

**Department of Microbiology**  
**Semester-III**  
**(In Force from June-2017)**  
**EC-301- DIVERSITY OF BACTERIA**  
**(Syllabus of theoretical portion)**  
**(Total Teaching Hours=30, Credit=02)**

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<b>Unit 1 Archea bacteria</b>	<b>07 Hrs</b>
<b>Introduction and phylogeny</b>	
<b>General properties</b>	
● Cell wall and cell membrane	
● Chromosome	
● Ribosome	
<b>Salient features of:</b>	
● Cell wall and cell membrane	
● Chromosome	
● Thermophilic S <sup>0</sup> metabolizers	
<b>Unit 2 Eubacteria(Selected genera)</b>	<b>07Hrs</b>
<b>Photosynthetic bacteria: General properties</b>	
● Oxygenic photosynthetic bacteria: <i>Cyanobacteria</i>	
● Anoxygenic photosynthetic bacteria: Purple bacteria, Purple non sulphur bacteria, Green bacteria	
<b>Chemolithotrophic bacteria</b>	
● Nitrifying bacteria: <i>Nitrobacter, Nitrosomonas</i>	
● Colorless Sulphur bacteria: <i>Thiobacillus</i> ,	
● Iron, Hydrogen and Magnetotactic bacteria: <i>Siderococcus, Hydrogenobacter, Aquaspirillum</i>	
<b>Unit 3 Eubacteria II (Selected genera)</b>	<b>08Hrs</b>
<b>Gram negative spiral and curved rods</b>	
● Spirocheatales	
● Spiral bacteria: <i>Spirillum</i> and <i>Azospirillum</i>	
● Curved rods: <i>Bdellovibrio, Desulfovibrio</i>	
<b>Gram negative aerobic rods and cocci</b>	
● Pseudomonadaceae: <i>Pseudomonas, Xanthomonas</i>	
● Neisseriaceae: <i>Neisseria</i>	
<b>Gram-negative anaerobic and facultative rods and cocci</b>	
● Enterobacteriaceae: <i>E coli, Serratia, Enterobacter, Proteus, Shigella, Salmonella</i>	
● Vibrionaceae: <i>Vibrio</i> ,	
<b>Obligatory Parasites</b>	
● Rickettsiaceae: <i>Rickettsia</i> ,	
● Chlamydiaceae: <i>Chlamydia</i>	
● Mollicutes: <i>Mycoplasma</i>	
<b>Unit 4 Eubacteria III (Selected genera)</b>	<b>08 Hrs</b>
<b>Gram positive rods and cocci</b>	
● Micrococcaceae: <i>Staphylococcus</i>	
● Deinococcaceae: <i>Deinococcus</i>	

- Other genera: *Streptococcus*, *Leuconostoc*
- Endospore formers: *Bacillus*, *Clostridium*
- Non spore forming Rods: *Lactobacillus*

**Gram positive irregular rods**

- Nonfilamentous rods: *Corynebacterium*,
- Aerobic curved rods: *Mycobacterium*
- Nocardioforms: *Nocardia*

**Filamentous bacteria with complex morphology: Frankia, Streptomyces**

**Bacteria with unusual morphology**

- Prosthecae budding/nonbudding bacteria: *Hyphomicrobium*, *Caulobacter*
- Nonprosthecae budding/nonbudding bacteria: *Planctomyces*, *Gallionella*
- Gliding fruiting/nonfruiting bacteria: *Myxobacteria*, *Beggiatoa*

**Textbook: Atlas R M, (2015), Principles of Microbiology 2<sup>nd</sup> Edition, McGraw Hill education, Mumbai**

**Suggested Reading:**

**Garrity George M, Noel R Krieg et al (2011) Bergey's Manual of Systematic Bacteriology (Vol. I to IV) 2<sup>nd</sup> edition, Editors James T Staley and Aidan C Parte Springer**

**Department of Microbiology**  
**Semester-III**  
**(In Force from June-2017)**  
**MIC-301: BIOCHEMISTRY**  
**(Syllabus of theoretical portion)**  
**(Total Teaching Hours=30, Credit=02)**

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<b>UNIT 1: Biochemistry of microorganisms</b>	<b>7Hrs</b>
<ul style="list-style-type: none"><li>● Structure of atom</li><li>● Elements of Living organisms</li><li>● Molecules and chemical bonds</li><li>● Different chemical reactions in living system</li><li>● Bio molecules of living system</li></ul>	
<b>UNIT 2: Carbohydrates and nucleic acids</b>	<b>8 Hrs</b>
<ul style="list-style-type: none"><li>● Definition, Occurrence, General structure, Properties and Classification of Carbohydrates</li><li>● Derived Carbohydrates</li><li>● Biological importance of Carbohydrates</li><li>● General structure of nucleic acids(DNA ,RNA) and nucleotides, Functions of nucleotides</li></ul>	
<b>UNIT 3: Amino acids and proteins</b>	<b>8 Hrs</b>
<ul style="list-style-type: none"><li>● <b>Amino acids:</b> Amino acids and their properties Structure and classification of amino acids Biological importance of Amino acids</li><li>● <b>Proteins:</b> Defination Classification, Properties of Proteins Structure of Proteins Biological importance of proteins</li></ul>	
<b>UNIT 4: LIPID</b>	<b>7Hrs</b>
<ul style="list-style-type: none"><li>● <b>Lipids:</b> Definition, Properties of Lipids Structure and Classification of Lipids</li><li>● <b>Fatty acids:</b> Definition, Properties of Fatty acids Classification, Nomenclature and Structure of Fatty acids Classification, Nomenclature and Structure of Fatty acids</li></ul>	

## REFERERENCE BOOKS

- 1.Principles of Microbiology.Atlas, R.M..WcBrown
2. Harper—s Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, Lange MedicalBooks. 25th edition.
- 3 Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand &Company.
- 4.Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.
- 5.Biochemistry-Dr. Ambika Shanmugam, Published by Author.
- 6.Biomolecules-C. Kannan , MJP Publishers,Chennai-5.
- 7.Microbiology - an introduction,8<sup>th</sup> Tortora, Funke & Pearson
- 8.Outline of Biochemistry Conn, Stumpf,Breuning, Dci.John Wiley &Sons.
- 9.Principles of Biochemistry,2<sup>nd</sup> Lehninger, Nelson & Cox CBS, New Delhi
- 10.Fundamental Principles of Bacteriology A.J. Sale Tata McGraw Hill

**Department of Microbiology**  
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**MIC-301: BIOCHEMISTRY**  
**(Syllabus of Practical portion)**  
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1. Qualitative analysis of Carbohydrates.
2. Qualitative analysis of Proteins.

**Department of Microbiology**  
**Semester-III**  
**(In Force from June-2017)**  
**MIC-302: SOIL MICROBIOLOGY**  
**(Syllabus of theoretical portion)**  
**(Total Teaching Hours=30, Credit=02)**

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<b>Unit 1 History, significance and developments in the field of Soil Microbiology</b>	<b>07 hrs</b>
<ul style="list-style-type: none"><li>● Contributions of Beijerinck, Winogradsky, Selman A. Waksman</li><li>● Components of Soil, Soil Profile, Soil Microorganisms, Scope and Importance of Soil Microbiology, Factors affecting Distribution, Activity and Population of Soil Microorganisms, Soil Formation.</li></ul>	
<b>Unit 2. Microbial Interactions</b>	<b>07 hrs</b>
<ul style="list-style-type: none"><li>● Microbe interactions:</li><li>● Mutualism, synergism, commensalism, competition, amensalism, parasitism, predation</li><li>● Microbe-Plant interaction:</li><li>● Mycorrhizae, Lichens</li><li>● Microbe-animal interaction:</li><li>● Microbes in ruminants, nematophagus fungi and symbiotic luminescent bacteria</li></ul>	
<b>Unit 3. Biogeochemical Cycling</b>	<b>08 hrs</b>
<ul style="list-style-type: none"><li>● Carbon cycle:</li><li>● Microbial degradation of cellulose, hemicelluloses, lignin and chitin</li><li>● Nitrogen cycle:</li><li>● Nitrogen fixation, ammonification, nitrification, denitrification and nitrate reduction</li><li>● Phosphorus cycle:</li><li>● Phosphate immobilization and solubilisation</li><li>● Sulphur cycle:</li><li>● Microbes involved in sulphur cycle</li><li>● Iron Cycle:</li></ul>	
<b>Unit 4 Introduction to Plant Pathology(Fungi and Bacteria)</b>	<b>08 hrs</b>
<ul style="list-style-type: none"><li>● Study of some important plant diseases giving emphasis on its etiological agent, symptoms, and control</li><li>● Important diseases caused by fungi</li><li>● White rust of crucifers - <i>Albugo candida</i></li><li>● Late blight of potato - <i>Phytophthora infestans</i></li></ul>	

- Powdery mildew of wheat - *Erysiphe graminis*
- Ergot of rye - *Claviceps purpurea*
- Black stem rust of wheat - *Puccinia graminis tritici*
- Early blight of potato - *Alternaria solani*
- Loose smut of wheat - *Ustilago nuda*

**Important diseases caused by phytopathogenic bacteria:**

- Angular leaf spot of cotton, bacterial leaf blight of rice, crown galls, bacterial cankers of citrus

**SUGGESTED READINGS**

1. Atlas RM and Bartha R. (2000). Microbial Ecology: Fundamentals & Applications. 4th edition. Benjamin/Cummings Science Publishing, USA
2. Madigan MT, Martinko JM and Parker J. (2014). Brock Biology of Microorganisms. 14th edition. Pearson/ Benjamin Cummings
3. Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition, Academic Press
4. Coyne MS. (2001). Soil Microbiology: An Exploratory Approach. Delmar Thomson Learning.
5. Martin A. (1977). An Introduction to Soil Microbiology. 2nd edition. John Wiley & Sons Inc. New York & London
6. Subba Rao NS. (1999). Soil Microbiology. 4th edition. Oxford & IBH Publishing Co. New Delhi.
7. Willey JM, Sherwood LM, and Woolverton CJ. (2013). Prescott's Microbiology. 9th edition. McGraw Hill Higher Education.
8. Agrios GN. (2006). Plant Pathology. 5th edition. Academic press, San Diego,
9. Lucas JA. (1998). Plant Pathology and Plant Pathogens. 3rd edition. Blackwell Science, Oxford.
10. Mehrotra RS. (1994). Plant Pathology. Tata McGraw-Hill Limited.
11. Rangaswami G. (2005). Diseases of Crop Plants in India. 4th edition. Prentice Hall of India Pvt.Ltd., New Delhi.
12. Singh RS. (1998). Plant Diseases Management. 7th edition. Oxford & IBH, New Delhi

**Department of Microbiology**  
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**MIC-302: SOIL MICROBIOLOGY**  
**(Syllabus of Practical portion)**  
**(Total Teaching Hours=45,Credit=02)**

1. Identification of *Bacillus*, *Clostridium*, *Staphylococcus* from soil.
2. Cultivation and Isolation of Actinomycetes
3. Isolation of *Rhizobium*/*Azotobacter* from root nodules.
4. Isolation of Fungi (*Mucor*, *Rhizopus*, *Aspergillus*, *Neurospora*) from soil.
5. Demonstration of oozing of *Citrus canker*.



**Department of Microbiology**  
**Semester-III**  
**(In Force from June-2017)**  
**MIC-303: Control of Microorganisms**  
**(Syllabus of theoretical portion)**  
**(Total Teaching Hours=30, Credit=02)**

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**Unit 1 physical methods of microbial control** **08 hrs**

**Principle of Microbial Control:**

- Principles ,Death rate, Factors Affecting Antimicrobial control, General mode of antimicrobial agents

**Physical agents of control:**

- High temperature: Principles, Thermal death time(TDT) and Decimal reduction time ,Direct heat, Dry heat, Moist Heat, Tyndalization
- Sterilization at Low temperature:
- Principles of Low temperature, Refrigeration,
- Role of Desiccation
- Radiation
- Sonic waves
- Surface tension in microbial control
- Filtration: Bacteriological filters

**Unit.2. Chemical methods of microbial control** **08 hrs**

- Chemical agents of control:
- Ideal antimicrobial chemical agent and its characteristics.
- Major groups of antimicrobial chemical agents
- Phenol Alcohols, Aldehydes, Halogens, Heavy metals, Dyes, Quaternary ammonium compounds, Gaseous agents.
- Evaluation of Antimicrobial agent : Use of tube dilution, Agar plate methods, Phenol coefficient test.

**Unit 3 Chemotherapy** **07 hrs**

- Principles of Chemotherapy, Historical development of chemotherapy: Paul Ehrlich, S.Waxman, A.Fleming,
- Types of Chemotherapeutic agents and general mode of action : Cell wall, Protein, Cell membrane, Enzymes
- New Generation antibiotics

**Unit 4 Chemotherapeutic agents** **07 hrs**

- Antibiotics and synthetic drugs, antibiotics and their mode of action: Penicillin, and Streptomycin, antifungal, antiviral agents.
- Mode of action of Sulfonamides.

- Development of Antibiotic resistance
- Assay of antibiotics.
- Non medical uses of antibiotics.

### ***REFERENCE BOOKS***

- 1.** Microbiology, Pelczar, M.J. Chan, E.C.S., Kreig N.R.: Mc Graw Hill Book Company
- 2.** General Microbiology, Stainer R.Y., Ingraham Wheelis, M.L.Painter, P.R. Mac Millan India.
- 3.** Introduction to Microbiology by J.L. Ingraham and C.A. Ingraham, 2000
- 4.** Microbiology by J,G Black, 2002
- 5.** Elementary Microbiology (Vol-I) Fundamentals of microbiology)
- 6.** Dr. H.A.Modi; (Aug 1995) AKTA Prakashan, Nadiad-387001

**Department of Microbiology**  
**Semester-III**  
**(In Force from June-2017)**  
**MIC-303: Control of Microorganisms**  
**(Syllabus of Practical portion)**  
**(Total Teaching Hours=45, Credit=02)**

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1. Study of effect of antibiotics on bacteria
  - A. Study of sensitivity spectrum of antibiotic against the test organism by use of paper disc method
  - B. Determination of spectrum of activity of an antibiotic by use of agar ditch method
2. Find out the MBC of given antibiotic
3. Evaluation of germicide by Phenol coefficient method
4. Effect of antimicrobial agents on the growth of bacteria (Antibiotic, Phenol, Crystal violet) by cup method.

**GUJARATVIDYAPEETH : AHMEDABAD**  
**M.D. GramsevaMahavidyalaya, Sadra, Dist: Gandhinagar**  
**Department of Microbiology**  
**B.Sc. Semester-III**  
**CHEM-301: Organic Chemistry**  
**(Syllabus of theoretical portion) (In force from June, 2017)**  
**(External Evaluation: 60% + Internal Evaluation: 40%)**  
**(Total Teaching Hours=30, Credit=02)**

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**Unit-1(A): Stereochemistry (25% Marks) (08 Hours)**

- 1(A).1 Definition of stereochemistry and stereoisomerism **(0.5hour)**
- 1(A).2 Configurational isomers: cis-trans isomers (for acyclic and cyclic compounds) **(0.5hour)**
- 1(A).3 E-Z nomenclature **(1hour)**
- 1(A).4 Chirality **(1hour)**
- 1(A).5 Configurational isomers: isomers with one and more than one chiral centre (Lactic acid, Tartaric acid, 2,3-dibromopentane, 3-chloro-2-butanol) – enantiomers, diastereomers, mesocompounds **(2hours)**
- 1(A).6 R-S nomenclature (one and more than one chiral centre) **(2hours)**
- 1(A).7 Conformational analysis of ethane and n-butane only **(1hour)**

**References**

1. Organic Chemistry (sixth edition), Robert Thornton Morrison and Robert Neilson Boyd, Prentice-Hall of India Pvt. Ltd., New Delhi, (1999)
2. Organic Chemistry (second edition), Paula Yurkanis Bruice, Prentice-Hall, Inc., New Jersey (1998)

**(B): Aromatic substitution reaction (25% Marks) (07Hours)**

- 1(B).1 Introduction about electrophilic and nucleophilic substitution reactions **(1hour)**
- 1(B).2 Electrophilic reagent / electrophilic substitution reaction **(0.5hour)**
- 1(B).3 Mechanism of nitration, sulphonation, halogenation, Friedel-Craft alkylation, Friedel-Craft acylation **(2hours)**
- 1(B).4 Classification of substituents groups **(0.5hour)**
- 1(B).5 Theory of orientation of second group in monosubstituted benzene **(1hour)**  
[first substituent is activating / deactivating group]
- 1(B).6 Orientation of third group in disubstituted benzenes **(0.5hour)**
- 1(B).7 Conversion [reactions form] based on above topics **(1.5hours)**

**References**

1. Organic Chemistry (sixth edition), Robert Thornton Morrison and Robert Neilson Boyd, Prentice-Hall of India Pvt. Ltd., New Delhi (1999)

**Unit-2: Amino acids, Peptides and Protein (50% Marks) (15Hours)**

- 2.1 General structure of amino acids **(1hour)**
- 2.2 Classification and nomenclature of amino acids **(1hour)**

- 2.3 Configuration of amino acids: D and L notation(**1hour**)
- 2.4 Preparation of amino acids: Amination of  $\alpha$ -haloacids, Gabriel phthalamide synthesis, strecker synthesis(**2hours**)
- 2.5 Zwitter ion (dipolar ion)(**1hour**)
- 2.6 Isoelectric point of amino acids(**1hour**)
- 2.7 Reaction of amino acid with ninhydrine (not structural reaction) (**1hour**)
- 2.8 Peptide linkage (dipeptides, tripeptides, polypeptides)(**1hour**)
- 2.9 Geometry of peptide linkages(**1hour**)
- 2.10 Determination of structure of peptides(**2hours**)
- N-terminal residue analysis (DNFB method, Phenyl isothiocyanate method)
  - C-terminal residue analysis (by thiohydantoin and with carboxypeptidase enzyme)
- 2.11 Work out the sequence of amino acid residues from given peptides(**1hour**)
- 2.12 The strategy of peptide synthesis (Benzylloxycarbonyl method)(**1hour**)
- 2.13 Overview of primary, secondary, tertiary and quaternary structure of proteins(**1hour**)

#### References

1. Organic Chemistry (sixth edition), Robert Thornton Morrison and Robert Neilson Boyd, Prentice-Hall of India Pvt. Ltd., New Delhi, (1999)
2. Organic Chemistry (second edition), Paula Yurkanis Bruice, Prentice-Hall, Inc., New Jersey (1998)
3. Organic Chemistry (third edition), Francis A. Carey, The McGraw-Hill Companies, Inc., New York (1996)

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#### Board of Studies(Chemistry)

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|----------------------------|------------------------|
| (1) Dr. Nikhil Bhatt       | (5) Dr. Mallika Sanyal |
| (2) Dr. Pranav Shrivastav  | (6) Dr. Hitesh J. Shah |
| (3) Dr. Dasharath P. Patel | (7) Dr. Mayur C. Shah  |
| (4) Dr. Yogesh S. Patel    |                        |

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**B.Sc. Semester-III**  
**CHEM-301: Organic Chemistry**  
**(Syllabus of practical portion) (In force from June, 2017)**  
**(External Evaluation: 60% + Internal Evaluation: 40%)**  
**(Total Teaching Hours=45, Credit=02)**

**Qualitative analysis of organic compounds (45 hours)**

Candidates are expected to perform the following tests for the organic compounds

- (1) Nature of compound: acidic, basic, phenolic, neutral based on solubility tests
- (2) Presence of elements: Lassaigne's test (C, H, N, S, X)
- (3) Identification of functional groups:
 

-COOH	>C=O
-OH (alcoholic)	-NH <sub>2</sub>
-OH (phenolic)	-NO <sub>2</sub>
-CHO	-CONH <sub>2</sub>
-CH	-X
- (4) B.P. / M.P.
- (5) Identification of compound

**List of organic compounds for qualitative analysis**

Compounds	Acidic	Basic	Phenolic	Neutral
<b>C, H, O elements</b>	Tartaric acid Citric acid Phthalic acid Benzoic acid Oxalic acid Succinic acid	xxxxxxxxxx	Phenol $\alpha$ -Naphthol $\beta$ -Naphthol Resorcinol	Methanol Ethanol Benzaldehyde Acetone Acetophenone Benzene Toluene Naphthalene
<b>C, H, O, N elements</b>	Anthranilic acid p-Nitrobenzoic acid	Aniline o-Nitroaniline m-Nitroaniline p-Nitroaniline $\alpha$ -Naphthylamine	o-Nitrophenol p-Nitrophenol	Acetamide Benzamide Nitrobenzene Urea
<b>C, H, O, N, S elements</b>	xxxxxxxxxx	xxxxxxxxxx	xxxxxxxxxx	Thiourea
<b>C, H, O, X elements</b>	xxxxxxxxxx	xxxxxxxxxx	xxxxxxxxxx	Chloroform Carbontetrachloride Chlorobenzene Bromobenzene

**CHEM-301: Organic Chemistry**  
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**B.Sc. Semester-III**  
**CHEM-302: Analytical Chemistry**  
**(Syllabus of theoretical portion) (In force from June, 2017)**  
**(External Evaluation: 60% + Internal Evaluation: 40%)**  
**(Total Teaching Hours=30, Credit=02)**

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**Unit-1(A): Introduction of analytical chemistry (25% Marks) (7 Hours)**

- 1(A).1 Role of analytical chemistry **(1hour)**
- 1(A).2 Classification of analytical methods: chemical and instrumental methods **(1hour)**
- 1(A).3 Advantages and limitations of chemical and instrumental methods **(3hours)**
- 1(A).4 Literatures of analytical chemistry **(1hour)**
- 1(A).5 Safety in analytical / chemistry laboratory **(1hour)**

**References**

1. Fundamental of Analytical Chemistry (seventh edition), Douglas A.Skoog, Donald M. West and F. James Holler, Saunders college publishing, New York, pp. 1-10,81(1996)
2. Analytical Chemistry (sixth edition), Gray D. Christain, John Wiley and Sons, Inc., Singapore, pp.1-14(2003)

**Unit-1(B): Complexometric titrations (25% Marks) (8Hours)**

- 1(B).1 Introduction **(0.5hour)**
- 1(B).2 Classification of ligands **(0.5hour)**
- 1(B).3 Structure and acidic properties of EDTA **(0.5hour)**
- 1(B).4 Complexes and formation constant: How stable are complexes? **(1hour)**
- 1(B).5 Effect of pH on EDTA equilibria **(1hour)**
- 1(B).6 Types of EDTA titrations: direct titration, back titration, substitution titration **(1hour)**
- 1(B).7 Indicators for EDTA titrations / metal ion indicators **(2hours)**
  - working mechanism
  - Preliminary information of metal ion indicators- Murexide, Eriochrome black T, xylenol orange
- 1(B).8 Masking and demasking agents **(1.5hours)**

**References**

1. Analytical Chemistry (sixth edition), Gray D. Christain, John Wiley and Sons, Inc., Singapore, pp.294-312(2003)
2. Fundamental of Analytical Chemistry (seventh edition), Douglas A.Skoog, Donald M. West and F. James Holler, Saunders college publishing, New York, pp. 278-302(1996)
3. Vogel's Text Book of Quantitative Chemical Analysis (fifth edition), Longman Scientific and Technical Publish Group, England, pp. 309-323 (1991)



## **Unit-2: Acid-base titrations**

**(50%Marks) (15 Hours)**

- 2.1 Introduction **(1hour)**
- 2.2 Neutralization of strong acid with a strong base by pH metry**(2hours)**
- 2.3 Neutralization of weak acid with a strong base by pH metry**(2hours)**
- 2.4 Neutralization of weak base with a strong acid by pH metry**(2hours)**
- 2.5 Titration of mixture of strong acid and weak acid / base by pH metry**(1hour)**
- 2.6 Comparative study of different nature of curves for 2.2 to 2.5 **(1hour)**
- 2.7 Acid-base indicators: definition, theory and Henderson-Hasselbach equation **(2hours)**
- 2.8 Application of acid-base titrations **(2hours)**
  - Reagents for neutralization titrations: preparation and standardization of acids / bases
  - The determination of inorganic substances (ammonium salts, nitrates and nitrites, carbonates and carbonate mixtures)
  - The determination of organic functional groups (carboxylic and sulphonic acid groups, amine groups, ester groups, hydroxyl groups (Phenolic), carbonyl groups)
- 2.9 Numerical based on 2.2 to 2.4, 2.7 **(3hours)**

### **References**

1. Analytical Chemistry (sixth edition), Gray D.Christain, John Wiley and Sons,Inc., Singapore, pp.266-286(2003)
2. Fundamental of Analytical Chemistry (seventh edition), Douglas A.Skoog, Donald M.West and F.James Holler, Saunders college publishing, New York, pp. 248-265 (1996)

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### **Board of Studies(Chemistry)**

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**(Total Teaching Hours=30, Credit=02)**

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**(A) Solution preparation and standardization (30 Hours)**

- (1) Preparation and standardization of potassium permanganate solutions (approximately 0.05N) **(3 hours)**
- (2) To determine normality of given ferrous ammonium sulphate / ferrous sulphate solution using standard potassium permanganate solutions **(3 hours)**
- (3) Preparation and standardization of potassium dichromate solutions (approximately 0.05N) **(3 hours)**
- (4) To determine normality of given ferrous ammonium sulphate / ferrous sulphate solution using standard potassium dichromate solutions **(3 hours)**
- (5) Preparation and standardization of sodium thiosulphate solutions (approximately 0.1N) **(3 hours)**
- (6) To determine normality of given iodine solution using standard sodium thiosulphate solutions **(3 hours)**
- (7) Preparation and standardization of EDTA solutions (approximately 0.01N) **(3 hours)**
- (8) To determine normality of given  $MgCl_2$  solution using standard EDTA solutions **(3 hours)**
- (9) Preparation and standardization of silver nitrate solutions (approximately 0.02N) **(3 hours)**
- (10) To determine normality of given KCl solution using standard silver nitrate solutions **(3 hours)**

**(B) Acid-base titrations by pH metrically and conductometrically (15 Hours)**

- (1)  $HCl \rightarrow NaOH$  **(6 hours)**
- (2)  $CH_3COOH \rightarrow NaOH$  **(6 hours)**
- (3)  $HCl + CH_3COOH \rightarrow NaOH$  (by pH metrically only) **(3 hours)**

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**Department of Microbiology  
Gujarat Vidyapith, Sadra**

**Proposed Syllabus for Bachelor of Science (B.Sc)  
Core Paper – English**

**Semester 3: ENG 301: English**

**Credit: 2**

**Number of Hours per Semester: 30**

**Objectives:**

1. To familiarize students with different genres of writings.
2. To develop among students the comprehensive understanding of comprehension passages.
3. To develop among students the skill of writing short notes which are informative in nature.
4. To develop vocabulary which is used to describe a feature of a person or thing.
5. To develop understanding of function of tenses in paragraphs.
6. To develop official written communication skills needed by students and young scholars.
7. To develop academic skills of comprehending texts and lectures/presentations.

**Unit 1: Comprehension (Weightage – 40%)**

**10 Hours**

1. The Luceon by W. Somerset Maugham
2. Films of Adventure by K. R. Cripwell
3. Vanar Jatakam by T. Vijayendra
4. The Fast by M. K. Gandhi

**Comprehension Pattern:**

1. Short questions
2. Short notes
3. Fill in the blanks
4. Multiple choice questions based on the text

***NB: Short questions as well as short notes should be informative in nature.***

**Unit 2: Vocabulary (Weightage – 10%)** **2 Hours**

1. Antonyms/Synonyms (Based on the Comprehension texts)
2. One Word Substitutes

**NB: Teacher should provide a list of One Word Substitutes for the students.**

**Unit 3: Grammar (Weightage – 20%)** **8 Hours**

1. Future Conditionals
2. Adjectives (Detailed Study)
3. Adverbs (Detailed Study)
4. Prepositions
5. Use of tenses in paragraphs

**Unit 4: Writing Skills (Weightage – 20%)** **4 Hours**

1. Leaving Short Messages (On Paper)
2. Composing SMS on Cell Phone
3. Formal Letter Writing (Asking for Leave, Scholarship, Complaint)
4. Formal Emails (Asking for Leave, Scholarship, Complaint)

**Unit 5: Academic Skills (Weightage – 10%)** **3 Hours**

1. Note-taking
2. Note-making
3. Summarizing

**Seminar/Presentation** **5 Hours**

**List of Reference Books:**

Achar, Deeptha *et al.* Eds. *English for Academic Purposes Book – 1.* Gandhinagar: University Granthnirman Board, 2011.

Achar, Deeptha *et al.* Eds. *English for Academic Purposes Book – 1.* Hyderabad: Orient BlackSwan, 2012.

Achar, Deeptha *et al.* Eds. *English for Academic Purposes Book – 2.* Gandhinagar: University

- Granthnirman Board, 2011.
- Achar, Deeptha *et al.* Eds. *English for Academic Purposes Book – 2*. Hyderabad: Orient BlackSwan, 2013.
- Gandhi, M. K. Gandhi. *An Autobiography Or The Story of My Experiments with Truth*. Ahmedabad: Navjivan, 2011.
- National Open School. *English: Senior Secondary Course*. Despatch 10 C. New Delhi, National Open School, 1995.
- Tickoo, M. L. *et al.* Eds. *I Am The People: English Reader*. Delhi: CBSE, 1996.
- Vijayendra, T. *An Intelligent Bird's Guide to the Birdwatcher and Other Stories*. Udupi: Sangatya, 2014.
- Wren, P. C. and H. Martin. *High School English Grammar and Composition*. (Gujarati). Trans. Dr. Usha Upadhyay and Jegeesha Upadhyay. New Delhi: S. Chand, 2013.