

# College of Computer, Science & Information Technology - Junagadh

AFFILIATED TO BHAKTA KAVI NARSINH MEHTA UNIVERSITY



◆ Syllabus ◆

## Bachelor of Science

[ Microbiology, Biotechnology, Chemistry ]

[ Semester – III & IV ]

Academic Year : 2020 – 21

( Effective from June – 2019 )



◀ **ADDRESS : C.C.S.I.T. - JUNAGADH** ▶

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**SYLLABUS PATTERN OF BACHELOR OF SCIENCE  
MICROBIOLOGY/BIOTECHNOLOGY/CHEMISTRY  
[CBCS]**

(SEMESTER-III)					
Subject code	Subject Name	Credit	Int. Marks	Ext. Marks	Total Marks
MB-301	Microorganisms : Classification & Significance (TH)	4	30	70 (14x5)	100
MB-301	Microorganisms : Classification & Significance (PR)	3	15	35	50
BT-301	Metabolism of Biomolecules (TH)	4	30	70 (14x5)	100
BT-301	Metabolism of Biomolecules (PR)	3	15	35	50
C-301	Chemistry (TH)	4	30	70 (14x5)	100
C-301	Chemistry (PR)	3	15	35	50
English	Foundation of English	3	30	70 (14x5)	100
<b>Total Credits</b>		<b>30</b>	<b>Total Marks</b>		<b>550</b>

(SEMESTER-IV)					
Subject code	Subject Name	Credit	Int. Marks	Ext. Marks	Total Marks
MB-401	Applied Microbiology [Theory]	4	30	70 (14x5)	100
MB-401	Applied Microbiology [Practical]	3	15	35	50
BT-401	Environmental Biotech. & Biostatistics [Theory]	4	30	70 (14x5)	100
BT-401	Environmental Biotech. & Biostatistics [Practical]	3	15	35	50
C-401	Chemistry(Theory)	4	30	70 (14x5)	100
C-401	Chemistry(Practical)	3	15	35	50
English	Foundation of English	3	30	70 (14x5)	100
<b>Total Credits</b>		<b>30</b>	<b>Total Marks</b>		<b>550</b>

**Structure of Theory Examination Paper – External**

Question Paper contains 5 Questions (each of 14 marks). Every Question is divided in four parts like (a), (b), (c) and (d). Every Question will be asked from corresponding unit as specified in the syllabus of each course. (i.e. Question-1 is from Unit No. 1 and remaining questions from their corresponding Units).

**TOTAL MARKS : 70, TOTAL TIME : 2½ HOURS**

**General Instructions:**

1. Time duration of each theory paper will be of Two and Half hours.
2. Total marks of each theory paper will be 70 marks.
3. There will be five questions.
4. All questions are compulsory.

**Instructions to the candidates for Practical Examination:-**

1. Practical Exam. would be conducted for 1 ½ days, All the students have to remain present at the examination center 15 minutes before the scheduled time for examination.
2. Students have to carry with them certified Journal, I – card, Examination Receipt, and other necessary requirements for examination.
3. Student should not leave the laboratory without the permission of examiner.
4. Use of calculator is allowed but the use of mobile phones is strictly prohibited.
5. The candidate has to leave the laboratory only after the submission of all the answer sheets of the exercises performed.

## **B.Sc. SEMESTER – III**

### **MB-301 : MICROORGANISMS : CLASSIFICATION AND SIGNIFICANCE** **(Theory)**

#### **UNIT-1**

**(TEACHING HOURS-12, MARKS-14)**

##### **INTRODUCTION TO MICROBIAL DIVERSITY**

- 1.1 Introduction to Biodiversity- Microbial evolution and diversity
- 1.2 Microbial Taxonomy: Introduction and overview
- 1.3 Classification systems - Taxonomic ranks of microorganisms
- 1.4 Major characteristics used in taxonomy
- 1.5 Phylogeny- Survey of Prokaryotic Phylogeny and Phylogenetic Groups of Eukaryotes
- 1.6 Introduction to metagenomics

##### **Reference Books: (SEMESTER 3 UNIT-1)**

1. Prescott, Healey and Klein., Microbiology-5<sup>th</sup> International Edition, Tata-McGraw Hill publications, Delhi
2. Atlas. R.M., Principles of Microbiology-2<sup>nd</sup> Edition
3. Modi, H.A. Elementary Microbiology - Vol -I, Akta Prakashan, Nadiyad

#### **UNIT-2**

**(TEACHING HOURS-12, MARKS-14)**

##### **PROKARYOTIC DIVERSITY**

- 2.1 Introduction to Archaea and Eubacteria
- 2.2 Gram negative bacteria – General features of:  
Aerobic/Microaerophilic motile, helical vibrioid Non-motile curved bacteria Aerobic/Microaerophilic rods and cocci Facultative anaerobes – rods, curved and helical Dissimilatory Sulfate reducers Anaerobic cocci Phototrophic bacteria
- 2.3 Gram positive bacteria – General features of: Endospore forming rods and cocci Asporogenous rods Mycobacteria and Actinomycetes
- 2.4 Extremophilic Microorganisms

##### **Reference Books : (SEMESTER 3 UNIT-2)**

1. Prescott, Healey and Klein., Microbiology-5<sup>th</sup> International Edition, Tata-McGraw Hill publications, Delhi
2. Atlas. R.M., Principles of Microbiology- 2<sup>nd</sup> Edition
3. Modi, H.A. Elementary Microbiology - Vol -I, Akta Prakashan, Nadiyad
4. Pelczar, M.J., Chan E.C.S., Krieg, N.R., Microbiology, 5 Edition. Tata McGraw Hill Publication Co. Ltd. New Delhi.
5. Tortora, Funke & Case. Microbiology-An Introduction, 8<sup>th</sup> Edition, Pearson Education, Delhi.
6. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L., Painter, R.K. General Microbiology, 5<sup>th</sup> Edition. MacMillan Press Ltd., London.
7. Salle, S.J. Fundamental Principles of Bacteriology, Tata McGraw Hill Publication Co. Ltd. New Delhi.
8. Frobisher M., Hinsdill, Crabtree and Goodherat, Fundamentals of Microbiology 9<sup>th</sup> Edition. W.B Saunders Co. USA.

#### **UNIT-3**

**(TEACHING HOURS-12, MARKS-14)**

##### **EUKARYOTIC DIVERSITY**

###### **A: FUNGI:**

- 3.1 General characteristics – Definition, occurrence, Structure, Reproduction
- 3.2 Classification and introduction to major divisions of Fungi
- 3.3 Economic importance of fungi

###### **B: ALGAE:**

- 3.4 General Characteristics – Definition, Occurrence, Ultra – Structure, Reproduction
- 3.5 Economic importance of Algae

###### **C: PROTOZOA:**

- 3.6 General Characteristics – Definition, Occurrence, Ultra – Structure, Reproduction
- 3.7 Economic importance of Protozoa

##### **Reference Books : (SEMESTER 3 UNIT-3)**

1. Prescott, Healey and Klein., Microbiology-5<sup>th</sup> International Edition, Tata-McGraw Hill publications, Delhi

2. Atlas. R.M., Principles of Microbiology-2<sup>nd</sup> Edition
3. Modi, H.A. Elementary Microbiology - Vol -I, Akta Prakashan, Nadiyad
4. Pelczar, M.J., Chan E.C.S., Krieg, N.R., Microbiology, 5<sup>th</sup> Edition. Tata McGraw Hill Publication Co. Ltd. New Delhi.
5. Dubey, R.C. and Maheshwari, D.K., A Text Book of Microbiology, S. Chand Publications, New Delhi.
6. Powar and Daginawala, General Microbiology Vol-II. Himalaya Publishing House, Mumbai.

#### UNIT-4

(TEACHING HOURS-12, MARKS-14)

#### AKARYOTIC DIVERSITY(VIRUSES)

- 4.1 Introduction and General Characteristics: Definition, Structure, Classification
- 4.2 Cultivation and Enumeration of Viruses
- 4.3 Bacterial Viruses:  
Classification, Lytic life cycle (T4 phage), lysogenic life cycle (Lambda phage)
- 4.4 Introduction to Animal Viruses:  
Classification, Replication, Cytocidal effects, Viruses and Cancer, Prions
- 4.4 Introduction to Plant Viruses:  
Classification, Structure & Replication of TMV, Economic importance, Viroids

#### Reference Books : (SEMESTER 3 UNIT- 4)

1. Prescott, Healey and Klein., Microbiology-5<sup>th</sup> International Edition, Tata-McGraw Hill publications, Delhi
2. Atlas. R.M., Principles of Microbiology- 2<sup>nd</sup> Edition
3. Mani, A., Selwaraj, A.M., Narayanan L.M., and Arumngam, N., Microbiology, Saras Publication, Delhi
4. Pelczar, M.J., Chan E.C.S., Krieg, N.R., Microbiology, 5<sup>th</sup> Edition. Tata McGraw Hill Publication Co. Ltd. New Delhi.
5. Harmeet Kaur, Encyclopedia of Microbiology, Anmol Publication, Delhi

#### UNIT-5

(TEACHING HOURS-12, MARKS-14)

#### SIGNIFICANCE OF MICROORGANISMS IN NATURE

- 5.1 Biomagnification of pesticides and Bioremediation
- 5.2 Biodeterioration of Paper, Textiles, paints, woods & metals and its control
- 5.3 Microbial Air Pollution & Air Sanitation
- 5.4 Bioleaching of metals and Microbial enhanced oil recovery
- 5.5 Biofuels
- 5.6 Bioplastics

#### Reference Books : (SEMESTER 3 UNIT 5)

1. Environmental microbiology by Rania Maier, Academic Press
2. Atlas. R.M., Principles of Microbiology- 2<sup>nd</sup> Edition
3. Biotechnology by Smith, Oxford University Press
4. Pelczar, M.J., Chan E.C.S., Krieg, N.R., Microbiology, 5<sup>th</sup> Edition. Tata McGraw Hill Publication Co. Ltd. New Delhi.
5. Biotechnology fundamental & applications By Purohit S.S.

### **MB-301 : MICROORGANISMS : CLASSIFICATION & SIGNIFICANCE** **(PRACTICAL)**

**Practical Hours - 3 hrs/day for 2 days/Week = Total 6 hours/Week**

1. Isolation of Gram negative bacteria from the given sample.
2. Identification of Gram negative bacteria from the given pure culture using biochemical media (*E.coli*, *Enterobacter aerogenes*, *Proteus*, *Salmonella*)
3. Isolation of Gram positive bacteria from the given sample.
4. Identification of Gram positive bacteria from the given pure culture using biochemical media (*Bacillus megaterium*, *Bacillus subtilis*, *staphylococcus aureus*, *Streptococcus*)
5. Identification of Fungi on the basis of Morphological Characteristics.
6. Cultivation of yeast from different natural samples and its morphological characterization using microscopic observation.
7. Microscopic observation of different algae from the given samples.

8. Microscopic observation of different protozoa from the given sample.
9. Isolation and cultivation of bacteriophage of *E.coli* from the given sewage sample.
10. Chemical analysis of water: Chloride, Hardness, Nitrite Nitrogen, Alkalinity, Acidity, TDS, TSS, TS
11. Determination of air flora and air density from indoor & outdoor sources
12. Field Visit to Sewage treatment plant / Forest / Sanctuary / Soil Research Laboratory / GPCB Station and preparation of report

**Reference Books : (SEMESTER 3 PRACTICAL)**

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

**BT-301 : METABOLISM OF BIOMOLECULES (Theory)**

**Unit-1:- ENZYME**

**(credit-0.8)**

- 1.1 Enzymes:- General properties, Nomenclature and Classification. Biocatalyst and Chemical Catalyst, Coenzymes, Cofactors, Isoenzyme and Allosteric Enzyme
- 1.2 Catalytic Mechanism (Proximity and Orientation effects, Acid base Catalysis, Covalent Catalysis and Metal ion catalysis and Transition state analog)
- 1.3 Enzyme Kinetics (derivation of Michaelis-Menten constant, linear transformation of the equation)
- 1.4 Enzyme Inhibition: Mechanism and Types (Irreversible and Reversible)
- 1.5 Mechanism of Enzyme Regulation: Covalent and Allosteric Regulation

**UNIT-2:- METABOLISM – 1**

**(credit-0.8)**

- 2.1 Carbohydrate Metabolism: Glycolysis, fate of pyruvate
- 2.2 Carbohydrate Metabolism: TCA
- 2.3 Carbohydrate Metabolism: Gluconeogenesis and HMP
- 2.4 Lipid Metabolism:  $\beta$ -oxidation of fatty acids
- 2.5 ETC and Oxidative Phosphorylation

**UNIT-3:- METABOLISM – 2**

**(credit-0.8)**

- 3.1 Protein Metabolism: Transamination, Decarboxylation and Deamination
- 3.2 Protein Metabolism: Urea Cycle
- 3.3 Biosynthesis of Nucleic Acid
- 3.4 Photosynthesis
- 3.5 Inborn Errors of Metabolism

**UNIT-4:- HORMONES**

**(credit-0.8)**

- 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
- 4.5 Disorders due to hormonal imbalance in humans

**UNIT-5:- MOLECULAR TRANSPORTATION AND SIGNALING**

**(credit-0.8)**

- 5.1 Composition and architecture of membrane
- 5.2 Solute transport across membrane
- 5.3 Signal transduction cascade
- 5.4 Regulation of cell cycle by protein kinase
- 5.5 Role of signal transduction by hormones

**BT-301 : METABOLISM OF BIOMOLECULES (Practical)**

**LIST OF Practical**

- Exp.1. To demonstrate working operations of spectrophotometer.
- Exp.2. Estimation of Protein by Biuret method.
- Exp.3. Estimation of Reducing Sugar by Nelson- Somogyi method
- Exp.4. Estimation of Nucleic Acid (DNA and RNA)

- Exp. 5, 6, 7 Assaying of various enzymes (any three):
- Amylases by KI-I2 method.
  - Phenol oxidase (Potato).
  - Phosphatases
  - Urease.
  - Invertase by GOD/POD and DNSA method.
  - Proteolytic enzymes (Trypsin or Pepsin).
  - Lipases (Germinating castor seeds).
- Exp. 8, 9, 10 Enzyme Kinetics:
- Effect of Substrate concentration (Determination of Km and Vmax).
  - Effect of pH and temperature on enzyme activity
  - Effect of Enzyme inhibitors on enzyme activity
- Exp. 11 One day Field visit.

#### LIST OF INSTRUMENTS

- |   |                 |
|---|-----------------|
| 1. pH Meter                             | 2. Hot Air Oven |
| 3. Weigh Balance                        | 4. Water Bath   |
| 5. Refrigerator                         | 6. Autoclave    |
| 7. Spectrophotometer and/or Colorimeter | 8. Incubator    |
| 9. Stirrer                              | 10. Centrifuge  |
| 11. Vortex                              |                 |

#### LIST OF REFERENCES

- Lenhinger. Principles of Biochemistry, Nelson & Cox, 4th Edition.
- Voet&Voet Donald. 3rd Edition. Fundamentals of Biochemistry, J/W.
- Mathews, Van Holde, Biochemistry, 3rd Edition Pearson Education.
- Garret and Grisham, Biochemistry, Thomsan Edition, 3rd Edn.
- U Satyanarayan, Biochemistry, 3rd Edn, Books and Allied Pvt. Ltd.
- Salisbury and Rose, Plant Physiology, 4th Edn, Wadsworth Pub.
- Arthur M. Lask, Introduction to Protein Science, Oxford publication.
- Stryer – Biochemistry. W.H.Freeman& Co.
- Curriculum: B.Sc. Biotechnology, Semester I &II.
- Saurashtra University, Rajkot, Gujarat (INDIA)10 of 17
- Price & Steven, Fundamentals of Enzymology,3rd Edition
- Cohn and Stumph. Outline of Biochemistry. Wiley eastern.
- Creighton, proteins: Structure & Molecular Properties, Freeman Pub.
- Zube's Biochemistry.4th Edition Macmillan.
- Switzer and Garrity. Experimental Biochemistry WH Freeman. 2nd Edition
- Hames and Hooper. 2000. Instant notes in Biochemistry. BIOS Sci. Publ.
- Smith G.Biotechnology. Cambridge Univ. Press.
- Geoffrey Cooper. The cell with CD- Rom. SinauerAsso. Incorp.
- Elliott & Elliot.3rd Edition Biochemistry and molecular biology.
- Seidman and Moore. 2000. Basic laboratory methods for biotechnology. Longman
- Boyer, Concepts in biochemistry. Thomson
- A.V.S.S. Rama Rao, A Text book of Biochemistry, , UBS Publisher
- S.R. Thimmaiah, Standard methods in Biochemical Analysis, Kalayani Pub.
- Sawhney and Randhir Singh, Introductory Practical Biochemistry, Narosa Pub.
- BeeduSashidar Rao & Vijay Deshpande, Experimental Biochemistry, I K Int. Pvt. Ltd.
- Plummer. An introduction to practical Biochemistry, 3rd Edition
- J.Jayraman. Lab Manual in Biochemistry.
- Biotechnology, U. Satyanarayan, Books and Allied
- Practical manuals of Biotechnology, S. Chand

**P.S. The above reference book list are common for all the unit**

## C-301 : Chemistry(Theory)

### UNIT-1 : [Chapter-1 & 2]

#### Chapter-1: Wave mechanics and MO theory

[10 hours]

- 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  $H_2^+$  &  $H_2$ ,
- Potential energy and Schrodinger's equation for  $H_2^+$  &  $H_2$ ,
- Derivation of normalized wave function of  $H_2^+$  based on M.O.T.,
- Derivation coefficient of wave function of  $sp$ ,  $sp^2$  &  $sp^3$  Hybridization with bond angle.

**Chapter-2: Chemistry of the elements of First transition series and First Inner transition series [10 hours]**

**First (3d) 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 Oxoanions of transition metals,
- Calculation of magnetic moment of ion of 3d series metal.

**First (4f) 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 : [Chapter-3,4,5 & 6]**

**Chapter-3: Aryl halides [4-hours]**

- Basic IUPAC nomenclature of aryl halide,
- Preparation (including preparation from diazonium salts),
- Nucleophilic aromatic substitution ( $SNAr$ ),
- Benzyne mechanism,
- Relative reactivity of alkyl, allyl/benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

**Chapter-4: Alcohols, Phenols, Ethers and Epoxides**

**[6-hours]**

- 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-5: Nitrogen Containing Functional Groups [6-hours]**

- 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, aryl 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-6: Reactions and Rearrangement [4-hours]**

**Name Reaction:**

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

**Rearrangement:**

- Pinacol-Pinacolone Rearrangement,
- Fries Rearrangement,
- Claisen Rearrangement,

**UNIT-3 : [Chapter-7, 8 & 9]**

**Chapter-7: Equilibrium [8 hours]**

- 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)
- 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-8: Solutions [8 hours]**

- Introduction,
- Factors affecting 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),
- Vapour 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,

### Solution of Gas in Liquid:

- Factors affecting solubility of a gas,
- Effect of pressure (Henry's Law), Numericals.

### Chapter-9: Nernst Distribution Law [4 hours]

- 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

### Reference book:

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. A Text Book of Organic Chemistry (II Edition) by Raj K. Bansal
7. Name Reactions in Organic Synthesis by Dr. A.R.Parikh et. al
8. Reactions and Rearrangements by Gurdeep Chatwal
9. Essentials of Physical Chemistry, B. S. Bahl, G. D. Tli and Arun Bahl, S. Chand & Co.. New Delhi
10. Elements of Physical Chemistry, Late B.R. Puri, L. R. Sharma and Madan Pathania, Vishal Publishing Co. Jalandhar
11. Principles of Physical Chemistry, Samule H. Maron and Carl F. Prutton, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi
12. Physical Chemistry, B. K. Sharma, Goel Publication House. Meerut.

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## C-301 : Chemistry(Practical)

### 1. Organic Qualitative Analysis: [Minimum 10 Practicals]

[Minimum six bifunctional Organic Compounds should be given]

Identification of an organic compound through the functional group analysis and determination of melting point or boiling point  
(Bifunctional organic compounds)

### 2. Organic Volumetric Estimation: [Standard solution to be given]

1. To determine the amount of  $-\text{CONH}_2$  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  $-\text{COOH}$  in the given carboxylic acid

## Foundation English(Theory)

Teaching Hours	:	45 Hours per semester
Total marks	:	100 Marks
Semester End Exam	:	70 Marks
Internal assessment	:	30 Marks

**Course objectives:**

### Learning Objectives:

- The Course intends to strengthen the student's language skill.
- The Course intends to equip the student's with language proficiency in foreign language.
- The Course intends to develop student's reading, writing and communication skills.
- To Make the students aware about the Indian culture and civilization through prescribed text.

### Detailed Syllabus:

Unit	Item	Marks	Hours
1	<b>Imprints</b> :- A Course book on Prose and Fiction. (3 Essays and 2 short stories. List is given Macmillan publisher India Pvt. Ltd. Published in 2018	28	18
2	Grammar : Active to Passive , Primary Auxiliary (Do, Be, Have)	14	09
3	Letter Writing (Personal) list is given & Guided Dialogue writing	14	09
4	Information Transfer Through Visual to Verbal & Precis Writing	14	09
<b>Total Teaching Hours</b>			<b>45</b>

### Recommended Reading :

- Murphy's English Grammar, Cambridge University Pass.
- Thompson and Martinet, A Practical English Grammar,(Fourth Edition) OUP.
- Cobuild Intermediate English Grammar and Practice ; Publisher : Harper Collins UK; 2 edition(June 1, 2011)

### Free Online Education Certificate Course Link

<http://swayam.gov.in/courses/5827-senior-secondary-english>

**Unit-1:** Essays & Short Stories (from the above mentioned text following essays and short stories are in the syllabus for semester three.

### ESSAYS

1. Of Studies - Francis Bacon
2. The Spectator Club - Richard Steele
3. A Bachelor's Complaint against the Behaviour of Married People - Charles Lamb

### SHORT STORIES

1. A Cup of Tea - Katherine Mansfield.
2. The Open Window - H. H. Munro (saki)

**For Unit – 3 topics are given below.**

- **Topics for Personal Letter Writing**
  1. Wishing / Thanking on Birthday
  2. Letter inviting friend on an educational book fair.
  3. Informing Parents about Hostel life.
  4. Letter of consolation on the demise of relative.
  5. Inviting friend on any festival / occasion
  6. Invitation on Marriage ceremony
  7. Informing / asking about vacation planning
  8. Good wishes on/ for exam / career
  9. Letter on recalling school days
  10. Letter inviting friend on educational tour

## **B.Sc. SEMESTER – IV**

### **MB-401 : APPLIED MICROBIOLOGY(Theory)**

#### **UNIT-1**

**(TEACHING HOURS-12, MARKS-14)**

##### **SOIL AND AGRICULTURAL MICROBIOLOGY**

###### **A) Soil Microbiology**

- 1.1 Physical & Chemical Characteristics of Soil
- 1.2 Rhizosphere & Microbial flora of Soil
- 1.3 Interactions among soil microorganisms: Neutral, Beneficial & Harmful interactions
- 1.4 Introduction to sedimentary and gaseous biogeochemical cycles and role of microorganisms
- 1.5 Nitrogen fixation and Winogradsky's column

###### **B) Agricultural Microbiology**

- 1.5 Pathogens for plant diseases : Plant mycology, Plant bacteriology and Plant virology
- 1.6 Management of plant disease
- 1.7 Biofertilizers
- 1.8 Biopesticide and biocontrol

###### **Reference books:**

1. Principles of Microbiology By Atlas R.M.: 2nd edition
2. Microbiology by Pelczar M.J. & Chain E.C.S. : 5th edition
3. Introduction to soil microbiology by Alexander M: 2nd edition
4. Biotechnology fundamental & applications By Purohit S.S.
5. Diseases of Crop plants in India by Rangaswami G.
6. Microbiology fundamental & applications By Purohit S.S.

#### **UNIT-2**

**(TEACHING HOURS-12, MARKS-14)**

##### **FOOD MICROBIOLOGY**

- 2.1 Microbial flora of fresh food
- 2.2 Microbial spoilage of foods: Fresh foods & Canned foods
- 2.3 Food Borne infection & intoxication: Role of S.aureus,, C.botulinum & Salmonella Spp.in food poisoning
- 2.4 Preservation of foods: General principles & methods of food preservation
- 2.5 Microbiological examination of food; Introduction to AGMark
- 2.6 Brief introduction about fermented foods: Pickles, Sauerkraut, Silage, Sausages & Bread
- 2.7 Microorganisms as food: Single Cell Protein, Mushrooms and Functional foods

###### **Reference books:**

1. Fundamentals of Microbiology By Frobisher M.: 9th edition
2. Microbiology by Pelczar M.J. & Chain E.C.S. : 5th edition
3. Industrial Microbiology by Prescott S.C. : 3rd edition
4. Food Microbiology by Frazier W.C. : 3rd edition
5. Food science & Experimental foods By Swaminathan M.
6. Modern food microbiology by J James

#### **UNIT-3**

**(TEACHING HOURS-12, MARKS-14)**

##### **DAIRY MICROBIOLOGY**

- 3.1 Milk as a medium, normal flora of milk
- 3.2 Types of microorganisms in milk: Biochemical types, Pathogenic types, Temperature types
- 3.3 Spoilage of milk & milk products
- 3.4 Microbial analysis of milk: SPC, Direct count, MBRT, Resazurin test
- 3.5 Grading of milk
- 3.6 Fermented milk Beverages & Manufactured Dairy Products: Starter Culture, Cheese, Yogurt, Buttermilk, Acidophilus milk, Kefir
- 3.7 Preservation of milk: Principles & methods of preservation

###### **Reference books**

1. Fundamentals of Microbiology By Frobisher M.: 9th edition
2. Microbiology by Pelczar M.J. & Chain E.C.S. : 5th edition
3. Industrial Microbiology by Prescott S.C. : 3rd edition
4. Food Microbiology by Frazier W.C. : 3rd edition
5. Fundamentals of Dairy Microbiology by Prajapati J.B.

## UNIT-4

(TEACHING HOURS-12, MARKS-14)

### MICROBIOLOGY OF DRINKING WATER AND WASTE WATER

#### A Microbiology of drinking water

- 4.1 Sanitary survey, Bacteriological evidence of pollution, Bacteriological analysis & Sampling techniques of water
- 4.2 Microorganisms other than Coliforms as nuisance organisms

#### B Water purification

- 4.3 Sedimentation, Filtration use of Sand filters, Disinfection

#### C Waste water

- 4.4 Chemical and Microbial Characteristics of waste water, B.O.D., C.O.D. as indicator of quality of waste water
- 4.5 Waste water treatment & Disposal - Single Dwelling Process & Municipal Treatment - Primary Treatment, Secondary Treatment, Advanced & final treatment
- 4.6 Solid waste processing: Anaerobic Sludge digestion & Composting

#### Reference books

1. Principles of Microbiology By Atlas R.M.: 2nd edition
2. Microbiology by Pelczar M.J. & Chain E.C.S. : 5th edition
3. Environmental microbiology by Rania Maier, Academic Press
4. Advanced Waste water Treatment by R.K. Goel
5. Microbiology fundamental & applications By Purohit S.S.
6. Microbiology by Prescott L.M.

## UNIT-5

(TEACHING HOURS-12, MARKS-14)

### PHARMACEUTICAL MICROBIOLOGY

- 5.1 Introduction to pharmaceutical microbiology and pharmacopoeia
- 5.2 Sterility testing of pharmaceutical products
- 5.3 Quality assurance and validation: GMP and GLP in pharmaceutical industries
- 5.4 Quality assurance and quality management in pharmaceuticals: ISO, WHO and other certifications
- 5.5 Total Quality Management

#### Reference books

1. Pharmaceutical Microbiology by Ashutosh Kar, New Age International Publishers
2. Pharmaceutical Microbiology – Edt. by W.B.Hugo & A.D.Russell Sixth edition. Blackwell scientific Publications.
3. Quality control in the Pharmaceutical Industry - Edt. by Murray S.Cooper Vol.2. Academic Press New York.

## MB-401 : APPLIED MICROBIOLOGY (PRACTICAL)

Practical Hours – 3hrs/day for 2 days/Week

Total 6 hours/Week

1. Isolation of nitrogen fixing bacteria
2. Cultivation of nitrifying and denitrifying bacteria (Demo)
3. Cultivation of cellulose decomposing microorganisms from soil(Demo)
4. Demonstration of oozing, and isolation of pathogen from diseased specimen of lemon leaf showing citrus canker and isolation of *Xanthomonas spp.*
5. Standard qualitative analysis of milk
6. Methylene Blue Reduction Time test for milk
7. Isolation and identification of coli forms from Water by Presumptive, Confirmed & Completed test
8. To determine MIC, LD 50 of Beta-lactum/aminoglycoside/tetracycline/ ansamycins (Demo)
9. Sterility testing by *Bacillus stearothermophilus*
10. Sampling of pharmaceuticals for microbial contamination and load (syrups, suspensions, creams and ointments, ophthalmic preparations).

#### REFERENCE BOOKS (SEMESTER 4 PRACTICAL)

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.

## **BT-401 : ENVIRONMENTAL BIOTECHNOLOGY** **& BIOSTATISTICS(Theory)**

### **Unit-1:- Ecosystem and its component (credit-0.8)**

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

### **Unit-2:- Environmental pollutions and its remedies (credit-0.8)**

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

### **Unit-3:- Microbial Application in Environment (credit-0.8)**

- 3.1 Physical, Chemical & Biological properties of water and waste-water
- 3.2 Primary, Secondary and Tertiary treatment processes
- 3.3 Treatment of solid wastes (Anaerobic digestion and composting)
- 3.4 Biofertilizers and Biocontrol
- 3.5 Bioleaching and Bioplastics

### **Unit-4:- Biostatistics – 1 (credit-0.8)**

- 4.1 Scope and applications of Biostatistics
- 4.2 Samples and population concept, Collection, Processing and Presentation of data
- 4.3 Frequency distribution
- 4.4 Measures of Central tendency- Arithmetic, Harmonic and Geometric Mean, Mode and Median, their applications, merits and demerits
- 4.5 Measures of dispersion- Range, Variance, Standard Deviation, Coefficient of Variance, their applications, merits and demerits

### **UNIT-5:- Biostatistics – 2 (credit-0.8)**

- 5.1 Correlation analysis and Regression analysis: Linear, Bivariate regression analysis
- 5.2 Probability and Conditional probability, Theoretical distributions-Binomial and Poisson distribution and their Properties; Normal distribution and its properties, Skewness and kurtosis
- 5.3 Student's t-test- introduction and application in biology
- 5.4 Chi square test- introduction and application in biology
- 5.5 Analysis of variance- introduction and application in biology

## **BT-401 : ENVIRONMENTAL BIOTECHNOLOGY** **& BIOSTATISTICS(Practical)**

### **LIST OF PRACTICAL'S**

- Exp. 1. Physical parameters of waste water (Color, Turbidity, Odor, pH, TS, TDS and TSS Estimation)
- Exp. 2. NH<sub>4</sub>-N Estimation
- Exp. 3. NO<sub>2</sub>-N Estimation and NO<sub>3</sub>-N Estimation
- Exp. 4. Chloride Estimation
- Exp. 5. Ca-Mg Hardness
- Exp. 6. Phosphorus Phosphate Estimation
- Exp. 7. Dissolved oxygen (DO)
- Exp. 8. Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD)
- Exp. 9. Bacteriological analysis by MPN technique
- Exp. 10. Biostatistics examples:
  - a. Calculation of Mean, Standard Deviation and Coefficient of Variance
  - b. Frequency distribution graphs and curves
  - c. Value of confidence limit for the population mean

- d. Significant test: Student's t-test for paired and unpaired data
  - e. Chi-square test
  - f. Analysis of variance (ANOVA) - Randomized Block Design (RBD)
  - g. Regression coefficient and Correlation coefficient
- Exp. 11. One day Field visit

#### LIST OF INSTRUMENTS

- |   |                   |
|---|-------------------|
| 1. pH Meter                             | 2. Hot Air Oven   |
| 3. Weigh Balance                        | 4. Water Bath     |
| 5. Refrigerator                         | 6. Incubator      |
| 7. BOD Incubator                        | 8. Autoclave      |
| 9. UV Spectrophotometer and Colorimeter | 10. COD Apparatus |

#### LIST OF REFERENCES

1. Jerrold H Zar, Biostatistical analysis, 4th Edition, Pearson Education
2. P.S.S.Sundar Rao, An Introduction to Biostatistics, Eastern Economy Edition.
3. N.Gurumani, An Introduction to Biostatistics, 2nd Edition, MJP Publisher.
4. Saras Publication, Biostatistics applications
5. Wayne W. Daniel, Biostatistics: a foundation for analysis in the health sciences. Wiley & Sons
6. Manoj Tiwari & Kapil Khulbe, Environmental studies, IK International
7. Bimal Bhattacharya & Rintu Banerjee, Environmental Biotechnology, Oxford Pub.
8. H.R. Singh, Environmental Biology, S. Chand Pub.
9. P.D. Sharma, Environmental Microbiology, Naroosa Pub.
10. Nuzhat Ahmed, Industrial And Environmental Biotechnology, Horizon press
11. S.K.Agrawal, Advanced Environmental Biotechnology, APH pub.
12. Gareth M. Evans & Judith C. Furlong, Environmental Biotechnology, Wiley pub.
13. K. Omasa, Pollution & Plant Biotechnology, Springer IntEdn
14. Indu Shekhar Thakur, Environmental Biotechnology, IK International
15. William P.Cunningham, Environmental Science, McGraw Hill
16. Pradipta Kumar Mohapatra, Textbook of Environmental Biotechnology, IK Int.
17. A. Mackenzie, Instant notes in Ecology, Viva books Pvt Ltd
18. Rajvaidhya, Environmental Biochemistry, APH Pub
19. Ahmed, Industrial & Envi. Biotech, Horizon
20. Bitton, Wastewater Microbiology - 2 ed, Wiley
21. PurohitShammi, Environmental Sciences, Student Edi
22. Eugene Odum ,Ecology, Oxford
23. Gerba&Pepler, Environment microbiology
24. Hammer. Water and Wastewater technology. Prentice-Hall.
25. APHA. Water and Wastewater analysis.
26. Scragg, A. H. 1999. Environ. Biotechnology. Longman.
27. Rittman & Mc Carthy. Environ. Biotechnology. Principles & application. McGraw-Hill.
28. N.P. Cheremisnoff. 1999. Biotechnology for waste and wastewater treatment. Noyes Pub.
29. Michael Heal.(Ed). Environ monitoring & biodiagnostics of hazardous Contaminants.
30. Milton, Wainwright. 1999. An Introduction to Environ. Biotechnology. Kluwer Academy.

## C-401 : Chemistry(Theory)

### Unit-1 : [Chapter-1, 2 & 3]

#### Chapter-1 Organometallic compounds

[05 hours]

- Introduction, Classification based on nature of M-C Bond and hepticity,
- Preparation, Properties and uses of Organo Lithium compounds and Organo magnesium compounds,
- Preparation, bonding & structure of (1) Zeise's Salts, (2) Tri Methyl Aluminium (dimer) and (3) Ferrocene.

#### Chapter-2 Bio-Inorganic Chemistry

[05 hours]

- Metalloporphyrins,
- 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-3 Basics of Co-ordination chemistry

[10 hours]

- Coordination 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,
- Coordination number, coordination polyhedron, Oxidation number of central metal atom,
- IUPAC Nomenclature of coordination compounds
- Warner coordination theory and its failure,
- Co-ordination number and geometry related to co-ordination number,
- Isomerism in coordination 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 complex
- 2) Optical isomerism
  - Application of coordination compounds in biological systems, analytical chemistry, extraction of gold and silver, purification of metals, industry, medical field.

## Unit-2 : [Chapter-4, 5, 6 & 7]

### Chapter-4 Active methylene compounds:

[3-hours]

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

### Chapter-5 Aldehydes and ketones

[5-hours]

- Introduction,
- Constitution of carbonyl group and reactivity,
- Preparation of aldehydes and ketones;
- Nucleophilic addition reactions (HCN, Grignard, Alcohol,  $NaHSO_3$ )
- Nucleophilic addition-elimination reactions with ammonia derivatives with mechanism;
- Oxidations and reductions (Clemmensen, Wolff-Kishner,  $LiAlH_4$ ,  $NaBH_4$ );

### Chapter-6 Carboxylic Acids and their Derivatives:

[5-hours]

- 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-7 Reaction and Rearrangement-II:

[7-hours]

#### Name Reaction:

- Aldol condensation,
- Cannizzaro Reaction,
- Benzoin condensation,
- Knoevenagel condensation,
- Claisen-Schmidt,
- Perkin Reaction,
- Wittig reaction,
- Haloform reaction,
- Baeyer Villiger oxidation
- Meerwein Ponndorf Verley reduction.

#### Rearrangement:

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

## Unit-III [Chapter-8 & 9]

### Chapter-8 Physical Properties and Molecular Structure: [8-hours]

- **Introduction**
- **Types of Physical Properties:** Additive and Constitutive Properties
- **Molar Volume:** Kopp's Law, Atomic Volume
- **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 Clausious 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 : (i) Mono atomic molecules, (ii) Diatomic molecules (iii) Triatomic molecules (CO<sub>2</sub>, H<sub>2</sub>O, SO<sub>2</sub>) (iv) Tetratomic molecules (NH<sub>3</sub>, BCl<sub>3</sub>) (v) Aromatic Compounds (Benzene) (vi) Resonance Structure (N<sub>2</sub>O), Cis-Trans Isomer (viii) Orientations in Organic Molecules (o, m and p substitution),
- **Numericals**

### Chapter-9: Thermodynamics: [12 hours]

- 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 Coefficient of Ideal Gas.
- Zeroth Law (Only Statement and Explanation),
- Variation of Enthalpy with Temperature (Kirchhoff Equation),
- Flame and Explosion Temperature,
- Numericals

#### Reference book:

1. Quantum chemistry by A. K. Chandra
2. Basic Concept of Quantum Chemistry by R. K. Das.
3. Molecular Physical Chemistry by McQuarrie
4. Principles of Inorganic chemistry - Puri, Sharma & Kalia.
5. Concise Inorganic Chemistry - J. D. Lee
6. Advanced Inorganic Chemistry- Cotton and Wilkinson
7. Basic Inorganic Chemistry - Gurdeep & Chatwal
8. Organic Chemistry (Volume I, II & III) by S.M. Mukherji, S.P. Singh and R.P. Kapoor
9. A Text Book of Organic Chemistry (II Edition) by Raj K. Bansal
10. Name Reactions in Organic Synthesis by Dr. A.R.Parikh et. al
11. Reactions and Rearrangements by Gurdeep Chatwal
12. Essentials of Physical Chemistry, B. S. Bahl, G. D. Tli and Arun Bahl, S. Chand & Co.. New Delhi.



13. Elements of Physical Chemistry, Late B.R. Puri, L. R. Sharma and Madan Pathania, Vishal Publishing Co. Jalandhar.
14. Principles of Physical Chemistry, Samule H. Maron and Carl F. Prutton, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
15. Physical Chemistry, B. K. Sharma, Goel Publication House. Meerut.
16. Elements of Physical Chemistry, Samuel Glasstone and David Lewis, Macmillan & Co.

### **C-401 : Chemistry(Practical)**

#### **1. Inorganic Qualitative Analysis:**

**[Minimum ten 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  $\text{S}^{2-}$ ]

#### **2. Physicochemical Exercise**

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 KI.
3. To study the rate of reaction between  $\text{KBrO}_3$  and 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 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.

### **Foundation English(Theory)**

<b>Teaching Hours</b>	<b>:</b>	<b>45 Hours per semester</b>
<b>Total marks</b>	<b>:</b>	<b>100 Marks</b>
<b>Semester End Exam</b>	<b>:</b>	<b>70 Marks</b>
<b>Internal assessment</b>	<b>:</b>	<b>30 Marks</b>

**Course objectives:**

#### **Learning Objectives:**

- The Course intends to strengthen the student's language skill.
- The Course intends to equip the student's with language proficiency in foreign language.
- The Course intends to develop student's reading, writing and communication skills.
- To make the students aware about the Indian culture and civilization through prescribed text.

#### **Detailed Syllabus:**

Unit	Item	Marks	Hours
1	<b>Imprints</b> :- A Course book on Prose and Fiction. (3 Essays and 2 short stories. List is given) Macmillan publisher India Pvt. Ltd. Published in 2018	<b>28</b>	<b>18</b>
2	Grammar : Modal Auxiliaries, Direct – Indirect	<b>14</b>	<b>09</b>
3	Letter Writing (Official), list is given. Report Writing (Academic) List is given	<b>14</b>	<b>09</b>
4	Translation of sentences. Gujarati to English and English to Gujarati	<b>14</b>	<b>09</b>
<b>Total Teaching Hours</b>			<b>45</b>

### **Recommended Reading :**

- Murphy's English Grammar, Cambridge University Press.
- Thompson and Martinet, A Practical English Grammar,(Fourth Edition) OUP.
- Cobuild Intermediate English Grammar and Practice ; Publisher : Harper Collins UK; 2 edition(June 1, 2011)

### **Free Online Education Certificate Course Link**

<http://swayam.gov.in/courses/5827-senior-secondary-english>

**Unit-1:** Essays & Short Stories (from the above mentioned text following essays and short stories are in the syllabus for semester Four.

### **ESSAYS**

4. On National Prejudices – Oliver Goldsmith
5. Machines and Emotions – Bertrand Russell
6. Seven Rules of Writing – V.S. Naipaul

### **SHORT STORIES**

3. Some words with a Mummy – Edgar Allan Poe.
4. The Model Millionaire – Oscar Wilde

**For Unit – 3 topics are given below.**

- **Topics for Report Writing**

1. Celebration of Welcome Day
2. Fashion Parade / Well Dress Competition
3. Celebration of Religious Festival (Janmashtami, Navratri, Diwali, Raksha Bandhan)
4. Celebration of The Independence Day or The Republic Day
5. Celebration of Teacher's Day
6. Welcome to New Year (1st January)
7. Celebration of N. S. S. Camp
8. Celebration of Sports Day
9. Celebration of Annual / Farewell Function
10. Report on the speech of an academician

- **Topics For Official Letter Writing**

1. Leave Report
2. Letter complaining about lack of hygienic surrounding in college campus
3. Letter complaining about lack of good magazines and newspapers in library
4. Letter complaining about irregularity in lectures
5. Letter complaining about lack of laboratory tools and chemicals
6. Letter requesting about educational tour
7. Letter requesting about job placement facilities
8. Letter complaining about mal-practices during university exams
9. Letter complaining about evils of ragging by senior students
10. Letter complaining about lack of primary facilities like benches, boards, projectors etc.