

DEPARTMENT: MICROBIOLOGY

PROGRAMME: B.Sc Semester Pattern

Statements of Programme Specific Outcomes

By the end of this course, the students will be able to:

1. Understand the contributions of various scientist in microbiology and scope of various branches
2. Understand various kinds of prokaryotic & eukaryotic microbes and their interactions
3. Explain and describe importance of organic compounds and its chemistry found in living cells
4. Understand and explain various processes of metabolism of carbohydrates amino acids and vitamins
5. Explain DNA, RNA and protein structure and their synthesis
6. Understand the concept of disease development, spread, control and eradication from society
7. Understand the basic concepts of gene and their regulation of action
8. Explain and write various industrial fermentations and bioinstrumentation.

Course: Semester-I

Paper-I : History And Microbial Morphology

Content: History and scope of Microbiology, Prokaryotic Cell structure, Bacterial Taxonomy

Scope:

By the end of this course, the students will be able to:

1. Understand the contributions of eminent scientists in the development of microbiology
2. Understand the ultra structure of bacterial cell
3. Compare the differences in bacterial cell with plant cell and animal cell
4. Classify the bacteria on the basis of various parameters.
5. Bacterial Taxonomy will provide a complete picture about the taxonomical classification of microbes.

Course: Semester-I

Paper-II : Microbial Diversity.

Content: Prokaryotic microbes, Eukaryotic microbes, Acellular microbes:Viruses, Microbial interaction.

Scope:

By the end of this course, the students will be able to:

1. Compare prokaryotic organism with eukaryotic organism
2. Understand the importance of methane producing bacteria
3. Write the method of reproduction in algae fungi and protozoa

4. Understand and compare the characteristics properties of virus with other microbes
5. Understand various kinds of positive and negative interactions of different microbes
6. This subject will provide a complete picture about the taxonomical classification of microbes.

Course: Semester I LAB I

By the end of this course, the students will be able to:

1. Understand working and mechanism of different equipments and tools used in microbiology
2. Prepare various nutrients media for cultivating microbes in laboratory
3. Perform the staining technique of various bacteria
4. Design an experiment to isolate specific bacteria in pure form from sample
5. Determine the sensitivity of specific bacteria to given antibiotics
6. Microscopy, staining, sterilization, characterization of microbes along with microbial structure will be studied.

Course: Semester-II

Paper-I: Microbial Physiology

Content: Microbial Nutrition, Microbial growth and cell cycle, Microbial control, Chemical agents.

Scope:

By the end of this course, the students will be able to:

1. Understand the basic nutritional requirements of bacteria
2. Describe various types of nutrient media for cultivation and isolation of bacteria
3. Explain typical growth curve of bacteria
4. Understand the factors that responsible for bacterial growth
5. Explain mechanism of bacterial cell injury by an anti-microbial agent like anti-biotic.
6. To inculcate knowledge in cell divisions, functions and microbial physiology.

Course: Semester-II

Paper-II: Microbial Techniques

Content: Microscopy-I Principle and application, Staining techniques, Nutritional and growth techniques.

Scope:

By the end of this course, the students will be able to:

1. Understand and explain basic principles and different kinds of microscope
2. Explain the process of different staining techniques
3. Understand and compare various types of stains and dyes
4. Analyze the determination of specific nutrients by bacteria

5. On successful completion of this subject the students should have Knowledge on bioinstrumentation and their application and usages.

Course: LAB Semester II

By the end of this course, the students will be able to:

1. Enumerate bacterial load in the food sample in quality unit
2. Cultivate bacteria in the lab by using aerobic & anaerobic techniques
3. Demonstrate antimicrobial power of heavy metal ion against any bacteria
4. Demonstrate effect VV radiations of bacterial growth.

Course: Semester-III

Paper-I: Chemistry of Organic Constituents And Enzymology

Content: Carbohydrates And Lipids, Amino acids and proteins, Enzymology, Nucleic acid and Vitamins

Scope:

By the end of this course, the students will be able to:

1. Understand the classification of organic compounds like carbohydrates
2. Understand the chemistry of different kinds of carbohydrates
3. Describe importance of vitamins to human body and their deficiency syndrome
4. Compare DNA and RNA
5. Understand the mechanism of enzyme.
6. To inculcate knowledge of biochemical properties of molecules.

Course: Semester-III

Paper-II: Industrial Microbiology

Content: Fundamentals of industrial microbiology, Fermentor design, scale up and DSP, Industrial Production.

Scope:

By the end of this course, the students will be able to:

1. Understand and describe scope of industrial microbiology
2. Understand and operate fermenters in various industries
3. Explain the process of commercial production and ethanol Vitamin B2 Beer, Wine Penicillin etc.
4. Perform the methods and harvesting and product recovery in industrial fermentations
5. Work out the maintenance of ferment or plant.
6. Enable the student to get sufficient knowledge in relationship between food and microbes, techniques used in food processing.

7. On Successful Completion of this subject the students should have a sound knowledge about - combining living matter, in the form of organisms or enzymes, with nutrients under specific optimal conditions to make a desired product.

8. Enable the student to get sufficient knowledge of Bioprocess Technology, methods of translating discoveries of life sciences into practical and industrial products, processes and techniques that can serve the needs of society.

Course: LAB Sem III

By the end of this course, the students will be able to:

1. Design practical experiments to identify carbohydrates from given sample
2. Demonstrate enzyme activity by bacteria
3. Understand the techniques to estimate proteins, RNA, DNA from given sample
4. Design an experiment to produce ethanol by fermentation technique
5. Demonstrate application of yeast in baking industry

Course: Semester-IV

Paper-I: Metabolism

Content: Carbohydrate, Lipid and Nucleic Acid, Amino acids and Proteins, Energy Generation.

Scope:

By the end of this course, the students will be able to:

1. Understand the general strategy of metabolism
2. Understand and explain various metabolic processes operating in living cell
3. Understand the mechanism by which energy is generated in human body
4. Explain and describe the process of protein formation in living cell
5. Explain and describe the process of replication of DNA

Course: Semester-IV

Paper-II: Applied Microbiology

Content: Water microbiology, Waste water treatment, Air and Soil microbiology, Food microbiology

Scope:

By the end of this course, the students will be able to:

1. Understand and explain the significance of bacteriological analysis of drinking water
2. Understand and describe various methods applied for treatment of water and waste water
3. Explain the methods for disposal of industrial wastes
4. Understand the role of microbes of soil in various important processes
5. Describe and explain the applications of bacteria and fungi in bio fertilizers
6. To inculcate knowledge in role and impact created by microbes in agricultural development.

7. Focus on food processing, nutrition , food science & food processing technology. And also study methods of refrigeration, material handling and food preservation.

Course: LAB Sem IV

By the end of this course, the students will be able to:

1. Understand the techniques to isolate microbes from water and waste water (sewage)
2. Understand and demonstrate chlorination of water
3. Demonstrate the technique to find out the alkalinity of water sample
4. Design the experiment to find out quality of raw material
5. Find out microbial load in given drinking water sample.

Course: Semester-V

Paper-I: Medical microbiology

Content: Epidemiology and host –parasite relationship, Microbial mechanism of Pathogenicity, Study of pathogenic organisms, Disease control.

Scope:

By the end of this course, the students will be able to:

1. Understand and explain the stages of infections diseases
2. Describe various modes by which infections spread in community
3. Describe various methods that can be adopted to control spread of infection in community
4. Understand and explain various hospital borne, air borne and water-borne diseases
5. Understand how to educate the people about taking care of health
6. Understand the role of drugs in disease control.
7. It provides knowledge of pathogenic microorganisms, their characterization, pathogenesis and control. Student can safeguard himself & society and can work diagnostics and hospitals.

Course: Semester-V

Paper-II: Molecular biology and bioinstrumentation

Content: Gene mutation and regulation, Genetic recombination, Bioinstrumentation-I (Principles and applications),

Scope:

By the end of this course, the students will be able to:

1. Understand and describe various concepts – related with gene and its regulation
2. Understand and explain various processes by which gene transfer occurs amongst microbes
3. Explain the causes of gene mutation and their effect on cell
4. Understand and explain the principles, methodology and application of various bio instruments like spectrophotometer, electrophoresis, chromatography, centrifuge etc

Course: LAB Semester V:

By the end of this course, the students will be able to:

1. Understand the techniques for isolation of DNA and RNA from living cell
2. Understand and describe liver function test by estimating creatinine from patient's serum
3. Analyze proper chromatography technique to find out unknown organic compounds from sample
4. Understand and design the experiment to diagnose pathogenic organism from patient.

Course: Semester-VI

Paper-I: Immunology

Content: Defensive mechanism of host, Diagram of Haematopoiesis, Antigens, Tagged antibody test, Hypersensitivity reactions,

Scope:

By the end of this course, the students will be able to:

1. Understand and describe human body's resistance mechanism against disease
2. Understand and write the role of human body's various organs in natural resistance.
3. Understand the properties, structure and importance of antibiotics in immunity
4. Understand various mechanism by which antibiotic destroys antigens
5. Describe and explain the reasons, classes and development of allergy in humans.
6. To inculcate knowledge in human immune response towards micro organisms.

Course: Semester-VI

Paper-II: Biotechnology

Content: Tools & techniques of genetic engineering, Application of genetic engineering, Agricultural biotechnology, Food.

Scope:

By the end of this course, the students will be able to:

1. Understand the tools and techniques of genetic engineering
2. Understand and describe DNA, fingerprinting and its application in forensic science
3. Understand the methods of production of health related compounds by biotechnology
4. Understand and write application of biotechnology in agriculture
5. Explain and describe the advantages /disadvantages of genetic engineering for humans
6. Understand the production and importance of genetically modified food
7. It is the most advanced subject in Microbiology having abroad applications in industrial, medical, agricultural fields. Hence students with this knowledge can work in biotechnology industries with above applications.

Course: LAB Semester VI:

By the end of this course, the students will be able to:

1. Understand and analyze the experiment to diagnose sexually transmitted disease
2. Understand and describe the detection of typhoid
3. Analyze the production of bio-fertilizer
4. Analyze the production of soyasauce
5. Understand and explain various experiments to diagnose diseases.



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