii) Preparation of standard oxalic acid solution. Standardisation of  $\text{KMnO}_4$  solution and estimation of Iron.
  - iii) Preparation of standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution. Standardisation of  $\text{Na}_2\text{S}_2\text{O}_3$  and estimation of copper iodometrically.
  - iv) Preparation of standard  $\text{ZnSO}_4$  solution. Standardisation of EDTA. Total hardness of water.
- 3) Gravimetric Analysis:-
  - 1) Use of balance. Determine the loss per gram of  $\text{NaHCO}_3$  and hence percentage purity.
  - 2) Determine loss per gram and percentage composition of  $\text{Na}_2\text{CO}_3$  and  $\text{NaHCO}_3$  in the mixture  $\text{Na}_2\text{CO}_3 + \text{NaHCO}_3$

(2)

SCHEME FOR PRACTICAL EXAMINATION :- Examination will be of six hr. duration

The distribution of marks for various experiments will be as:-

- 1) Physical chemistry experiment - 30
- 2) Organic compound - 10
- 3) Volumetric analysis/Gravimetric/organic estimation - 25
- 4) Inorganic Qualitative - 15
- 5) Oral - 10
- 6) Journal - 10