

# College of Computer, Science & Information Technology - Junagadh

AFFILIATED TO BHAKTA KAVI NARSINH MEHTA UNIVERSITY



◆ Syllabus (NEP-2020) ◆

## Bachelor of Science (Honours)

[ CHEMISTRY ]

[ Semester – III & IV ]

Academic Year : 2024 – 25

( Effective from June – 2024 )



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## Credit Structure

Semester - 3									
Sr. No.	Course Group (Major/Minor/MDC /SEC/AEC/VAC)	Paper No.	Course Paper Title	Credit	Ext. Marks (Theory)	Int. Marks (Theory)	Ext. Marks (Pract.)	Int. Marks (Pract.)	Total Marks
1	Major-5	CHM205-2C	Intermediate Chemistry-205	4	50	50	--	--	100
2	Major-6	CHM206-2C	Intermediate Chemistry-206	4	50	50	--	--	100
3	Major-7	CHM207-2C	Intermediate Chemistry Practical-207	4	--	--	50	50	100
4	MDC-3	MDCBTT301	Environmental Biotechnology & Pollution	4	50	25	--	25	100
5	SEC-3	---	Microbiological Analysis of Air, Water & Soil to Pollution Control	2	25	25	--	--	50
6	AEC-3	---	English Language and Grammar-1	2	25	25	--	--	50
9	VAC-3	---	Indian Mythology: Avatars	2	25	25	--	--	50
<b>Total Credits</b>				<b>22</b>	<b>Total Marks</b>				<b>550</b>

Semester - 4									
Sr. No.	Course Group (Major/Minor/MDC /SEC/AEC/VAC)	Paper No.	Course Paper Title	Credit	Ext. Marks (Theory)	Int. Marks (Theory)	Ext. Marks (Pract.)	Int. Marks (Pract.)	Total Marks
1	Major-8	CHM208-2C	Intermediate Chemistry-208	4	50	50	--	--	100
2	Major-9	CHM209-2C	Intermediate Chemistry-209	4	50	50	--	--	100
3	Major-10	CHM210-2C	Intermediate Chemistry Practical-210	4	--	--	50	50	100
4	Minor-3	MINMB401	Environmental Micro. & Microbial Ecology	4	50	25	--	25	100
5	SEC-4	---	Chromatographic Techniques	2	25	25	--	--	50
6	AEC-4	---	English Language and Grammar-2	2	25	25	--	--	50
9	VAC-4	---	Agri. Engineering (Environmental Science-2)	2	25	25	--	--	50
<b>Total Credits</b>				<b>22</b>	<b>Total Marks</b>				<b>550</b>

### General Instructions (Passing Standard) :

The standard of passing the B.Sc.(IT)/B.C.A. Degree Examination will be as under:

1. To pass any semester examination of the B.Sc. Degree, a candidate must obtain at least 40% marks in the university examination (External & Internal) with all sections (e.g. Theory, Practical & Internal) separately in each course.
2. Class will be awarded based on Earned Grade Points, SGPA and CGPA as per rules of University.

# Syllabus of B.Sc.(Honours) Semester - III

## Major-5 : Intermediate Chemistry-205 (Theory)

### **Unit-1 :**

**[Teaching Hrs. 15]**

#### **Chapter-1 : Chemistry of the element of First Transition Series**

- Introduction, Position in the periodic table, Electronic configuration, Reversal of energies of 3d and 4s orbitals, Physical properties such as atomic properties (atomic radii, Ionic radii, Ionization potential), Oxidation states, Metallic conductivity, Melting point & Boiling point, Density, Reducing properties, Tendency of formation of alloys, Catalytic properties, Magnetic and spectral properties, Oxides and oxo anions of transition metals, Calculation of magnetic moment of ion of 3d series metal.

#### **Chapter-2 Chemistry of the element of First Inner Transition Series**

- Introduction, Position in the periodic table, Occurrence & Important ores, Individual isolation by (A) Ion Exchange Method (B) Solvent extraction method, Electronics configuration with necessary explanation, Oxidation state & their stability, Magnetic properties, Color, Isotopes, Spectral properties, Lanthanide contraction, Misch metal, Uses of Lanthanides & their compounds.

### **Unit-2 :**

**[Teaching Hrs. 15]**

#### **Chapter-3 Alcohols, Phenols, Ethers and Epoxides**

Basic IUPAC nomenclature of alcohol, phenol and ether,

##### **Alcohols:**

Preparation (by the reduction of aldehyde, ketone, carboxylic acid, ester and Grignard reaction), Chemical properties (Reaction with sodium metal, Relative reactivity of 1°, 2°, 3° alcohols (Lucas test), Esterification and Oxidation by periodic acid and lead tetraacetate)

##### **Phenols:**

Preparation (Dow process and Cumene process), Chemical Properties; Electrophilic substitution reaction (nitration, sulphonation and bromination) Relative acidity of phenol, alcohol and carboxylic acid, Factors affecting on acidity of phenol.

##### **Ethers:**

Preparation (Williamson synthesis) and Chemical reactions (with Cl<sub>2</sub> in light and dark, with conc. H<sub>2</sub>SO<sub>4</sub>, with hot and cold HI, hydrolysis)

##### **Epoxides:**

Reactions of epoxides with alcohols, ammonia derivatives and LiAlH<sub>4</sub>.

#### **Chapter-4 Nitrogen Containing Functional Groups**

Basic IUPAC nomenclature of amine, nitro compounds, nitriles and isonitriles.

##### **Amines:**

Effect of substituent and solvent on basicity; Distinction between 1°, 2° and 3° amines with Hinsberg reagent, Preparation (from nitro compound, alkyl halide and Hoffmann degradation of amides) Chemical properties: Reaction with acid chloride, alkyl halide and nitrous acid. Chemical reaction of aniline (nitration, sulphonation and bromination) Diazonium Salts: Preparation and their synthetic applications.

Preparation and important reactions of nitro compounds, nitriles and isonitriles.

#### **Chapter-5 Aryl halides**

Basic IUPAC nomenclature of aryl halide, Preparation (including preparation from diazonium salts), Nucleophilic aromatic substitution (S<sub>N</sub>Ar), Benzyne mechanism, Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

### **Unit-3 :**

**[Teaching Hrs. 15]**

#### **Chapter-6 Phase Equilibrium-I**

Introduction, Criteria of phase equilibrium, Explanation of terms: Phases, Components and Degrees of freedom of a system, Gibbs Phase Rule, Limitations of Phase Rule, Phase diagrams of one-component systems (Water, Sulphur, CO<sub>2</sub>) Two component systems: Condensed Phase Rule, Eutectics system (Lead-Silver) and Park method of desilverization, Congruent melting point system (Mg - Zn) and Incongruent melting point system (Na - K).

#### **Chapter-7 Solutions**

Introduction, Factors affecting on solubility, Types of solutions, Types of liquid -liquid solutions

**Miscible Liquid Pair:**

Ideal solutions and Raoult's law, Deviations from Raoult's law (non-ideal solutions), Vapor pressure - composition curves of ideal and non-ideal solutions, Temperature - composition curves of ideal and non-ideal solutions, Distillation of ideal and non-ideal solutions, Lever rule, Fractional column and Bubble cap tower, Azeotropes.

**Immiscible Liquid Pair:**

Introduction, Principle of steam distillation and its applications, Numericals,

**Unit-4 :****[Teaching Hrs. 15]****Chapter-8 Chemistry of some special compounds of p-block elements**

Oxo acids of Phosphorus ( $\text{H}_3\text{PO}_2$ ,  $\text{H}_3\text{PO}_3$ ,  $\text{H}_3\text{PO}_4$ ,  $\text{H}_3\text{PO}_5$ ,  $\text{H}_4\text{P}_2\text{O}_7$ ,  $\text{H}_4\text{P}_2\text{O}_8$ ,  $\text{H}_4\text{P}_2\text{O}_5$ ,  $\text{H}_4\text{P}_2\text{O}_6$ ,  $\text{HPO}_3$ ,  $(\text{HPO}_3)_3$  and  $(\text{HPO}_3)_n$ , Oxo acids of Sulphur (Sulphurous acid series, Sulphuric acid series, Thionic acid series, Peroxy acid series, Oxo acids of halogen, Oxides of chlorine ( $\text{Cl}_2\text{O}$ ,  $\text{ClO}_2$ ,  $\text{Cl}_2\text{O}_6$ ,  $\text{Cl}_2\text{O}_7$ ) and oxide of iodine ( $\text{I}_2\text{O}_5$ ), Inter-halogen compounds Valence bond and VSEPR approach of following xenon compounds; Oxides of xenon ( $\text{XeO}_3$ ,  $\text{XeO}_4$ ), Fluorides of xenon ( $\text{XeF}_2$ ,  $\text{XeF}_4$ ,  $\text{XeF}_6$ ), Oxy-fluorides of xenon ( $\text{XeOF}_4$ ,  $\text{XeO}_2\text{F}_2$ ,  $\text{XeOF}_2$ )

**Chapter-9 Name Reactions and Rearrangement-I****Name Reaction:**

Reimer-Tiemann, Kolbe's Schmidt, Carbylamine reaction, Hoffmann's exhaustive methylation

**Rearrangement:**

Pinacol-Pinacolone Rearrangement, Fries Rearrangement, Claisen Rearrangement,

**Chapter-10 Nernst Distribution Law**

Introduction, Nernst Distribution Law and its limitations, Modified Nernst Distribution Law [Solute associate in the solvent, Solute dissociate in the solvent, Solute enters into chemical reaction with solvent] Applications, Solvent extraction, Numericals

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**Major-6 : Intermediate Chemistry-206 (Theory)****Unit-1 :****[Teaching Hrs. 15]****Chapter-1 Wave mechanics-I**

Introduction of wave Mechanics, Postulates of wave Mechanics, Interpretation of  $\psi$ ,  $\psi^2$ ,  $\psi\psi^*$ , Derivation of Schrodinger's equation in three dimensions (Cartesian Coordinates), Eigen function & Eigen value, Orthogonal & Normalized wave function, Concept of Molecular Orbital Theory, Characteristic of Molecular Orbital, Wave function of  $\text{H}_2^+$  &  $\text{H}_2$ , Potential energy and Schrodinger's equation for  $\text{H}_2^+$  &  $\text{H}_2$ , Derivation of normalized wave function of  $\text{H}_2^+$  based on M.O.T., Derivation coefficient of wave function of  $sp$ ,  $sp^2$  &  $sp^3$  Hybridization with bond angle.

**Chapter-2 Fertilizer**

Introduction, Plant nutrients and its role, Classification and Properties of fertilizers, Nitrogenous fertilizers:

**Ammonium nitrate:** Manufacture by Prilling method and Stengel method

**Ammonium sulphate:** Manufacture from gypsum (Sindri Process) & Action as fertilizer

**Urea:** Manufacture from Ammonium carbide and Sindri process & Action as fertilizer

**Phosphate fertilizer:** Manufacture of Normal super phosphate and Triple super phosphate

**Ammonium Phosphate:** Manufacture of Mono ammonium phosphate and Diammonium phosphate

**Unit-2 :****[Teaching Hrs. 15]****Chapter-3 Aldehydes and ketones**

Introduction, Constitution of carbonyl group and reactivity, Preparation of aldehydes and ketones; Nucleophilic addition reactions (HCN, Grignard, Alcohol,  $\text{NaHSO}_3$  with mech) Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism; Oxidations and reductions (Clemmensen, Wolff-Kishner,  $\text{LiAlH}_4$ ,  $\text{NaBH}_4$ , with mech);

**Chapter-4 Carboxylic Acids and their Derivatives**

Preparation, Physical properties and reactions of monocarboxylic acids: Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group Mechanism of acidic and alkaline hydrolysis of esters, Claisen condensation, Dieckmann reaction.

### Chapter-5 Active methylene compounds

Keto-enol tautomerism, Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

### Unit-3 :

[Teaching Hrs. 15]

#### Chapter-6 First Law of Thermodynamics

Introduction, Limitations and advantages of Thermodynamics, Types of systems, Properties of system: Intensive and extensive properties, Types of processes, State and path functions, Exact and inexact differential concept of heat, Work and internal energy, First law of Thermodynamics: Statements, Mathematical derivation, Heat absorbed at constant volume, Perpetual machine of first kind, Enthalpy, Heat Capacity: Its types and derivation of relation ( $C_p - C_v = R$ ), Isothermal reversible and irreversible work of ideal gas, Proof of:  $W_{rev} > W_{irr}$  Relations between  $P - V$ ,  $V - T$  and  $T - P$  for Adiabatic process, Adiabatic reversible and irreversible work of ideal gas, Joule Thomson effect, Joule Thomson co-efficient of ideal gas, Zeroth Law (Only Statement and Explanation), Variation of enthalpy with temperature (Kirchhoff Equation), Numericals

#### Chapter-7 Physical Properties and Molecular Structure

##### Introduction

**Types of Physical Properties:** Additive and constitutive properties

**Surface Tension:** Explanation of Surface Tension, Name of methods to determine surface tension, The Drop Weight method

**Parachor:** Macleod Equation and  $P_1/P_2 = V_1/V_2$ , Atomic Parachor, To determine structure of (i) Quinine (ii) Benzene (iii) Isocyanides group (iv) Nitro group

**Viscosity:** Explanation (Briefly), unit and factors affecting the viscosity, Measurement of viscosity (derivation of  $\eta_1 / \eta_2 = d_1 t_1 / d_2 t_2$ ), Ostwald's Viscometer

**Refractive Index and Refractivity:** Introduction, Specific and Molecular Refractivity, Abbe Refractometer, Molecular refractivity and chemical constitution

**Optical Activity:** Polarization of light, Optical activity, Factors affecting angle of rotation, Specific rotation, Polarimeter

**Dipole Moment:** Polar and non-polar molecule, Electric polarization (Polarizability of molecules), The Mosotti Clausius Equation, Kinds of molar polarization [Electron & nuclear polarization, orientation polarization (permanent dipole moment)]; Application of Dipole Moment: Identification of polar and non-polar molecules,

Molecular Structure: Mono atomic molecules, (ii) Diatomic molecules (iii) Triatomic molecules ( $CO_2$ ,  $H_2O$ ,  $SO_2$ ) (iv) Tetratomic molecules ( $NH_3$ ,  $BCl_3$ )

##### Numericals

### Unit-4 :

[Teaching Hrs. 15]

#### Chapter-8 Cement

Introduction, Type of cement, Raw material for manufacture, Cement rock beneficiation, Manufacturing processes of Portland cement, setting and hardening of Portland cement, Properties and uses of cement, Mortar and concrete, curing and decay of concrete, RCC and its advantage

#### Chapter-9 Name Reactions and Rearrangement-II

##### Name Reaction:

Aldol condensation, Cannizzaro reaction, Knoevenagel condensation, Perkin reaction, Wittig reaction, Haloform reaction, Baeyer Villiger oxidation.

##### Rearrangement:

Beckmann rearrangement, Benzil-Benzilic acid rearrangement, Hofmann bromamide degradation.

#### Chapter-10 Phase Equilibrium-II

Two components partially miscible liquid pairs: (1) Maximum critical solution temperature (2) Minimum critical solution temperature (3) Maximum and Minimum critical solution temperature, Influence of impurity on critical solution temperature, Three component partially miscible liquid system, Method of graphical presentation, Types of partially miscible three liquid systems: One partially miscible pair: Effect of adding third component, Nature of tie line, Plait point, Binodal curve, Characteristics of diagram, A is added to binary system, A is constant and B and C varied, Formation of two pairs of partially miscible liquid, Formation of three pairs of partially miscible liquid, Application of ternary liquid diagram.

## Major-7 : Intermediate Chemistry Practical – 207

Unit No.	Syllabi	Teaching Hour
1	<b>Organic Qualitative Analysis [Minimum 15 Practical]</b> <b>[Minimum six bifunctional Organic Compounds should be given]</b> Identification of an organic compound through the functional group analysis and determination of melting point or boiling point (Bifunctional organic compounds)	60
2	<b>Organic Volumetric Estimation:</b> [Standard solution may be prepared by the students/given. Six-Estimations may be given] 1. To determine the amount of -CONH <sub>2</sub> in the given Acetamide solution 2. To determine the amount of Phenol/m-cresol in the given solution 3. To determine the amount of Aniline/p-toludine in the given solution 4. To determine the amount of Ester in the given solution 5. To determine the amount of Glucose in the given solution 6. To determine the amount of - COOH in the given carboxylic acid	24
3	<b>Organic Synthesis: [Minimum 9 syntheses should be done]</b> (Percentage of yield, crystallization, melting point) i. <b>Acetylation / Benzoylation</b> 1. Acetylation of salicylic acid 2. Acetylation of aniline 3. Acetylation of phenol 4. Benzoylation of aniline 5. Benzoylation of phenol ii. <b>Aliphatic Electrophilic substitution</b> 1. Preparation of iodoform from ethanol 2. Preparation of iodoform from acetone iii. <b>Aromatic Electrophilic Substitution</b> <b>Nitration:</b> 1. Preparation of m-dinitrobenzene, 2. Preparation of nitro acetanilide. <b>Halogenation:</b> 1. Preparation of p-bromo acetanilide, 2. Preparation 2:4:6 -tribromo phenol iv. <b>Diazotization / Coupling</b> 1. Preparation of methyl orange 2. Preparation of methyl red v. <b>Oxidation</b> 1. Preparation of benzoic acid from benzaldehyde	36

## MDC-3 : Environmental Biotechnology & Pollution (Theory)

### Unit-1 :

[Teaching Hrs. 15]

#### ECOSYSTEM AND ITS COMPONENT

- 1.1 Terrestrial Biomes: - Deserts, Grasslands, Tundra & Forests and Aquatic Biomes: Freshwater & Saline Ecosystem
- 1.2 Biogeochemical Cycles: Nitrogen, Carbon & Sulfur cycle
- 1.3 Interaction within, between & among populations
- 1.4 Population Ecology, Population characteristics, Models of population growth and Interactions

### Unit-2 :

[Teaching Hrs. 15]

#### ENVIRONMENTAL POLLUTIONS AND ITS REMEDIES

- 2.1 Overview: Biodegradation of Hydrocarbon & Xenobiotics
- 2.2 Biodegradation of DDT, Nitrobenzene
- 2.3 An overview of process of Bioremediation & Biomagnification
- 2.4 Conventional Air Pollutants & Acid rain & Acid mine drainage

**Unit-3 :****[Teaching Hrs. 15]****MICROBIAL APPLICATION IN ENVIRONMENT**

- 3.1 Physical, Chemical & Biological properties of water and waste-water
- 3.2 Primary, Secondary and Tertiary treatment processes
- 3.3 Biofertilizers and Biocontrol
- 3.4 Bioremediation and Bioplastics

**Unit-4 :****[Teaching Hrs. 15]****HORMONES**

- 4.1 Introduction to Hormones: Endocrine and Exocrine
- 4.2 Plant Hormones and its functions
- 4.3 Animal Hormones and its functions
- 4.4 Types of Animal Hormones

**Suggested Reading:**

1. Prescott, Healey and Klein., Microbiology-5<sup>th</sup> International Edition, Tata-McGraw Hill publications, Delhi
2. Richard H. Baltz. Julian E Davies and Arnold L. Demain Manual of Industrial Microbiology and Biotechnology. 3<sup>rd</sup> edition, ASM Press (2010).
3. Daniel Forciniti. Industrial Bioseparation: Principles and practice. 1<sup>st</sup> edition edition, Wiley Blackwell (2008).
4. Reed. G. Prescott and Dunn's Industrial Microbiology. CBS Publishers. (1999).
5. Demain, A. L. Industrial Microbiology and Biotechnology. 2<sup>nd</sup> Edition. (2001).
6. EL Mansi. E.M.T., Fermentation Microbiology and Biotechnology. 2<sup>nd</sup> Edition, CRC Taylor & Francis (2007).
7. Waites, M.J., Morgan, N.L., Rockey, J.S. and Higton, G. Industrial Microbiology: An introduction. Blackwell Science Publishers (2002).
8. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L., Painter, R.K. General Microbiology, 5<sup>th</sup> Edition. MacMillan Press Ltd., London
9. Frobisher M., Hinsdill, Crabtree and Goodherat, Fundamentals of Microbiology, 9<sup>th</sup> Edition. W.B Saunders Co. USA
10. Dubey, R.C. and Maheshwari, D.K., A Text Book of Microbiology, S. Chand Publications, New Delhi.
11. Powar and Dagainawala, General Microbiology Vol-II. Himalaya Publishing House, Mumbai
12. Casida LE, Industrial Microbiology, J. Wiley, (1968).

**MDC-3 : Environmental Biotechnology & Pollution (Practical)**

Sr. No.	Practical	Teaching hours
1	Study yeast cell immobilization in calcium alginate gels	30
2	Study enzyme immobilization by sodium alginate method	
3	Winogradsky column preparation	
4	Estimate the Phosphate content of soil	
5	Determine the pH, temperature and texture of soil	
6	Water holding capacity of soil	
7	Soil moisture by oven drying method	

**SEC-3 : Microbiological Analysis of Air, Water & Soil to Pollution Control (Theory)****Unit-1 :****[Teaching Hrs. 08]****Aero-Microbiology**

- Aero- microbiology: Bioaerosols, Air borne microorganisms (bacteria, Viruses, fungi) and their impact on human health and environment,
- Significance in food and pharma industries and operation theatres, allergens.

**Unit-2 :****[Teaching Hrs. 08]****Water-Microbiology**

- Water borne pathogens, water borne diseases.
- Sample Collection, Treatment and safety of drinking (potable) water, methods to detect potability of water samples:
  - (a) standard qualitative procedure: presumptive/MPN tests, confirmed and completed tests for faecal coliforms
  - (b) Membrane filter technique and Presence/absence tests

**Unit-3 :****[Teaching Hrs. 07]****Control Measures**

- Control Measures: Fate of bioaerosols, inactivation mechanisms – UV light, HEPA filters, desiccation, Incineration.
- Precipitation, chemical disinfection, filtration, high temperature, UV light

**Unit-4 :****[Teaching Hrs. 07]****Soil Microbiology**

- Soil-microbiology: Soil borne pathogens, soil borne diseases, Sampling of soil, sample collection and analysis.
- Isolation and identification of pathogens. Soil testing methods. Soil treatment.

**Suggested Reading:**

1. Medigan, M.T., Martinko, J. M. and Parker, J. Brock Biology of Microorganisms. Pearson Education Inc., New York
2. Alexander, M John. Microbial ecology. Wiley & Sons, Inc., New York.
3. Alexander, M John. Introduction to soil microbiology. Wiley & Sons Inc., New York.
4. Barker, KH, and Herson, D.S. Bioremediation. Mc Craw Hill Inc., New York.
5. Chapelle, F.H. Ground Water Microbiology and Geochemistry. New York: John Wiley & Sons, 2000.
6. K.R. Aneja. Laboratory Manual of Microbiology and Biotechnology New Age Publications. 2014

**SEC-3 : Microbiological Analysis of Air, Water & Soil to Pollution Control (Practical)**

Sr. No.	Practical content	Teaching Hrs.
1.	Chemical analysis of water: Chloride, Hardness, Nitrite Nitrogen, Alkalinity, Acidity, TDS, TSS, TS	30
2.	Isolation and Determination of air flora and air density from indoor & outdoor sources.	
3.	Isolation and identification of coli forms from Water by Presumptive, Confirmed & Completed test.	
4.	Isolation and cultivation of bacteriophage of <i>E.coli</i> from the given sewage sample	
5.	Field Visit to Sewage treatment plant / Forest / Sanctuary / Soil Research Laboratory / Environmental laboratory / GPCB Station and preparation of report	
6.	Study the prevention and control of organism using UV light.	
7.	Study the filtration techniques to study the control of organisms.	

**Suggested reading**

1. Patel. R.J., Patel. K.R., Experimental Microbiology, Vol-I, Aditya Publications, Ahmedabad, India.
2. Patel. R.J., Patel. K.R., Experimental Microbiology, Vol-II, Aditya Publications, Ahmedabad, India.
3. Dubey. R.C., Maheshwari. D.K., Practical Microbiology, S.Chand & Company Ltd., New Delhi
4. Konika Sharma., manual of Microbiology – Tools & Techniques, Ane Books, Delhi.



## AEC-3 : ENGLISH LANGUAGE & GRAMMAR-1

### Table of Contents

Unit No.	Syllabus Contents	Teaching Hours
1	<b>Short stories:</b> The Secret of Culture by Munshi Premchand ( <a href="https://www.arvindguptatoys.com/arvindgupta/ruskin-stories.pdf">https://www.arvindguptatoys.com/arvindgupta/ruskin-stories.pdf</a> ) The Last Question by Issac Asimov ( <a href="https://users.ece.cmu.edu/~gamvrosi/thelastq.html">https://users.ece.cmu.edu/~gamvrosi/thelastq.html</a> ) <b>Essays:</b> Why We Crave Horror Movies by Stephen King ( <a href="https://faculty.uml.edu/bmarshall/lowell/whywecravehorrormovies.pdf">https://faculty.uml.edu/bmarshall/lowell/whywecravehorrormovies.pdf</a> ) Ebooks v paper by Julian Baggini <ul style="list-style-type: none"><li>(<a href="https://www.ft.com/content/53d3096a-f792-11e3-90fa-00144feabdc0#axzz35eMWcGoS">https://www.ft.com/content/53d3096a-f792-11e3-90fa-00144feabdc0#axzz35eMWcGoS</a>)</li></ul>	15
2	<b>Grammar:</b> Active-Passive voices <b>Composition:</b> Report writing <ul style="list-style-type: none"><li>(List of topics has been given)</li></ul>	15

#### Suggested Reading:

1. Intermediate English Grammar: Reference and Practice for South Asian Students by Raymond Murphy. Cambridge University Press
2. Business Communication by Urmila Rai and S.M. Rai. Himalaya Publishing House
3. Effective Technical Communication by M Ashraf Rizvi. Tata Mc Graw hill
4. Spoken English: A Foundation Course by Kamlesh Sadanand and Susheela Punitha (Part I and Part II)

#### Topics for report writing:

1. **Cultural Festivals:** Describe a cultural festival celebrated in your community or country.
2. **Sports Events:** Report on a recent sports event such as a cricket match, football game, or tennis tournament.
3. **Concerts or Music Festivals:** Write about a concert or music festival you attended, describing the performers and atmosphere.
4. **School or University Events:** Report on a school play, science fair, or university lecture.
5. **Art Exhibitions:** Write about an art exhibition you visited, discussing the artworks and artists.
6. **Charity Events:** Report on a charity run, fundraiser, or volunteer activity you participated in.
7. **Film Screenings or Premieres:** Describe a film screening or premiere you attended, discussing the movie and audience reactions.
8. **Science or Technology Conferences:** Write about a conference or expo focused on science, technology, or innovation.
9. **Book Fairs or Literary Events:** Report on a book fair or literary event you attended, discussing authors and books.

## VAC : INDIAN KNOWLEDGE SYSTEM-2(IKS)

### INDIAN MYTHOLOGY : AVATARS

#### Purposes:

1. Students develop social consciousness for the preservation of youth.
2. As the universe moves along the path of innumerable literal impulses.

**Course Objectives:**

- To expose students to rich cultural knowledge of avatars
- To understand myth and message behind each avatar tale
- To understand concept of avatars in modern light
- To spread awareness on Indian knowledge system

**Course Learning Outcomes:**

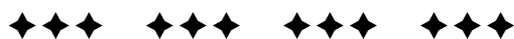
- After completion of the course:
- Students will be able to understand the concept of avatar in Indian mythology.
- Students will be able to identify myths and message behind them.
- Students will be able to understand impact of myth on public life.
- Students will be able to evaluate Indian myths on avatars and their modern retelling.

**Course Contents:**

Unit No.	Syllabi	Teaching Hours
1	<ul style="list-style-type: none"><li>• Matsya avatar</li><li>• Kurma avatar</li><li>• Varah avatar</li><li>• Narsimha avatar</li><li>• Vamana avatar</li></ul>	15
2	<ul style="list-style-type: none"><li>• Parashuram avatar</li><li>• Rama avatar</li><li>• Krishna avatar</li><li>• Buddha avatar</li><li>• Kalki avatar</li></ul>	15

**Suggested Reading:**

1. Mythology of Vishnu and His Incarnations by M. L. Varadpande
2. Indian Mythology by Devdutt Pattanaik
3. Unusual Tales from Indian Mythology by Sudha Murty
4. Indian Mythology: Vedic and Puranic by William Wilkins



# Syllabus of B.Sc.(Honors) Semester - IV

## Major-8 : Intermediate Chemistry-208 (Theory)

### **Unit-1:** **[Teaching Hrs. 15]**

#### **Chapter-1 Basics of Co-ordination chemistry**

Introduction of co-ordination compounds, Double salt, mixed salt and complex compounds, Types of complex compounds, Classification of ligands (Based on charge and denticity),  $\pi$ - acid ligands, Ambidentate ligands, Chelating ligands, Bridge ligands and Flexi dentate ligands, co-ordination number, co-ordination polyhedron, Oxidation number of central metal atom, IUPAC nomenclature of co-ordination compounds, Warner co-ordination theory and its failure, Co-ordination number and geometry related to co-ordination number, Isomerism in co-ordination compounds; 1) Structural isomerism 2) Stereo isomerism

#### **In structural isomerism-**

1) Ionization 2) hydration 3) co-ordination 4) co-ordination positions 5) polymerization 6) linkage isomerism 7) Ligand isomerism,

#### **In stereo isomerism-**

1) Geometrical; Cis-trans isomerism in  $ML_4$  and  $ML_6$  types of complexes  
2) Optical isomerism  
Application of co-ordination compounds in biological systems, analytical chemistry, extraction of gold and silver, purification of metals, industry, and medical field.

#### **Chapter-2 Organometallic compounds**

Introduction, Classification based on nature of M-C Bond and hapticity. Preparation, Properties and uses of Organo lithium compounds and Organo magnesium compounds, Preparation, bonding & structure of (1) Zeise's Salts ( $d\pi-p\pi$ ) bonding, (2) Tri Methyl Aluminium ( $3c-2e$ ) bonding and (3) Ferrocene (Sandwich structure-Moffitt-without orgal diagram).

### **Unit-2:** **[Teaching Hrs. 15]**

#### **Chapter-3 Molecular Symmetry**

Introduction, Symmetry elements and symmetry operations with illustrations, Concept and properties of group, Products of symmetry operation, Symmetry point group classification flow chart [ $C_{av}$ ,  $D_{ah}$ ,  $C_s$ ,  $C_i$ ,  $C_1$ ,  $T_d$ ,  $O_h$ ,  $I_h$ ,  $D_{nh}$ ,  $D_{nd}$ ,  $D_n$ ,  $C_{nh}$ ,  $C_{nv}$ ,  $S_{2n}$ ,  $C_n$ ], Construction of group multiplication tables for  $C_{2v}$ ,  $C_{3v}$  and  $C_{2h}$  point groups, Definition & calculation of Order (h) of point groups.

### **Unit-3:** **[Teaching Hrs. 15]**

#### **Chapter-4 Second Law of Thermodynamics**

Limitations of first law of thermodynamics, Spontaneous process, Carnot cycle and theorem, Statements of second law of thermodynamics, Perpetual machine of second kind (briefly), Concept of entropy and definition of entropy,  $\Delta S$  in reversible & irreversible (spontaneous) process,  $\Delta S$  in ideal gases,  $\Delta S$  of mixture of ideal gas,  $\Delta S$  in physical transformations and heating of the substance, Entropy and second law of thermodynamics, Physical significance of entropy, Numerical based on theory.

#### **Chapter-5 Free Energy and Chemical Equilibrium-I**

Free Energy: its significance and variation with P and T, Work function: Its physical significance and variation with V and T,  $\Delta G$  for ideal gases, Gibbs Helmholtz equation and its applications, Criteria for chemical equilibrium (According to  $\Delta G = \Delta H - T\Delta S$ ), Numerical based on theory.

### **Unit-4:** **[Teaching Hrs. 15]**

#### **Chapter-6 Oils and Fats**

Introduction, Properties of oil and fats, Classification, Hydrogenation of oil: (i) Optimum condition for the hydrogenation process and (ii) Preparation of Nickel catalyst, Process for hydrogenation of oil: (i) Dry process and (ii) Wet process,  
Analysis of oil and fats: (i) Saponification value (ii) Acid value (iii) Iodine value (WIJS method) and (iv) Reichert - Meisel value.

#### **Chapter-7 Stereochemistry**

Difference between Asymmetric-Dissymmetric, Enantiomers-Diastereomers, Methods of Resolution, Racemic modification and its types, Anomers and epimers. Stereochemistry of compounds with 1 and 2 asymmetric carbon atoms (similar and dissimilar) threo, erythro and meso forms and R, S Nomenclature. Conformations of cyclohexane: Explanations of  $\alpha/\beta$  and axial/equatorial bonds, Newmann and conformational projections, comparison of various conformations of cyclohexane w.r.t Shape, Symmetry, intramolecular interactions and relative energy level diagram. Conformations of Methyl cyclohexane: Comparison of relative stability.

## Chapter-8 Free Energy and Chemical Equilibrium-II

Law of active mass, Vant Hoff isotherm (By equilibrium box and chemical potential method), Vant Hoff isochore, Clausius - Clapeyron equation, Numerical based on theory.

# Major-9 : Intermediate Chemistry-209 (Theory)

## Unit-1:

[Teaching Hrs. 15]

### Chapter-1 Wave Mechanics-II

Basic concepts, Operators algebra (addition, subtraction, multiplication), commutative property, linear operator, commutation operator, the operator DEL & DEL SQUERED, momentum operator, Hamiltonian operator, Particle in one dimensional box; Wave equation and energy related to a particle moving in one dimensional box, Energy levels and interpretation of energy equation, Normalization and orthogonally of wave function, Particle in three-dimensional box; Derivation of normalized wave equation, Energy related with it, Degeneracy, Example based on energy of ls orbital, normalization, orthogonally, particle in one and three dimensional box and degeneracy.

### Chapter-2 Soap and Detergent

Introduction, Raw materials for manufacture, Methods for manufacture of soap (i) Batch process (ii) Continuous process Types of soap: Toilet soap, transparent soap, shaving soap, Neem soap, Introduction to detergents, Principal group of synthetic detergents, Bio-degradability of surfactants, Classification of surface-active agents, Anionic detergents, Manufacture of anionic detergents; (i) Oxo Process (ii) Alfol Process, (iii) Welsh Process Cationic detergents, Non - Ionic detergents, amphoteric detergents

## Unit-2:

[Teaching Hrs. 15]

### Chapter-3 Alkaloids

Introduction, Occurrence, Classification and Isolation, General method of proving structure of alkaloids, Constitution, Properties and synthesis of (i) Coniine (ii) Nicotine and (iii) Papaverine

### Chapter-4 Terpenoids

Introduction, Occurrence, Classification, General characteristics of Terpenoids, Isoprene & special Isoprene Rule, Constitution and Synthesis of Citral and  $\alpha$ -Terpineol

### Chapter-5 Name reactions, Rearrangements and Reagent

Reactions: Arndt Eistert reaction and Bischler Napieralski reaction  
Rearrangements: Curtius rearrangement and Benzoin Condensation  
Reagent: Lithium Aluminium hydride  $\text{LiAlH}_4$  and Sodamide

## Unit-3:

[Teaching Hrs. 15]

### Chapter-6 Chemical Kinetics

Concept of Chemical Kinetics, Rate of chemical reaction, Dependence of rate of reaction on concentration, Factors affecting on rate of chemical reaction, Rate law and rate constant, Order of the chemical reaction, Molecularity of elementary & complex reactions, Molecularity versus order of reaction, Zero order reaction, Integrated rate equation of first order reaction, Second order reaction, Methods for determination of order of reaction, Arrhenius equation (Without Derivation), Concept of activation energy. Theories of reaction rate: Collision theory of reaction rate, Absolute rate or activated complex theory, Numericals based on theory.

### Chapter-7 Third law of Thermodynamics

Introduction, Nernst heat theorem, Third law of thermodynamics, Determination of absolute entropies of solids, liquids and gases, Applications of third law of thermodynamics ( $\Delta S^0$ ,  $\Delta G^0$  and equilibrium constant of chemical reaction), Tests of third law of thermodynamics, Residual entropy, Numerical based on theory.

## Unit-4:

[Teaching Hrs. 15]

### Chapter-8 Bio-Inorganic Chemistry

Metalloporphyrin, Structure and roll of Haemoglobin in biological system, Myoglobin, Structure of chlorophyll and its importance, Toxicity of arsenic, mercury, lead and cadmium, Reason for toxicity.

### Chapter-9 Heterocyclic Compounds-I

Classification and nomenclature of mono heterocyclic compound based on size of ring, Aromaticity in 5 membered (Furan, Thiophene and Pyrrole), Preparation of Furan, Thiophene, and Pyrrole, Chemical Properties (Electrophilic Substitution Reaction) of Furan, Thiophene and Pyrrole Nitration, Sulphonation, Acetylation, Chlorination, Reaction with Organometallic Compounds, Aromaticity of Pyridine, Basicity of Pyridine, Relative basicity of Pyridine, Pyrrole and Aliphatic amines Preparation of Pyridine from acetylene, Hantzsch's synthesis, Chemical Properties of Pyridine: Electrophilic and Nucleophilic Substitution Reaction.

## Chapter-10 Partial Molar Properties

Introduction, Definition of partial molar property, Concept of chemical potential, Physical significance (properties) of chemical potential, Derivation of Gibbs-Duhem equation, Variation of chemical potential with temperature and pressure, Determination of partial molar properties by method of intercept, Applications of chemical potential (Henry's law, Raoult's law and Nernst's distribution law), Numerical based on theory.

## Major-10 : Intermediate Chemistry Practical – 210

### Inorganic Qualitative Analysis:

[Minimum fifteen inorganic mixtures should be given]

Qualitative Analysis of an inorganic mixture containing four radicals (Including soluble  $\text{PO}_4^{-3}$ ), [Excluding  $\text{PO}_4^{-3}$  (insoluble),  $\text{CrO}_4^{-2}$ ,  $\text{Cr}_2\text{O}_7^{-2}$ ,  $\text{AsO}_3^{-3}$ ,  $\text{AsO}_4^{-3}$ ,  $\text{BO}_3^{-3}$  and  $\text{S}^{-2}$ ]

### Physicochemical Exercise (Seven exercises may be given)

1. To determine the specific reaction rate of the hydrolysis of methyl acetate / Ethyl acetate catalyzed by  $\text{H}^+$  ion at room temperature.
2. To study the rate of reaction between  $\text{K}_2\text{S}_2\text{O}_8$  and  $\text{KI}$ .
3. To study the rate of reaction between  $\text{KBrO}_3$  and  $\text{KI}$ .
4. To determine the temperature coefficient and Energy of activation for the hydrolysis of ester at two different temperatures.
5. To determine the temperature coefficient and Energy of activation for the reaction between  $\text{K}_2\text{S}_2\text{O}_8$  and  $\text{KI}$  at two different temperatures
6. To determine the rate of adsorption of the given organic acid using animal charcoal.
7. Distribution Law: To study the partition co-efficient of benzoic acid between water and benzene / kerosene and hence study the molecular condition of benzoic acid in the solution.
8. To study the partition co-efficient of acetic acid between water and chloroform and hence study the molecular condition of acetic acid in the solution.

### Inorganic Volumetric Analysis [Eight estimations should be given]

#### i. Iodometry and Iodimetry

- (a) Estimation of  $\text{Cu}^{+2}$  and  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  in the given  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  using 0.05N  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$  solution.
- (b) Estimation of  $\text{As}^{+3}$  and  $\text{As}_2\text{O}_3$  in the given  $\text{As}_2\text{O}_3$  using 0.05N  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$  solution.

#### ii. Complexometric titration:

1. Estimation of the amount of  $\text{Ni}^{+2}$  in the given  $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$  solution using 0.02 N EDTA solutions.
2. Estimation of the amount of  $\text{Mg}^{+2}$  and  $\text{Pb}^{+2}$  in the given solution containing a mixture of  $\text{Mg}^{+2}$  and  $\text{Pb}^{+2}$  using 0.02 N EDTA solution
3. Estimation of the amount of  $\text{Ca}^{+2}$  and  $\text{Zn}^{+2}$  in the given solution containing a mixture of  $\text{Ca}^{+2}$  and  $\text{Zn}^{+2}$  using 0.02 N EDTA solution
4. Estimation of the amount of  $\text{Fe}^{+3}$  and  $\text{Cr}^{+3}$  in the given solution containing a mixture of  $\text{Fe}^{+3}$  and  $\text{Cr}^{+3}$  using 0.02 N / 0.01 M  $\text{Pb}(\text{NO}_3)_2$  and 0.02 N / 0.01 M EDTA solution.

#### iii. Redox titration

1. Determination of the amount of  $\text{NO}_2^{-1}$  in the given  $\text{NaNO}_2$  or  $\text{KNO}_2$  solution by reduction method using 0.1 N  $\text{KMnO}_4$  solutions.

#### iv. Water Analysis

1. To determine the amount of chloride in the given sample of water using 0.02 N  $\text{AgNO}_3$ .

v. To determine the purity of  $\text{NaHCO}_3$  in the given sample.

## **Minor-03 : Environmental Microbiology & Microbial Ecology (Theory)**

### **Unit-1 :**

**[Teaching Hrs. 15]**

#### **Microbes in Environment**

- Terrestrial Environment: Soil profile and soil microflora.
- Aquatic Environment: Microflora of fresh water and marine habitats.
- Atmosphere: Mendelian Laws of inheritance Aero microflora and dispersal of microbes.
- Animal Environment: Microbes in/on human body (microbiomics) & animal (ruminants) body.
- Extreme Habitats: Extremophiles: Microbes thriving at high & low temperatures, pH, highly osmotic & osmotic pressures, salinity, & low nutrient levels.

### **Unit-2 :**

**[Teaching Hrs. 15]**

#### **Waste Management**

- Solid Waste management: Sources and types of solid waste, Methods of solid waste disposal (composting and sanitary landfill).
- Liquid waste management: Composition and strength of sewage (BOD and COD), Primary, secondary (oxidation ponds, trickling filter, activated sludge process and septic tank) and tertiary sewage treatment.

### **Unit-3 :**

**[Teaching Hrs. 15]**

#### **Microbial Treatments and Technique**

- Principles and degradation of common pesticides, organic (hydrocarbons, oil spills) and inorganic (metals) matter, biosurfactants.
- Treatment and safety of drinking (potable) water, methods to detect potability of water samples:  
(a) Standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms  
(b) Membrane filter technique Presence/absence tests.

### **Unit-4 :**

**[Teaching Hrs. 15]**

#### **Biogeochemical Cycles**

- Carbon cycle: Microbial degradation of cellulose, hemicelluloses, lignin and Chitin.
- Nitrogen cycle: Nitrogen fixation, ammonification, nitrification, denitrification and nitrate reduction.
- Phosphorus cycle: Phosphate immobilization and solubilisation.
- Sulphur cycle: Microbes involved in sulphur cycle
- Other elemental cycles: Iron and manganese

#### **Suggested Reading:**

1. Medigan, M.T., Martinko, J. M. and Parker, J. Brock Biology of Microorganisms. Pearson Education Inc., New York
2. Alexander, M John. Microbial ecology. Wiley & Sons, Inc., New York.
3. Alexander, M John. Introduction to soil microbiology. Wiley & Sons Inc., New York.
4. Barker, KH, and Herson, D.S. Bioremediation. Mc Craw Hill Inc., New York.
5. Pelczar, MJ Chan ECS and Krieg NR, Microbiology McGraw-Hill.

## **Minor-03 : Environmental Microbiology & Microbial Ecology (Practical)**

Sr. No.	Practical content	Teaching Hrs.
1	Analysis of soil pH, moisture content, water holding capacity, percolation, capillary action.	30
2	Isolation of microbes (bacteria & fungi) from soil (30 & 45C).	
3	Isolation of microbes (bacteria & fungi) from rhizosphere and rhizoplane.	
4	Assessment of microbiological quality of water.	
5	Determination of BOD of wastewater sample.	
6	Study the presence of microbial activity by detecting (qualitatively) enzymes (dehydrogenase, amylase, urease) in soil.	
7	Isolation of Rhizobium from root nodules.	
8	Estimation of protein	

**Suggested reading:**

1. Patel. R.J., Patel. K.R., Experimental Microbiology, Vol-I, Aditya Publications, Ahmedabad, India.
2. Patel. R.J., Patel. K.R., Experimental Microbiology, Vol-II, Aditya Publications, Ahmedabad, India.
3. Dubey. R.C., Maheshwari. D.K., Practical Microbiology, S. Chand & Company Ltd., New Delhi
4. Konika Sharma., manual of Microbiology – Tools & Techniques, Ane Books, Delhi.

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**SEC-4 : Chromatographic Techniques (Theory)****Unit-1 :****[Teaching Hrs. 7]****Chromatography:**

Introduction, Classification of chromatography - types of chromatography, Principle of Chromatography

**Column chromatography:** Principle, Adsorbents, Preparation of column, Method, Separation of green leaf pigment,

**Paper chromatography:** Introduction, Principle, Types of Paper Chromatography (Ascending and Descending, Two dimensional; Circular), Migration parameters( $R_f$  value and  $R_x$  value), Spotting and Visualization. Separation of amino acids and metal ions ( $Fe^+$ ,  $Co^{+2}$ ,  $Ni^{+2}$ ) mixture using spray reagent ninhydrine and aniline phthalate

**TLC:** Introduction, Principle, Method of preparation of chromplate, Experimental techniques, Superiority of TLC over other chromatographic Techniques, Application of TLC.

**Unit-2 :****[Teaching Hrs. 7]**

**Gas chromatography:** Introduction, Types, Principle of GLC and GSC, Instrumentation, Carrier gas and Solvent, Column and Detectors (Briefly), Advantages of gas chromatography

Ion Exchange chromatography: Introduction, Definition and Principle, Type of resins, Properties of ion exchange resins, Factors affecting separation of ions, Ion exchange capacity, Applications (Removal of interfering ion, Softening of water, Demineralization of water, Separation of lanthanides)

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**SEC-4 : Chromatographic Techniques (Practical)****Chromatography :-****[Teaching Hrs. 30]****Atleast six practicals may be given.**

1. To determine  $R_f$  value of individual amino acids in a mixture of amino acid by ascending paper chromatography.
2. To determine  $R_f$  value of individual and mixture of amino acid by circular paper chromatography.
3. To determine  $R_f$  value of individual and mixture of amino acid by thin layer chromatography (TLC).
4. To determine  $R_f$  value of individual and mixture of metal ions by ascending paper chromatography.
5. To determine  $R_f$  value of individual and mixture of metal ions by circular paper chromatography.
6. To determine  $R_f$  value of individual and mixture of two sugars by ascending paper chromatography.
7. Separation of a mixture of o-and p-nitrophenol or o-and p-aminophenol by thin layer chromatography (TLC)
8. Separation and identification of the monosaccharides present in the given mixture (glucose & fructose) by paper chromatography. Reporting the  $R_f$  values.

**Suggested Reading:**

1. Principles of Inorganic chemistry – Puri, Sharma & Kalia
2. Concise Inorganic Chemistry - J. D. Lee
3. Advanced Inorganic Chemistry- Cotton and Wilkinson
4. Basic Inorganic Chemistry - Gurdeep & Chatwal
5. Organic Chemistry (Volume I, II & III) by S.M. Mukherji, S.P. Singh and R.P. Kapoor
6. Engineering Chemistry by Jain and Jain
7. Industrial Chemistry by B.K. Sharma
8. Handbook of practical chemistry by shubhash and satish
9. Thin Layer Chromatography by Egal Stall
10. Chromatographic separation by Tata McGraw Hill
11. A Textbook of Quantitative Inorganic Analysis by A. I. Vogel
12. Inorganic qualitative analysis by Vogel and Gehani Parekh
13. Reigel's Handbook of Industrial Chemistry by James A. Kent

14. Fundamental of Analytical Chemistry by Skoog and West
15. Instrumental Methods of Chemical Analysis by B. K. Sharma
16. Instrumental Method of Chemical Analysis by Chatwal Anand
17. Analytical Chemistry by Dick
18. Electrometric Methods of Analysis by Browning
19. Principle of Instrumental Methods of Analysis by Skoog.
20. Mikes, O. & Chalmes, R.A. Laboratory Hand Book of Chromatographic & Allied Methods, Elles Harwood Ltd. London.
21. Ditts, R.V. Analytical Chemistry – Methods of separation.
22. Jack T. Ballinger; Gersshon J. Shugar. Chemical Technicians' Ready Reference Hand bok, 5<sup>th</sup> Edition, 2011, ISBN:9780071745925, The McGraw-Hill com, Incpanies

## AEC-4 : ENGLISH LANGUAGE & GRAMMAR-2

### Table of Contents

Unit No.	Syllabus Contents	Teaching Hours
1	<b>Short stories:</b> <ol style="list-style-type: none"> <li>1. The Story of an Hour by Kate Chopin (<a href="https://archive.vcu.edu/english/engweb/webtexts/hour/">https://archive.vcu.edu/english/engweb/webtexts/hour/</a>)</li> <li>2. The Seventh Pullet by H. H. Munro (Saki) (<a href="https://www.arvindguptatoys.com/arvindgupta/ruskin-stories.pdf">https://www.arvindguptatoys.com/arvindgupta/ruskin-stories.pdf</a>)</li> </ol> <b>Essays:</b> <ol style="list-style-type: none"> <li>1. On the Phenomenon of Bullshit Jobs: A Work Rant by David Graeber (<a href="https://www.strikemag.org/bullshit-jobs/">https://www.strikemag.org/bullshit-jobs/</a>)</li> <li>2. The Medium Really is the Message by Ezra Klein (<a href="https://www.nytimes.com/2022/08/07/opinion/media-message-twitter-instagram.html">https://www.nytimes.com/2022/08/07/opinion/media-message-twitter-instagram.html</a>)</li> </ol>	15
2	<b>Comprehension:</b> Proverbs <b>Composition:</b> Essay writing <ul style="list-style-type: none"> <li>• (List of topics has been given)</li> </ul>	15

#### Suggested Reading:

1. Intermediate English Grammar: Reference and Practice for South Asian Students by Raymond Murphy. Cambridge University Press
2. Business Communication by Urmila Rai and S.M. Rai. Himalaya Publishing House
3. Effective Technical Communication by M Ashraf Rizvi. Tata Mc Graw hill
4. Spoken English: A Foundation Course by Kamlesh Sadanand and Susheela Punitha (Part I and Part II)

#### List of topics for essay writing: (in 350 to 450 words)

- ✓ **Personal Topics:**
- ✓ **The Influence of Family on My Life:** Discuss how your family has impacted your values, beliefs, and aspirations.
- ✓ **A Memorable Travel Experience:** Describe a memorable trip you've taken and its impact on your perspective.
- ✓ **My Dreams and Ambitions:** Reflect on your dreams and aspirations for the future and how you plan to achieve them.
- ✓ **Critical Topics:**
- ✓ **The Impact of Social Media on Society:** Analyze the effects of social media on individuals and communities.
- ✓ **Media Influence on Body Image:** Critically examine the portrayal of body image in the media and its impact on self-esteem.
- ✓ **The Impact of online shopping on the lifestyle:** Critically evaluate the consequences of online shopping on the individuals and society.



### Contemplative Topics:

- **The Meaning of Success:** Contemplate what success means to you and how you measure it.
- **Embracing Change:** Reflect on the inevitability of change and how to adapt to it.
- **The Beauty of Simplicity:** Reflect on the value of simplicity in a complex world.

### List of Proverbs:

1. A bird in the hand is worth two in the bush.
2. Absence makes the heart grow fonder.
3. Actions speak louder than words.
4. All good things must come to an end.
5. All is fair in love and war.
6. All that glitters is not gold.
7. An apple a day keeps the doctor away.
8. As you sow, so shall you reap.
9. Beggars can't be choosers.
10. Better late than never.
11. Better safe than sorry.
12. Birds of a feather flock together.
13. Blood is thicker than water.
14. Charity begins at home.
15. Cleanliness is next to godliness.
16. Curiosity killed the cat.
17. Don't bite the hand that feeds you.
18. Don't count your chickens before they hatch.
19. Don't cry over spilled milk.
20. Don't put all your eggs in one basket.
21. Easy come, easy go.
22. Every cloud has a silver lining.
23. Every dog has its day.
24. Every man for himself.
25. Fortune favors the bold.
26. Haste makes waste.
27. Honesty is the best policy.
28. If the shoe fits, wear it.
29. If you can't beat them, join them.
30. Ignorance is bliss.
31. It's never too late to learn.
32. It's raining cats and dogs.
33. Kill two birds with one stone.
34. Let sleeping dogs lie.
35. Money doesn't grow on trees.

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### **VAC-2 : AGRI. ENGINEERING** **(ENVIRONMENTAL SCIENCE-2)**

#### હેતુઓ:-

- વિદ્યાર્થીઓ પર્યાવરણ સંરક્ષણનું મહત્વ સમજે
- વિદ્યાર્થીઓ પ્રાકૃતિક સંપત્તિનું મહત્વ સમજી અને તેનો વિવેકપૂર્વક ઉપયોગ કરવાની સમજ કેળવે.
- વિદ્યાર્થીઓ પ્રદૂષણ વિષે ખ્યાલ મેળવે.
- વિદ્યાર્થીઓ પર્યાવરણના સામાજિક પ્રશ્નોથી માહિતગાર બને.

#### ક્ષમતાઓ:-

- વિદ્યાર્થીઓ પર્યાવરણના જુદા જુદા ઘટકો વિષે સમજાવી શકે.
- વિદ્યાર્થીઓ પર્યાવરણમાં જન જાગૃતિ કઈ રીતે કરી શકાય તે સમજાવી શકે.
- વિદ્યાર્થીઓ પર્યાવરણ માટેના જુદા જુદા ભીત સૂત્રો લખી શકે.
- વિદ્યાર્થીઓ પર્યાવરણના પ્રદૂષણો વિષે સમજાવી શકે.

**Course Contents:**

Unit No.	Syllabi	Teaching Hours
1	પર્યાવરણીય પ્રદૂષણ, વ્યાખ્યા, પ્રકારો 1. વાયુ પ્રદૂષણ, કારણો, અસર અટકાવવાના ઉપાયો 2. જળ પ્રદૂષણ, કારણો, અસર અટકાવવાના ઉપાયો 3. ધ્વનિ પ્રદૂષણ, કારણો, અસર અટકાવવાના ઉપાયો	15
2	પર્યાવરણ અને સામાજિક પ્રશ્નો 1. વસ્તી વધારો અને પર્યાવરણ શહેરીકરણ 2. શહેરીકરણ અને ઉર્જા 3. પર્યાવરણ અને આરોગ્ય, HIV/AIDS 4. સામાજિક વનીકરણ	15

**Suggested Reading:**

1. પર્યાવરણશાસ્ત્ર – બીપીનભાઈ જોશી
2. પર્યાવરણ અને ભૂકંપ ઈજનેરી – ડો.
3. જંગલોની મુલાકાત લઈ અભ્યાસ કરવો.
4. Ecology and Environmental – P. D. Sharma Rastogi

**Evaluation Scheme and Distribution of Marks****Paper Style (For the Subject with Credit 2)**

Ques. No.	Particulars	From which Unit	Marks
1	Questions (Any Two Out of Four)	1	10
2	Questions (Any Two Out of Four)	1	10
3	Questions (Any Two Out of Four)	From each Unit	05
<b>Total Marks</b>			<b>25</b>

**Paper Style (For the Subject with Credit 4)****(Major/Minor/MDC Paper Evaluation Scheme and Distribution of marks)**

EXTERNAL ASSESSMENT BY UNIVERSITY		
Que. No.	Particulars	Marks
Q-1	Questions from Unit-1 (Any Two out of Four)	10
Q-2	Questions from Unit-2 (Any Two out of Four)	10
Q-3	Questions from Unit-3 (Any Two out of Four)	10
Q-4	Questions from Unit-4 (Any Two out of Four)	10
Q-5	Questions from Unit-5 (Any Two out of Four)	10
<b>Total Marks</b>		<b>50</b>