**GUJARAT Vidyapeeth : Ahmedabad**  
M.D. Gramseva Mahavidyalaya, Sadra, Dist: Gandhinagar  
Department of Microbiology  
B.Sc. Semester-II  
**MIC 201: Introduction to Microorganisms**  
(Syllabus of theoretical portion) (With Effect From 1\textsuperscript{st} July, 2016)  
(External Evaluation: 60% + Internal Evaluation: 40%)  
(Total Teaching Hours=30, Credit=02)

<table>
<thead>
<tr>
<th>UNIT</th>
<th>Course Content</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIT:1</td>
<td>General classification and mode of reproduction in Bacteria</td>
<td>(8 Hrs)</td>
</tr>
<tr>
<td>UNIT:2</td>
<td>Occurrence, General classification, Morphology, Mode of Reproduction and Economic Importance of: Yeasts and Moulds</td>
<td>(7 Hrs)</td>
</tr>
<tr>
<td>UNIT:3</td>
<td>Occurrence, General classification, Morphology, Mode of Reproduction and Economic Importance of: Algae, Protozoa and Helminths</td>
<td>(8 Hrs)</td>
</tr>
<tr>
<td>UNIT:4</td>
<td>Occurrence, General classification, Morphology, Mode of Reproduction and Economic Importance of: Virus</td>
<td>(7 Hrs)</td>
</tr>
</tbody>
</table>

**Textbook:** Microbiology: Pelczar MJ, Chan E C S and Kreig N R Tata Mc Grow Hill

**Reference Books:**

1. **General Microbiology:** R Y Stanier, Adelberg E A and J L Ingraham, Mac Millan Press Inc.
2. **Introduction to microbiology:** Ingraham J L and Ingraham C A Thomson Brooks/ Cole
3. **Principles of microbiology** R M Atlas Wm C brown Publishers
4. **Brock’s biology of Microorganisms** Madigan M T and Martinko J M Pearson Education Inc
5. **Microbiology: An introduction:** Tortora G J, Funke B R and Case C L Pearson Education Inc
6. **Elementary Microbiology Volume:1** Dr.H.A.Modi, Akta Prakashan
1 Motility study by Hanging drop and Agar stab
2 Micrometry
3 Observation of Bacterial growth
4 Observation of yeast growth on Glucose Yeast Extract Agar
5 Staining of yeast and demonstration of budding
6 Observation of fungi growth on Rose Bengal Agar
7 Mounting of fungi (Aspergillus, Mucor) and demonstration of sporangium and conidium
8 Study of permanent slides

Board of Studies (Microbiology)

1 Dr. S.R. Dave
2 Dr. S.A. Bhatt
3 Dr. Rakesh Patel
4 Dr. Devayani Tipre
5 Dr. Nupur Modi
6 Dr. Nikhil Bhatt
7 Dr. Srinivas Duggirala
8 Dr. Pradip Acharya
9 Mrs. Preeti Shukla
10 Dr. Niraj Seth
11 Dr. Pratik Shilpakar
12 Mr. Arvind Dungarachiya
13 Dr. Rakesh Soni
14 Dr. Haribhai Patel
GUJARAT VIDYAPEETH : AHMEDABAD
M.D. Gramseva Mahavidyalaya, Sadra, Dist: Gandhinagar
Department of Microbiology
B.Sc. Semester-II
MIC: 202 Ultrastructure and Growth of Bacteria
(Syllabus of theoretical portion)(With Effect From 1st July, 2016)
(External Evaluation: 60% + Internal Evaluation: 40%)
(Total Teaching Hours=30, Credit=02)

Unit 1: Ultrastructure (8 Hrs.)
1. Surface appendages of bacteria: General nature, arrangement, structure and role of flagella, General nature and significance of pili, prosthecae and stalks (2 Hrs.)
2. Surface layers of bacteria: General nature and significance of capsule, bacterial cell wall, Cell membrane and Mesosomes (2 Hrs.)
3. Bacterial cytoplasm and cell organelles: Cytoplasm, cytoplasmic inclusions, nuclear Material (2 Hrs.)
4. Bacterial endospore: Spore structure, sporulation and spore germination (2 Hrs.)

Unit 2: Nutrition (8 Hrs.)
1. Nutritional requirements of bacteria (Energy, electron, carbon, nitrogen, oxygen, sulfur, phosphorus, trace element, vitamins, water) (2 Hrs.)
2. Nutritional types of bacteria (Phototrophs, Chemotrophs, Autotrophs & heterotrophs, Obligate parasites) (2 Hrs.)
3. Bacteriological media: Types of media, Preparation of media (1 Hr.)
4. Physical condition required for growth (3 Hrs.)
   - Temperature: Psychrophiles, Mesophiles, Thermophiles
   - Gaseous requirements: Aerobic, Anaerobic, Facultative, Microaerophilic, Oxygen toxicity
   - pH (Hydrogen Ion Concentration)
   - Miscellaneous physical requirements: Osmotic pressure

Unit 3: Growth –I (7 Hrs.)
1. Generation time and growth rate (2 Hrs.)
2. Normal growth cycle of bacteria (Lag phase, Logarithmic phase, Stationary phase, Decline / Death Phase) (2 Hrs.)
3. Synchronous growth (1 Hrs.)
4. Continuous culture, Diauxic growth (2 Hrs.)

Unit 4: Growth –II (7 Hrs.)
1. Total count: Direct microscopic count, Electronic enumeration of cell numbers (Electronic particle counter), Determination of cell dry weight, Turbidimetric method [3 Hrs]
2. Viable count: Plate count method (SPC), Membrane filter count, MPN (2 Hrs.)
3. Cell activity: Determination of nitrogen content, Substrate utilization, Product formation, Cell Components (2 Hrs.)
<table>
<thead>
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<tbody>
<tr>
<td></td>
<td>2. <strong>Microbiology: An introduction</strong>: Tortora G J, Funke B R and Case C L. Pearson Education Inc</td>
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<tr>
<td></td>
<td>5. <strong>Elementary Microbiology</strong>: H. A. Modi, Akta Prakashan.</td>
</tr>
</tbody>
</table>
Gram staining
2 Spore staining: Dorner's method
3 Capsule Staining: Hiss's method
4 Determination of bacterial growth in liquid or solid medium.
5 Determination of bacterial growth at different pH.
6 Determination of bacterial growth at different temperature.
7 Determination of bacterial growth at different NaCl concentration.

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GUJARAT VIDYAPEETH : AHMEDABAD  
M.D. Gramseva Mahavidyalaya, Sadra, Dist: Gandhinagar  
Department of Microbiology  
B.Sc. Semester-II  
CHEM-201: Inorganic Chemistry  
(Syllabus of theoretical portion) (With Effect From 1st July, 2016)  
(External Evaluation: 60% + Internal Evaluation: 40%)  
(Total Teaching Hours=30, Credit=02)  

Unit-1: Coordination Compounds (50% Marks) (15 Hours)  
1.1 Double salts and Coordination compounds (2 hours)  
1.2 Werner’s work (2 hours)  
1.3 Types of ligands (1.5 hours)  
1.4 Chelate compound (0.5 hour)  
1.5 Isomerism of coordination compounds (3 hours)  
  -Geometrical isomerism  
  -Optical isomerism  
  -Ionization isomerism  
  -Linkage isomerism  
  -Coordination isomerism  
1.6 Stability of coordination compounds (2 hours)  
  -Step wise and overall formation constants  
1.7 Bonding in coordination compounds (2 hours)  
  -Crystal Field Theory  
1.8 Applications of coordination compounds (2 hours)  

References:  

Unit-2: Covalent Bonding and Molecular Orbitals (50% Marks) (15 Hours)

2.1 Introduction (1 hour)

2.2 Sidgwick-Powell theory (1 hour)

2.3 Valence Shell Electron Pair Repulsion (VSEPR) theory (1 hour)

2.4 Some examples using the VSEPR theory (2 hours)
   - BeCl$_2$
   - BF$_3$
   - NH$_3$
   - H$_2$O
   - PCl$_5$
   - SF$_6$
   - IF$_7$

2.5 Sigma and pi bonds (0.5 hour)

2.6 Molecular orbital method (0.5 hour)

2.7 Linear combination of Atomic Orbitals (LCAO) method (2 hours)
   - s-s combinations of orbitals
   - s-p combinations of orbitals
   - p-p combinations of orbitals
   - p-d combinations of orbitals
   - d-d combinations of orbitals
   - Nonbonding combinations of orbitals

2.8 Rules for Linear Combination of Atomic Orbitals (1 hour)

2.9 Examples of molecular orbital treatment for homonuclear diatomic molecules (4 hours)
   - H$_2^+$ molecule ion
   - H$_2$ molecule
   - He$_2^+$ molecule ion
-He₂ molecule
-Li₂ molecule
-Be₂ molecule
-B₂ molecule
-C₂ molecule
-N₂ molecule
-O₂ molecule
-O₂⁻ molecule ion
-O₂²⁻ molecule
-F₂ molecule

2.10 Examples of molecular orbital treatment for heteronuclear diatomic molecules

-NO molecule
-CO molecule
-HCl molecule

References:


------xxx------xxx--------xxx------
Qualitative analysis of inorganic mixture (45 hours)

Semi-micro method of analysis of mixture of powders containing four radicals excluding soluble $PO_4^{3-}$, arsenite, arsenate and borate. Mixture may be partly soluble in water and wholly soluble in an acid.

Candidate should perform the analysis of following ions:

$Na^+ , K^+ , NH_4^+ , Mg^{2+} , Ba^{2+} , Sr^{2+} , Ca^{2+} , Fe^{2+} , Fe^{3+} , Al^{3+} , Cr^{3+} , Zn^{2+} , Mn^{2+} , Co^{2+} , Hg^{2+} , Pb^{2+} , Cu^{2+} , Sn^{2+} , Ag^+ \text{ and } S^2- , SO_3^{2-} , SO_4^{2-} , CO_3^{2-} , Cl^- , Br^- , I^- , NO_3^- , NO_2^-  

-------XXX--------XXX--------XXX------
UNIT 1:  OPTICS  
**07 Hours**
- Fermat’s Principle of least time
- Law of reflection and Law of refraction using Fermat’s principle
- Resolution, Resolving power and Rayleigh’s criterion
- Resolving power of Prism
- Plane diffraction grating- Resolving power of Plane diffraction grating
- Introduction of optical instruments (Spectrometer, Simple Microscope, Compound Microscope)

UNIT 2:  SOUND  
**08 Hours**
**Sound wave:**
- Introduction, Intensity & its level,
- Loudness & pitch
- Radiation efficiency of a sound source
- Newton’s formula and Laplace’s correction

**Ultrasonic:**
- Introduction,
- Piezo electric effect
- Piezo electric oscillator
- Applications of ultrasonic waves

UNIT 3:  X-RAYS  
**07 Hours**
- Discovery of X-rays
- Production of X-rays
- Origin of X-rays
• Properties of X-rays
• Diffraction of X-rays
• Bragg’s law & crystal structure
• Crystallography by powder method
• Applications of X-rays

UNIT 4: OSCILLATION  
08 Hours

• Equation of displacement, velocity & acceleration
• Combination of two S.H.M. having same time period but different phase (Algebraic method & Graphical method)
• Particular case of Phase differences
• Lissajous figures, their demonstration using CRO
• Uses of Lissajous figures
• Combination of more than two S.H.M (Graphical method)

Reference:

1. Optics and atomic Physics by D. P. Kandelval, Himalaya Publishing house
2. Optics by Ajoy Ghatak (TMH edition)
1. To determine the resolving power of prism.

2. To determine Cauchy’s constant A and B using given formula and also find out with graph.

3. To determine the wavelength of sodium light using plane diffraction grating.

4. Find out the refractive index of different liquids using convex lens.

5. To verify the Stefan Boltzman’s fourth power law using AC source.

6. To study the error and analyze the given data having errors and propagated also to find the percentage errors of the given problems.

7. To study nuclear radioactive decay using simulation.

8. Determination of Miller Indices

9. Simple Pendulum

10. To find out absorption coefficient of liquid with the help of photovoltaic cell.
Objectives:

1. To read different kinds of simple material to find out information contained it.
2. To familiarize students with vocabulary used in the passages
3. To acquaint students with vocabulary having multiple meanings.
4. To familiarize students with the functions of some of the tenses.
5. To orient students towards electronic communication.
6. To develop among students the academic skills of locating books and journals.

Unit 1: Comprehension (Weightage – 40%)  
1. To Sir, with Love by E. R. Braithwaite
2. My Struggle for an Education by Booker T. Washington
3. Samples of Invitation Cards
4. Samples of Notices

**NB:** Teacher should provide at least three samples of invitation cards and notices each.

**Comprehension Pattern:**

1. Short questions
2. Fill in the blanks
3. 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%)  
1. Antonyms/Synonyms (Based on the comprehension texts only)
2. Homophones
3. Homonyms
NB: Teacher should provide a list of homophones and homonyms for the students.

**Unit 3: Grammar (Weightage – 20%)**

- 1 Pronouns (Detailed Study)
- 2 Present Perfect Tense
- 3 Present Perfect Continuous Tense
- 4 Past Perfect Tense
- 5 Past Perfect Continuous Tense

**Unit 4: Writing Skills (Weightage – 30%)**

- 1 Writing Emails
- 2 Describing an Experiment

NB: Only those experiments are to be considered which students undertake in their laboratory.

**Unit 5: Academic Skills: Reference Skills**

- 1 Accessing Books and Journals in a Library
- 2 Using Index of a book to locate specific information

NB: This unit is not to be asked in the examination.

**Seminar/Presentation**

**Reference :-**


GUJARAT VIDYAPEETH : AHMEDABAD  
M.D. Gramseva Mahavidyalaya, Sadra, Dist: Gandhinagar  
Department of Microbiology  
B.Sc. Semester-II  
EC-201: Biofertilizers  
(Syllabus of theoretical portion) (With Effect From 1st July, 2016)  
(External Evaluation: 60% + Internal Evaluation: 40%)  
(Total Teaching Hours=30, Credit=02)

UNIT:- 1  
1 Bio fertilizers-Introduction (4Hours)  
   - Nitrogen fixers, phosphate solubilizers,  
   - Nutrient trans locators, organic matter decomposers, growth accelerators  
2 Bio fertilizers-Marketing and prospects for commercialization (4Hours)  
3 Potential demand and current status of bio fertilizer production in India (4Hours)  
4 Microbiological techniques . (4Hours)  
   - Staining of microorganisms  
   - motility of bacterial cells

UNIT:- 2  
1 Production technology (2 Hours)  
   - Isolation of Rhizobium from nodules  
   - Isolation and culturing of Azotobacter  
   - Isolation and culturing of Azospirillum  
   - Isolation and culturing of Acetobacter  
   - Isolation and culturing of phosphate Solubilizing bacteria (2 Hours)  
2 Mass Production of bacterial biofertilizers (2 Hours)  
3 Quality control of biofertilizers (2 Hours)  
4 Field applications of biofertilizers) (1 Hour)

Reference Books

1 An introduction to biofertilizers and biopesticides,: Dr. M.S. Vora, H.N.Shelat & Dr. R.V. Vyas  
3 Biofertilizers :Subbarao N.S.  
4 Biofertilizers & Organic Farming : Vyas and H.A.modi  
એકમ ૧  પરયાવરણના જીવિક વિવિધાતનો પરિયાય

જીવિક વિવિધતા એ શું? જીવિક વિવિધતાના પ્રકારો: પરિસ્થિતિ તંત્રની વિવિધતા, જનતાઓની વિવિધતા અને જનનીય વિવિધતા, જીવિક વિવિધતાનું મહત્વ, તેની સામાજિક સંસ્કૃતિની ગુજરાતની કુદરતી સંપત્તિ: બનય સંપત્તિ, પાણી સંપત્તિ, માલય સંપત્તિ, પાણી સંપત્તિ, મણેગ્રાહ.

એકમ ૨  કુદરતી સ્રોતો: જમીન અને જંગલો

જમીન નિમ્નો અને તેના પર આસર કરતા પરિબળો, જમીન શેલ્ટલે શું? તેના વિષયનો: સપાટી જમીન અને અંત: જમીન, જમીનની સામાન્ય પરયાવરણ પર આસર, જમીનના ગુણધર્મો: જીવિક ગુણધર્મને, હોલિક ગુણધર્મને અને રાસાયણિક ગુણધર્મને. જમીનના વાક્ષણ્ય ગુજરાતમાં જમીનના પ્રકારો, જમીન અને પાણીની સંબંધ, જમીન અને હવાની સંબંધ, જમીનના સેનીય પ�hapus, જમીનમાં અનન્ત તહેવા તેનું વાક્ષણ્ય અને કાળો, જમીન પ્રદૂષણ અને સમસ્યાઓ: જમીન ધોવાલો, જમીનની આધીનીતા અને ભારત, જમીનની અભારની સમસ્યા, પકડ જમીન, રષીઝઅરલ, જમીન સંસ્કૃતિ, સંઘ અપેતી, સંઘ અપેતીના પાંચ પાંચથી. જંગલો મહત્વ, જંગલ વૈજ્ઞાનિક સંયાસના કારણો અને તેને નિવાસસ્વત્ત ઉપયોગ.

એકમ ૩  ઉદ્દેશ

ઉદ્દેશના વિવિધ ઉપયોગો અને દૃષ્ટિભાષા, ઉદ્દેશ શેલ્ટલે શું? તેના સ્્રોત અને પ્રકાર, ઉદ્દેશ અને પૂરી જ જણ તેવા ઉદ્દેશો જે તેમાં મૌલિકવો નો તરફથી.

(અ) ઉદ્દેશ સ્વયંભૂ: યાંત્રિક ઉદ્દેશ, ઉદ્દેશ, રાસાયણિક ઉદ્દેશ, ગુજરાતિય ઉદ્દેશ, નાલીય ઉદ્દેશ, સૌર ઉદ્દેશ, વિવિધ ઉદ્દેશ.
(4) ઉજળના સ્ત્રોતો: સૂર્ય, સમુદ્રની ભારતી-ઓટ, પરિસ્થિતિ, પવન, સુખાણુષતિમાં, લૂખરી ઉજળ, પોતાનો પનાંજા તેલ, કૃષિથી વાવુ, વિંધન, સંદેશ, સાહિત્ય.

(5) ઉજળ અને પાયા વરણની સંબંધ: વિવિધ ઉજળસંભવના ઉપયોગી પાયા વરણો પર અંતિ માફ અસરો, ઉજળ દ્વારા ઘર અને ઉજળ સંરક્ષણ.

(5) વિવિધ બનપરંપરાગત ઉજળ સાધનો: બાયોગેસ પલાં્ટ, સુર્ય કુકર, પ્રેશર કુકર, ગેસીજીકરણ, સોલર કોનોલીક પપ, પવનવાદી, સોલર ગીન હાઉસ, વિક્ટરિન, લાકડાં સ્વયંસમાર સ્વયંસમાર ઘર, સોલર સ્રાયર, સોલર સ્ીલ, સોલર વોટર હીટર.

Reference:
1. પાયા વરણ સાધી
2. પાયા વરણ અધયાય (પાયા વરણના અધયાયનું બાકી વિદ્યાશાળી સ્વરૂપ) –એ.ગી.સૂરયા
GUJARAT VIDYAPEETH : AHMEDABAD
M.D. Gramseva Mahavidyalaya, Sadra, Dist: Gandhinagar
Department of Microbiology
B.Sc. Semester-II
FC-201: ENVIRONMENTAL STUDY
(Syllabus of theoretical portion) (With Effect from 1st July, 2016)
(External Evaluation: 60% + Internal Evaluation: 40%)
(Total Teaching Hours=45, Credit=02)

1. पर्यावरण शिक्षण विषयनु पाणीकारक कार्य डिल्ल वारी/ पाणी, उर्जा तथा जमीन संदर्भ सर्व/ प्रोजेक्ट वारी द्वारा करावावामा आवश्यक.
2. पाणीकारक पृथ्वीरण
3. जमीनका नमुना तेवाणी पहलति

Board of Studies

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<th>नं.</th>
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<tbody>
<tr>
<td>1</td>
<td>डॉ. धवलभाई वाघेला</td>
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<tr>
<td>2</td>
<td>डॉ. प्रकाश क. पटेल</td>
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<td>3</td>
<td>डॉ. मनीषभाई गोर</td>
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<td>4</td>
<td>डॉ. कृष्णक आर. पटेल</td>
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<td>5</td>
<td>डॉ. निमित बड</td>
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<td>डॉ. हरीभाई पटेल</td>
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