Andhra University

Department of Inorganic and Analytical Chemistry

M.Sc.(Final) Chemistry Syllabus for 3rd Semester

Specialization - Environmental Chemistry

# Paper III : Elementary Microbiology

(Effective for 2020-21 Admitted batch)

**Unit -I : Elements of Microbiology**

Brief history of Microbiology-discovery of microorganisms, Controversy over spontaneous generation, Germ theory. Origin of microorganisms-Miller’s Experiment, Chemical and Biochemical evolution of life, A very brief general account on intracellular organelles. Procaryotes and Eucaryotes. Types of microbes. Whittaker’s five kingdom system of classification of organisms.

**Unit -2 : Bacterial Morphology**

Morphology and structure of bacterial cell-Slime layer, Capsule, Flagella, Pili, Cell Wall, Prosthecae, Cytoplasmic Membrane, Ribosomes, Mesosomes, Food granules and Chromatin body, Spore formation in bacteria. Reproduction of bacteria. Nutrition and nutritional types of bacteria-Phototrophs and chemotrophs, Autotrophs and heterotrophs. Lithotrophs and organotrophs, Aerobes, Anaerobes and Facultative Anaerobes. Chemical composition of bacteria, Myxobacteria

**Unit – 3 : Bacterial Metabolism**

Enzymes-Nomenclature and classification of enzymes, factors affecting enzymatic activity. Fermentation and Respiration-Intermolecular and intramolecular fermentation. Complete oxidation and incomplete oxidation. Generation of ATP-substrate level phosphorylation and oxidative phoshorylation, Glucose catabolism-Glycolysis pathway, Pentose phosphate pathway and Enterduodoroff pathway. Citric acid cycle.

**Books:**

1. Microbiology , P.L.Carpenter, W.B. Saunders Company, London(1977)
2. Microbiology, Pelczar, Chan, Krieg and Pelczar Jr. Mc. Graw Hill Book Co., International Student Edn. New Delhi (1986)
3. The Microbial World , V Edn., Stainer etal, Prentice- Hall of India Pvt. Ltd., New Delhi (1990).

**DEPARTMENT OF INORGANIC AND ANALYTICAL CHEM ISTRY**

**M.Sc. (Final) Chemistry III Semester**

**Specialization: Environmental Chemistry Paper-III: Elementary Microbiology**

**(effective for 2020-2021 admitted batch)**

Time: 3 hours Max. Marks: 80

**SECTION-A**

Answer all the questions 5x4=20M

1 a) What are Koch’s postulates? What is their importance?

or

b) What is Miller’s experiment? How did it help in understanding the evolution of life?

2 a) What does the term “Morphology” signify in microbiology? Mention the

various shapes and cell groupings observed in bacteria with a diagram.

or

b) Draw a neat diagram of a bacterial cell and identify the various parts mentioning

their importance in brief.

3 a) What are enzymes? Write a short note on classification of enzymes.

or

b) What is oxidative phosphorylation? Explain. How does it differ from substrate level phosphorylation?

4 a) Explain Embden Maeyorhoff pathway.

or

1. Write notes on nutrition and nutritional types of bacteria.

**SECTION-B**

Answer All Questions 15x4= 60 Marks

5 a) Write an essay on the controversy over spontaneous generation

or

b) What are intracellular organelles? Write a general account on their role in microbes.

6 a) What is an endospore? Write an essay on endospore formation and its importance in bacteria.

or

b) Write an essay on reproduction in bacteria.

7 a) What is the difference between intramolecular fermentation and extramolecular fermentation? Give the various steps involved in the Glycolytic pathway, giving the chemical structures.

or

b) What is respiration? Describe the citric acid cycle in detail. What is its importance?

8 a) Fermentation process is less efficient compared to a respiratory process in harnessing energy. Comment.

or

b) Explain the differences between Gram +ve and Gram –ve bacteria with suitable

diagrams.