

GUJARAT VIDYAPEETH : AHMEDABAD
M.D. Gramseva Mahavidyalaya, Sadra, Dist: Gandhinagar
Department of Microbiology
Semester-IV

(In Force from December -2011)

MIC-401- Principles of Microbial Taxonomy

(Syllabus of theoretical portion)

Total Mark: 50= External Evaluation: 40 Marks +

Internal Evaluation: 10Marks)

(Total Teaching Hours=30, Credit=02)

| | | |
|-----------------|---|-------------------|
| UNIT-1 | Principles of bacterial taxonomy (1) | 07 Hours |
| (1) | Objective (goals) of classification: position of microorganisms in living world, Whittaker's five-kingdom concept. Taxonomic groups, species concept, principles of binomial nomenclature, criteria used for classification of bacteria | |
| UNIT-II | Principles of bacterial taxonomy (2) | 07 Hours |
| (1) | Methods of classification : intuitive methods, numerical taxonomy, genetic approach Introduction to Bergey's manual, past and present status of bacterial taxonomy Introduction to microbial diversity | |
| UNIT-III | Principles of fungal taxonomy | 08 Hours |
| (1) | General criteria for classification and explanation of its importance | 01 Hour |
| (2) | (a) slime molds (b) Zygomycetes (c) Ascomycetes (d) Oomycete (e) basidiomycetes (f) deuteomycetes Study of above described classes of fungi on the basis of habitat, morphology, reproduction, (life cycle), economic importance | 06 ½ Hours |
| UNIT-IV | Virus structure | 08 Hours |
| (1) | Classification of virus Animal, plant, Bacteriophage, insect, fungi human viruses Based on nucleic acid: DNA virus, RNA virus | |
| (2) | 1. Virus taxonomy 2. taxonomy of Eucaryotic viruses 3. cytotoxic infection and cell damage | |

* **Reference books**

- (1) Introduction to virus by Bishwas
- (2) Introductory Mycology
(Publicated by Wiley, 96)
C. J. Alexopoulos
C. W. Moms
M. blackwll
- (3) Microbiology
Michael J.PelczarJR., E.C.S.Chan;
Noel R.Krieeg (5th edition-1993
Tata McGraw-Hill edition 1993

- (4) Microbiology : an introduction, tortora ,funke, and
case, 8th edition (20040. Pearson education pvt.
Ltd.Singapor
- (5) General microbiology; stanier, ingraham, wheetis and
pamter, 5th edition (1987),Macmullan press ltd. London
- (6) Microbiology, Prescott, harleg and kleinis, 7th edition
(2008) , Mcgraw hill, Now york.
- (7) Elementary Microbiology (Vol-II)
Fundamentals of microbiology)
Dr. H.A.Modi; (Aug 1995)
AKTA Prakashan, Nadiyad-387001

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Semester-IV

MIC-401- Principles of Microbial Taxonomy

(Syllabus of PRACTICAL portion)

Total Mark: 25= External Evaluation: 20 Marks +

Internal Evaluation: 05Marks)

(Total LAB Hours=45, Credit=02)

- 1 Study of microscopic, cultural and biochemical characteristics of *E.coli*, *B. subtilis*, *S. aureus*
- 2 Study of microscopic and cultural characteristics of *Penicillium*, *Mucor*, *Rhizopus*, *Aspergillus*, *Neurospora*

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Semester-IV
(In Force from December -2011)
MIC-402- Applied Microbiology
(Syllabus of theoretical portion)
Total Mark: 50= External Evaluation: 40 Marks +
Internal Evaluation: 10Marks)
(Total Teaching Hours=30, Credit=02)

| | | |
|-----------------|---|-----------------|
| UNIT-1 | Basics of agriculture microbiology | 08 Hours |
| | (1) Soil microbiology : Physicochemical structure of soil, interaction among soil microbes, Biogeochemical cycle of Nitrogen and carbon | 05 Hours |
| | (2) Biofertilizers Nitrogen fixers, phosphate solubilizers, organic matter decomposers, | 03 Hours |
| UNIT-II | Applied agriculture microbiology | 06 Hours |
| | (a) Biopesticides and bioinsecticides | 03 Hours |
| | (b) Plant pathology : Diseases of cotton, brinjal, citrus plant caused microorganisms. | 03 Hours |
| UNIT-III | Microbiology of water | 08 Hours |
| | (1) Introduction | 01 Hour |
| | (2) Natural waters : atmospheric, surface, stored and ground waters. Aquatic environments, conditions affecting microflora viz. temperature Hydrostatic pressure, light, salinity, pH, dissolved organic and inorganic matter Turbidity. distribution of microorganisms in aquatic environment. | 02 Hours |
| | (3) Microbiology of drinking water | 01 Hour |
| | (4) Sanitary survey, microbial indicators of faecal pollution, coliforms as indicators, need for their differentiation, methods of differentiation of coliforms, IMVIC test and elevated temperature test. Water borne diseases. Microorganisms other than coliforms as nuisance organisms : slime forming Bacteria, iron and sulphur bacteria, algae | 01 Hour |
| | (5) Bacteriological examination of drinking water. Sampling methods Purification of drinking water supplies : sedimentation | 02 Hours |
| UNIT-IV | Microbiology of Wastewater | 08 Hours |
| | Types of waste water, chemical and microbiological characteristics, BOD, COD and TOC as indicator of | 04 Hours |

strength of waste water, pollution problems due to disposal of untreated waste water.

Methods of waste water treatment. primary treatment, secondary treatment(biological), principles, role of microorganisms in; septic tank, Imhoff tank, trickling filters, activated sludge process, oxidation pond methods. Advanced treatment and final treatment **04 Hours**

*** Reference books**

- (1) Microbiology, pelczar, chan and krieg, 5th edition (1993), Tata, McGraw hill, Delhi
- (2) Subba Rao N.S. (1993) Biofertilizers in agriculture and forestry. 3rd revised edition, Oxford and IBH publishing Co.Pvt.ltd.;;New Delhi
- (3) Microbiology, Prescott, Harley and Klein, 7th edition (2008), McGraw hill, New York.
- (4) Biofertilizers and Organic Farming by Vyas and Modi

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MIC-402- Applied Microbiology

(Syllabus of PRACTICAL portion)

Total Mark: 25= External Evaluation: 20 Marks +

Internal Evaluation: 05Marks)

(Total LAB Hours=45, Credit=02)

- 1 Water analysis
- 2 Isolation of bacteriophage

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CHEM-401- Organic Chemistry-
(Syllabus of theoretical portion)

Total Mark: 50= External Evaluation: 40 Marks +

Internal Evaluation: 10Marks)

(Total Teaching Hours=30, Credit=02)

Unit-1: Heterocyclic compounds
(15 Hours)

(20 Marks)

- 1.1 Introduction **(1hour)**
- 1.2 Nomenclature of heterocycles: **(3hours)**
 - systematic nomenclature system for naming three to ten membered monocyclic hetero cycles of various unsaturation containing one or more hetero atoms
 - system of nomenclature is based on the trivial and semitrivial names of heterocycles [Pyrrole, Furan, Thiophene, Selenophene, Pyrazole, Imidazole, Isoxazole, Pyridine, Pyridazine, Pyrimidine, Pyrazine, Pyrene, Indole, Isoindole, Purine, Quinoline, Isoquinoline]
 - nomenclature systems for fused heterocycles
- Five membered heterocyclic compounds [Pyrrole, Furan, Thiophene]**
- 1.3 Source of pyrrole, furan and thiophene **(1hour)**
- 1.4 Orbital structure of pyrrole, furan and thiophene **(1hour)**
- 1.5 Preparation of pyrrole, furan and thiophene **(1hour)**
- 1.6 Orientation of electrophilic substitution in pyrrole, furan and thiophene **(1hour)**
- 1.7 Relative reactivity toward electrophilic aromatic substitution in pyrrole, furan, thiophene and benzene **(1hour)**
- Six membered heterocyclic compounds [Pyridine]**
- 1.8 Source of pyridine compound **(1hour)**
- 1.9 Orbital structure of pyridine **(1hour)**
- 1.10 Basicity of pyridine including comparison with basicity of pyrrole and aliphatic amine **(1hour)**
- 1.11 Orientation of electrophilic and nucleophilic substitution in pyridine **(2hours)**
- 1.12 Relative reactivity toward electrophilic aromatic substitution in benzene, pyridine **(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)

Unit-2: Carbohydrates-II

(20 Marks)

(15 Hours)

- 2.1 Introduction of diasaccharides **(2hours)**
- 2.2 Nomenclature of diasaccharides **(1hour)**
- 2.3 (+)-Maltose: source, general properties, uses, determination of the structure of a
(+)-Maltose **(3hours)**
- 2.4 (+)-Cellobiose: source, general properties, determination of the structure of a
(+)-Cellobiose **(3hours)**
- 2.5 (+)-Lactose: source, general properties, uses, determination of the structure of a
(+)-Lactose **(3hours)**
- 2.6 (+)-Sucrose: source, general properties, uses, determination of the structure of a
(+)-Sucrose **(3hours)**

References

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

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Semester-IV

(In Force from June-2010)

CHEM-401- Organic Chemistry-
(Syllabus of PRACTICAL portion) (In force from June, 2010)

Total Mark: 25= External Evaluation: 20 Marks +

Internal Evaluation: 05Marks)

(Total Teaching Hours=45, Credit=02)

(A) Qualitative analysis of organic mixture (33 Hours)

Separation of two components from the mixture of organic compounds using semi-micro method, identification of compounds by lassaigne's test, functional group test, melting point / boiling point test

- (1) Acids: Benzoic acid, Salicylic acid, Cinnamic acid, Phthalic acid, Anthranilic acid, Oxalic acid, Tartaric acid, p-nitrobenzoic acid
- (2) Phenols: α -Naphthol, β -Naphthol, o-Nitrophenol, p-Nitrophenol, Resorcinol
- (3) Amines: p-Toludine, o-Nitroaniline, m- Nitroaniline, p- Nitroaniline
- (4) Neutral: Urea, Thiourea, Acetamide, Benzamide, Acetanilide, Glucose, Naphthalene

(B) Preparation of organic compounds and its confirmation by function group test and M.P (12Hours)

- (1) Oxidation: Benzoic acid from benzaldehyde by KMnO_4
- (2) Nitration: p-nitroacetanilide from acetanilide

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(In Force from June-2010)

CHE-401- Organic Chemistry-

(Syllabus of PRACTICAL portion) (In force from June, 2010)

**(Total Marks: 25= External Evaluation: 20 Marks + Internal Evaluation:
05Marks)**

(Total Teaching Hours=45)

(A) Separation techniques (21 Hours)

(1) Crystallization(6hours)

- Concept of induction of crystallization
- Phthalic acid from hot water
- Acetanilide from boiling water
- Benzoic acid from water
- Naphthalene from ethanol

(2) Distillation (6hours)

- Simple distillation of acetone-water mixture using water condenser
- Distillation of nitrobenzene and chlorobenzene using air condenser

(3) Chromatography (9hours)

- To separate Pb^{2+} , Ag^+ and Hg^{2+} ions present in a mixture by paper chromatography
- To separate Zn^{2+} , Pb^{2+} and Cd^{2+} ions present in a mixture by paper chromatography
- Separation of a mixture of phenylalanine and glycine, alanine and aspartic acid, leucine and glutamic acid by paper and thin layer chromatography

(B) Gravimetric analysis (24 Hours)

- (1) Iron as ironoxide
- (2) Ni as $Ni(DMG)_2$
- (3) Ba as $BaSO_4$
- (4) Al as Al_2O_3

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CHEM-402- Analytical Chemistry-II
(Syllabus of theoretical portion)

Total Mark: 50= External Evaluation: 40 Marks +

Internal Evaluation: 10Marks)

(Total Teaching Hours=30, Credit=02)

Unit-1: Introduction to separation techniques (20 Marks)
(15 Hours)

- 1.1 Filtration, distillation and extraction **(3hours)**
- 1.2 Chromatography: principle, classification of chromatographic methods **(2hours)**
- 1.3 Paper chromatography: principle, experimental technique **(2hours)**
- 1.4 Column chromatography: principle, experimental technique **(2hours)**
- 1.5 Thin layer chromatography: principle, experimental technique **(2hours)**
- 1.6 Gas chromatography: principle, experimental technique (except types of detector) **(2hours)**
- 1.7 Applications of chromatography in qualitative and quantitative analysis **(2hours)**

References

1. Fundamental of Analytical Chemistry (seventh edition), Douglas A. Skoog, Donald M. West and F. James Holler, Saunders college publishing, New York, pp. 660-700(1996)
2. Experimental Organic Chemistry Harcourt (second edition), John C. Gilbert and Stephen F. Martin, Harcourt college publishers, New York, 24-86 and 154-175 (1998)

Unit-2: Statistics for analytical data (20 Marks) (15Hours)

- 2.1 Limitation of analytical data **(0.5hour)**
- 2.2 Accuracy and precision **(0.5hour)**
- 2.3 Measurement of central tendency: mean, median and mode **(1hour)**
- 2.4 Way of expressing accuracy: absolute error, relative error **(0.5hour)**
- 2.5 Way of expressing precision: range, deviation, average deviation, relative average deviation, standard deviation, coefficient of variation, variance **(1hour)**
- 2.6 Types of error in chemical analysis: systematic errors [instrumental error, errors of method, operative errors, personal errors] and random errors **(2hours)**
- 2.7 The effect of systematic errors on analytical results: constant errors and proportional errors **(1hour)**

- 2.8 Minimization of errors **(0.5hour)**
- 2.9 Significant figure and computations **(1hour)**
- 2.10 Confidence interval **(0.5hour)**
- 2.11 Student's t-test: Are there difference in the methods? **(1hour)**
 - when accepted value is known
 - comparison of the means of two samples
- 2.12 F-test: comparison of precision of two sets of data **(1hour)**
- 2.13 Rejection of a result: the Q-test **(0.5hour)**
- 2.14 Correlation coefficient: **(0.5hour)**
 - Pearson correlation coefficient
- 2.15 Linear regression **(0.5hour)**
- 2.16 Numerical based on all topics **(3hours)**

References

1. Analytical Chemistry (sixth edition), Gray D.Christain, John Wiley and Sons,Inc., Singapore, pp.65-123(2003)
- 2.Fundamental of Analytical Chemistry (seventh edition), Douglas A.Skoog, Donald M.West and F.James Holler, Saunders college publishing, New York, pp.11-70(1996)
3. Vogel's Text Book of Quantitative Chemical Analysis (fifth edition), Longman Scientific and Technical Publish Group, England, pp. 125-149(1991)
4. Quantitative Analysis (sixth edition), R.A.Day Jr. and A.L.Underwood, Prentice-Hill of India Pvt. Ltd., New York, pp. 07-42 (2003)
5. Quantitative Chemical Analysis (sixth edition), Daniel C. Harris, W.H.Freeman(Publisher)

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CHEM-402- Analytical Chemistry-II

(Syllabus of PRACTICAL portion) (In force from June, 2010)

**(Total Marks: 25= External Evaluation: 20 Marks + Internal Evaluation:
05Marks)**

(Total Teaching Hours=45)

(A) Separation techniques (21 Hours)

(1) Crystallization (6hours)

- Concept of induction of crystallization
- Phthalic acid from hot water
- Acetanilide from boiling water
- Benzoic acid from water
- Naphthalene from ethanol

(2) Distillation (6hours)

- Simple distillation of acetone-water mixture using water condenser
- Distillation of nitrobenzene and chlorobenzene using air condenser

(3) Chromatography (9hours)

- To separate Pb^{2+} , Ag^+ and Hg^{2+} ions present in a mixture by paper chromatography
- To separate Zn^{2+} , Pb^{2+} and Cd^{2+} ions present in a mixture by paper chromatography
- Separation of a mixture of phenylalanine and glycine, alanine and aspartic acid, leucine and glutamic acid by paper and thin layer chromatography

(B) Gravimetric analysis (24 Hours)

- (1) Iron as ironoxide
- (2) Ni as $Ni(DMG)_2$
- (3) Ba as $BaSO_4$
- (4) Al as Al_2O_3

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Semester-IV
(In force from December-2011)

Paper No:- ENG -401

Paper Name:- English

(Syllabus of theoretical portion)

Total Marks: 50 (External evaluation : 40 marks)

(Internal evaluation : 10 marks)

Credit :- 2

Time duration:- 30 hours/Paper/Semester

Unit-1 Text (35%)

Developing English Skills by P.K.Thaker, S.D.Desai, T.J. Purani,
Published by Oxford University Press, 200e impression.

- 1) The Conjuror's Revenge
- 2) A Snake in the Grass
- 3) The Topaz Cufflinks Mystery
- 4) Letter to Indu
- 5) A Thief's story

Unit-2 (15%) (From the lessons taught)

- 1) Match the words with their correct meanings.
- 2) Make meaningful sentences by using the words.
- 3) Use idiomatic phrase/expression in your sentence.

Unit-3 (25%)

- 1) Tenses
- 2) Change the Degree
- 3) Error Analysis
- 4) Conjunctions in the context of simple, compound and complex sentence

Unit-4 Comprehension (15%)

- 1) Paragraph Writing
- 2) Letter writing (Informal)
- 3) Translation (Eng. To Guj.) sentence.

Unit-5 Composition (10%)

An unseen paragraph.

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(In Force from December -2011)
EC-401- Biogas Technology
(Syllabus of theoretical portion)
Total Mark: 50= External Evaluation: 40 Marks +
Internal Evaluation: 10Marks)
(Total Teaching Hours=30, Credit=02)

Unit-1: Biogas

(20 Marks) (15 Hours)

- 1.1 Introduction: Definition, History of biogas**(2hours)**
- 1.2 How biogas is produced? (Biochemistry) **(3hours)**
- 1.3 Use of different raw materials for biogas production **(3hours)**
- 1.4 Factor affecting the production of biogas**(4hours)**
- 1.5 Qualitative (by Orset apparatus) and quantitative(by flow meter) analysis of biogas production**(3hours)**

Unit-2: Biogas Plant

(20 Marks) (15 Hours)

- 2.1 Types of biogas plant models (Design) **(3hours)**
- 2.2 How operate the biogas plants? **(1hours)**
- 2.3 Maintenance of biogas plants **(4hours)**
- 2.4 Uses of biogas **(2hours)**
 - Lightning
 - Cooking
 - Vehicle fuel
 - Electricity generation
- 2.5 Utilization of digested slurry **(3hours)**
- 2.6 Economics of biogas plant **(2hours)**

References

1. Biogas Systems: Principle and Applications, K.M.Mital, New Age International(P) Limited, New Delhi, (1996)
2. Handbook of Biogas Technology, Prateek Shilpkar and Deepti Shilpkar, Agrotech Publishing Academy, Udaipur (2009).

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Semester-IV

EC-402: Analytical Techniques for Water Analysis

(Syllabus of theoretical portion) (In force from December, 2011)

(Total Mark: 50= External Evaluation: 40 Marks + Internal Evaluation: 10Marks)

(Total Teaching Hours=30, Credit=02)

Unit-1: Sampling techniques and physical parameters for Water Analysis

(20 Marks) (15 Hours)

- 1.1 Source of water: Atmospheric water, surface water, stored water, ground water (4hours)
- 1.2 Human use of water (2hours)
- 1.3 Standards for drinking and irrigation purposes (1hour)
- 1.4 Collection, handling and preservation of water sample (3hours)
- 1.5 Analytical techniques of physical parameters for water analysis (5hours)
 - Colour
 - Temperature
 - Odour and taste
 - Transparency /Turbidity
 - suspended solids

Unit-2: Analytical Techniques of Chemical parameters for Water Analysis

(20 Marks) (15 Hours)

- 2.1 pH (1hour)
- 2.2 Electrical Conductivity (1hour)
- 2.3 Total dissolved solids (1hour)
- 2.4 Total alkalinity (1hour)
- 2.5 Total acidity (1hour)
- 2.6 Calcium, Magnesium and Total hardness (1hour)
- 2.7 Fluoride (1hour)
- 2.8 Chloride (1hour)
- 2.9 Sulphate (1hour)
- 2.10 Sodium (1hour)
- 2.11 Potassium (1hour)
- 2.12 Dissolved Oxygen (1hour)
- 2.13 Chemical Oxygen Demand (1hour)
- 2.14 Biological Oxygen Demand (1hour)

References

1. Standard Methods for the Examination of Water and Wastewater (18th edition), American Public Health Association, Washington,DC(1992).
2. Chemical and Biological Methods for Water Pollution Studies, R.K.Trivedy and P.K.Goel, Environmental Publications, Karad(1986).

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Department of Microbiology
Semester-IV
(In Force from December -2011)
EC-403. Analytical techniques for soil
(Syllabus of theoretical portion)
Total Mark: 50= External Evaluation: 40 Marks +
Internal Evaluation: 10Marks)
(Total Teaching Hours=30, Credit=02)

| | | |
|-----------------|--|-----------------|
| UNIT:- I | Introduction and sampling techniques for soil analysis • Introduction to soil formation • Composting of soil • Physical parameters of soil • Collection and preparation of samples of soil analysis | 07 Hours |
| UNIT:- 2 | Physical parameters and some chemical parameters of soil analysis (A) Physical parameters of soil analysis • Texture-mechanical analysis of soil • Colour • Moisture • Density and porosity, partical density, Maximum water holding capacity • Water movement in soil (B) Chemical parameters of soil analysis-1 pH Conductivity | 08 Hours |
| UNIT:- 3 | Chemical parameters of soil analysis-2 • Chloride, Sulfate, Calcium & Magnesium, Organic Carbon, Available sulfur | 07 Hours |
| UNIT:- 4 | Chemical parameters of Soil analysis-3 • Sodium, Potassium • Available Nitrogen • Available phosphorous | 08 Hours |
| | * Reference books (1) Soil chemical Analysis, Jackson M.L; Prantice Hall Inc. (1967) (2) A text book of soil Analysis Baruah, T.C. and Barthakur, H.P., 1997 Vikas Publishing House Pvt.ltd. | |