

GOVT DEGREE COLLEGE FOR WOMEN, NALGONDA
DEPARTMENT OF MICROBIOLOGY

As per CBCS syllabus W.e.f 2023-2024

Course Outcomes

I sem I Paper – General Microbiology

- The students will learn and Understand the basic concepts of Microbiology
- Historical developments related to science in particular of Microbiology as a branch of science and the scientists of Microbiology
- Basic staining procedure to view the cell structures
- Acquire knowledge on sterilisation of different objects by various methods
- Study of different microorganisms and viruses based on their characteristics
- Preparation of different culture media for the cultivation of microorganism

II sem II Paper – Microbial Diversity
Course outcomes


The students will get focus on providing the knowledge over the below mentioned

- Basic concepts of diversity at the level of ecosystem, species and genes
- Origin of diverse species in prokaryotes with physiological and metabolic characteristics
- Diverse species of eukaryotic microbes such as algae, fungi and protozoa with their structural, physiological characteristics
- Different types of microbial interactions in the ecosystem
- How to preserve the ecosystem and living species in it


Chairman-Board of Studies
Department of Microbiology
Govt. Degree College for Women (A)
Nalgonda.


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Dr. Suresh

With Effect from the Academic Year 2023-2024

GOVERNMENT DEGREE COLLEGE FOR WOMEN (A)

RAMAGIRI, NALGONDA
(Affiliated to Mahatma Gandhi University)

DEPARTMENT OF MICROBIOLOGY

Faculty of Science B.Sc. (Microbiology) CBCS Pattern


Code	Course Title	Course Type	HpW	Credits
Semester -I				
BS	General Microbiology	DSC-IA	4T + 3P = 7	4 + 1 = 5
Semester -II				
BS	Microbial diversity	DSC-IB	4T + 3P = 7	4 + 1 = 5

Note: HPW-Hours per Week

Schema for B.Sc. I Year Microbiology

Sl.No	Code	Semester	Paper	Type	Subjects	No of credits	Exam Hrs.	Max.Marks		
								IA	End Exam	Total
1	BS	I	I	Core-1 Theory	General Microbiology	4	2 hr:30 min	30	70	100
				Core-1 Practical	General Microbiology	1	3 hrs.	-	50	50
2	BS	II	II	Core-2 Theory	Microbial diversity	4	2 hr:30 min	30	70	100
				Core-2 Practical	Microbial diversity	1	3 hrs.	-	50	50


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Dr. Sujitha

B.SC Microbiology SYLLABUS UNDER CBCS w.e.f. 2023-24

Microbiology Theory I Year (Semester –I)

Total periods -60

BS,DSC-IA

Title: GENERAL MICROBIOLOGY

4HPW -Credits-4

UNIT-1: INTRODUCTION TO MICROBIOLOGY

Meaning, definition and scope. History of microbiology: Contribution of Louis Pasteur and Robert Koch. Importance and application of Microbiology.

Principles of Microscopy-Bright field, Dark field, Phase-contrast, Fluorescent and Electron microscopy (SEM and TEM). Principles and types of stains-simple stain, differential stain, negative stain. Structural stain-spore, capsule, flagella. Bacterial motility - Hanging drop method.

UNIT-2: STRUCTURE OF BACTERIA, VIRUSES & PURE CULTURE CONCEPT

Prokaryotes - Ultra structure of eubacteria.

General characteristics and classification of virus.

Morphology and structure of TMV and HIV. Structure and multiplication of lambda bacteriophage.

Isolation of pure culture techniques- Enrichment culturing, Dilution plating, streak plate, spread plate, Micromanipulator. Preservation of Microbial cultures – Sub culturing, overlaying cultures with minerals oils, lyophilization, sand cultures, storage at low temperature.

UNIT-3: MICROBIAL NUTRITION AND METABOLISM


Microbial Nutrition – Nutritional requirement, Uptake of nutrients by cell, Nutritional groups of microorganisms – Autotrophs, Heterotrophs, Mixotrophs. Components and types of bacterial growth media – simple and complex media.


Respiration – Glycolysis, HMP Pathway, ED Pathway, TCA Cycle and Anaplerotic reaction, Electron Transport, Oxidative and substrate level phosphorylation.

UNIT-4: STERILIZATION TECHNIQUES AND MICROBIAL GROWTH

Sterilization and disinfection techniques - Physical methods- Autoclave, Hot air oven, Laminar air flow, Filter sterilization. Radiation methods - U.V rays, Gamma rays, Ultrasonic methods. Chemical methods - Alcohols, Aldehydes, Phenol, Halogens and Hypochlorides.

Microbial growth – Different Phases of Growth in Batch culture. Factors Influencing microbial growth. Synchronous, Continuous, Biphasic Growth. Methods for measuring microbial growth – Direct Microscopic, Viable count, Turbidometry, Biomass.


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References:

1. Michael J. Pelczar, Jr. E.C.S.Chan, Noel R. Krieg Microbiology Tata McGraw- Hill Publisher.
2. Prescott, M.J., Harley, J.P. and Klein Microbiology 5th Edition, WCB McGrawHill, New York.
3. Madigan, M.T., Martinkl, J.M and Parker, J. Broch Biology of Microorganism. 9th Edition, MacMillan Press, England.
4. Dube, R.C. and Maheshwari, D.K. General Microbiology S Chand, New Delhi.
5. Anthanarayan and Panicker, Medical Microbiology.


General Microbiology

3HPW/1 credit

- Handling and calibration of light microscope.
- Simple and differential staining (Gram staining), Spore staining.
- Microscopic observation of cyanobacteria (Nostoc, Spirulina), algae and fungi (Saccharomyces, Rhizopus, Aspergillus, Pencillium, Fusarium).
- Isolation of T2 bacteriophage from sewage sample.
- Preparation of media for culturing autotrophic and heterotrophic microorganisms – algal medium, mineral salts medium, nutrient agar medium, McConkey agar and blood agar.
- Sterilization techniques: Autoclave, Hot air oven and filtration.
- Enumeration of bacterial numbers by serial dilution and plating (viable count)
- Isolation of pure cultures by streak, spread and pour plate techniques
- Preservation of microbial cultures- Slant, Stab, Sand cultures, mineral oil overlay and glycerol stocks
- Turbidometric measurement of bacterial growth and plotting growth curve.

References:

1. Experiments in Microbiology by K.R. Aneja.
2. GopalReddy.M., Reddy. M.N., SaiGopal. DVR and Mallaiah K.V. Laboratory Experiments in Microbiology.
3. Dubey, R.C. and Maheshwari, D.K. Practical Microbiology, S. Chand and Co New Delhi.
4. Alcamo, I.E. Laboratory Fundamentals of Microbiology. Jones and Bartlett Publishers, USA.


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Dr. Sumany





B.SC Microbiology SYLLABUS UNDER CBCS w.e.f. 2023-24

Microbiology Theory I Year (Semester -II)

Total periods -60

BS,DSC- 1B

Title: MICROBIAL DIVERSITY

4HPW- Credits-4

UNIT 1: CONCEPT OF BIODIVERSITY

Basic concept of Biodiversity and Conservation. Elements of Biodiversity - Ecosystem Diversity, Genetic Diversity, Species Abundance & Diversity. Economic Value of Biodiversity & Legal, Ethical and Conservation issues related to uses of biodiversity.

Classification of living organisms; Haeckel, Whittaker and Carl Woese systems. Differentiation of prokaryotes and eukaryotes.

Classification of bacteria as per the second edition of Bergey's manual of systematic bacteriology.

UNIT 2: PROKARYOTIC MICROBIAL DIVERSITY

General characteristics of eubacteria, Rickettsia and Mycoplasma.

Microbial richness: Exploration, significance, conservation and applications. Structural and physiological diversity of Archaea bacteria, Metabolic characteristics of extremophiles (Methanogens, Halophiles, thermoacidophiles).

Gram negatives: Cyanobacteria and Proteobacteria, Gram positives and heterogenous members including Firmicutes, Actinobacteria, Bacteroidetes, Acidobacteria and Planctomycetes

UNIT 3: EUKARYOTIC MICROBIAL DIVERSITY

Eukaryotic microbial diversity. Structural, physiological and metabolic characteristics, of Algae - Cyanophyta, Chlorophyta Bacillariophyta, Phacophyta, Rhodophyta; Fungi -Phycomycetis, Basidiomycetis, Zygomycetes, Oomycetes, Ascomycetes, Deuteromycetes (imperfect and perfect stages) and Protozoa - Giardia, Entamoeba and Plasmodium.

UNIT 4: MICROBIAL ECOSYSTEMS

Microbial interactions: Symbiosis, neutralism, commensalism, competition, antagonism, synergism, parasitism.

Understanding microbial diversity with Cultivated vs Uncultivated microorganisms.

The Great Plate count anomaly . Cultivation independent methods to assess microbial diversity.

Preserved and perturbed microbial ecosystems, microbiome for sustainable agroecosystems,


Human microbiome

References:

1. Pelczar Jr. M.J. Chan. E.C.S and Kreig.N.R (2006). "Microbiology"- 5th Edition McGraw Hill Inc. New York.

2. David. B.D., Delbecco., R., Eisen, H.N and Ginsburg. H.S (1990) "Microbiology" 5th Edition


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3. General Microbiology by Stainer, R.Y . Ingraham and Painter P.R (1986)
4. Brown , J.W principles of Microbial diversity , ASM press
5. Madigan M. T . (2017) Brock Biology of Microorganism , 15 th edition

I B.Sc II Sem Microbiology Practical syllabus


Microbial diversity

3HPW- 1 credit

1. Isolation of Methanogenic bacteria from Manure by anaerobic culturing
2. Isolation and enumeration of Halophiles from saline environment
3. Isolation of bacteria from diversified habitats to demonstrate antagonism, commensalism and synergism
4. Isolation of Cyanobacteria and Fungi from different habitats
5. Identification of fungi by staining
6. Microscopic observation of soil Algae and Protozoa
7. Winogradsky column to demonstrate microbial diversity
8. Visit and observe the near by ecosystem to understand the role of microorganisms
9. Demonstrate great plate count anomaly

References :

1. Aneza K.R 2001 , Experiments in Microbiology
2. Dubey R.C and Maheswari D.K 2002 Practical Microbiology
3. Reddy S.M , Reddy S.R 1998 , Microbiology practical manual , 3rd edition
4. Gopal reddy et al 2007 Laboratory experiments in Microbiology , 2 nd edition, Himalaya Publishing House , Mumbai


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