DEPARTMENT OF MICROBIOLOGY Govt. Jajwalyadev Naveen Girls College Jangir (C.G)

What is Microbiology?

Microbiology is the study of all living organisms that are too small to be visible with the naked eye. This includes bacteria, archaea, viruses, fungi, prions, protozoa and algae, collectively known as '**microbes**'. The discipline focuses on the structure, function, and classification of these organisms and looks for ways to exploit and control their activities. **Antoni van Leeuwenhoek** (1632-1723), a cloth trader from Delft, is the founding father of microbiology. He used home-made microscopes to discover the invisible world of micro-organisms. Microbiology has proved to be one of the most important disciplines in **biology**, making it possible to identify how some of these organisms cause diseases, discover cures for such diseases and even use some microbes for **industrial** purposes etc. Major groups of microbiology is concerned with form, structure, reproduction, physiology, metabolism classification, and, most important, economic importance of the microorganisms. All around the world there are **microbiologists** making a difference **to** our **lives** ensuring our food is safe, treating and preventing disease, developing green technologies or tracking the role of microbes in climate change. **Microbiologists** aim **to** answer many important global questions by understanding microbes.

Scope of Microbiology:

The **scope** in this field is immense due to the involvement of **microbiology** in many fields like medicine, pharmacy, diary, industry, clinical research, water industry, agriculture, chemical technology and nanotechnology. A **microbiologist** can innovate new diagnostic kits, discover new drugs, teach, research, etc. **Microbiology** is a thriving field that should provide **good** prospects for qualified workers. Most of the applied research projects that **microbiologists** are involved in require the expertise of scientists in multiple fields such as geology, chemistry, and medicine.

- Research Assistant.
- Food, Industrial or Environmental Microbiologists.
- Quality Assurance Technologists.
- Sales or Technical Representative.
- Clinical and Veterinary Microbiologists.
- Medical Technologists.
- Biomedical Scientist.
- Clinical Research Associate.
- Agriculture Department.
- Chemical Industries.
- Beverage Industry.
- Food Industry.
- Environmental Agencies.
- Research Organisations.
- Private Hospitals.
- Laboratories.

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PROGRAMME OUTCOMES (B.Sc. Microbiology)

PO-1. Understand the contributions of various scientist in microbiology and scope of various branches.

PO-2. Understand various kinds of prokaryotic & eukaryotic microbes and their interactions

PO-3. Explain and describe importance of organic compounds and its chemistry found in living cells

PO-4. To Knowledge of symptoms, pathogenicity and preventive measures and treatment of microbial diseases.

PO-5. Understand and explain various processes of metabolism of carbohydrates amino acids and vitamins

PO-6. To knowledge about role of microbes in production and spoilage of several foods.

PO-7 Basic information about fermenter and production of Industrial Microbiological products.

PO-8 Understand the basic concepts of gene and their regulation of action.

PROGRAMME SPECIFIC OUTCOMES (B.Sc. Microbiology)

On completion of the Programme the students will be able to-

PSO-1 Understand the concept of disease development, spread, control and eradication from society

PSO-2. Understand the unique importance of Modern Microbiology

PSO-3. Understand the values of Microbial Diversity.

PSO-4. Understand the basic concepts of gene and their regulation of action.

PSO-5 Can be able to apply in different applied microbial industries, medical laboratories etc.

PSO-6 Understand and explain various metabolic processes operating in living cell

Course Outcomes (B.Sc. PART- I/II/ III – Microbiology)				
S.No	Name of Course	Year/Semester	Name of Subject/Paper	Course Outcomes
1.	B.Sc.	Part-I (Paper-I)	General Microbiology & Basic Techniques	 Understand the contributions of eminent scientists in the development of microbiology Understand the ultra-structure of bacterial cell Compare the differences in bacterial cell with plant cell and animal cell Classify the bacteria on the basis of various parameters. Compare prokaryotic organism with eukaryotic organism Understand the importance of methane producing bacteria Write the method of reproduction in algae fungi and protozoa Understand and compare the characteristics properties of virus with other microbes Understand various kinds of positive and negative interactions of different microbes
2.	B.Sc.	Part-I (Paper-II)	Biochemistry & Physiology	 Understand the basic nutritional requirements of bacteria Describe various types of nutrient media for cultivation and isolation of bacteria Explain typical growth curve of bacteria Understand the factors that responsible for bacterial growth Explain mechanism of bacterial cell injury by an anti-microbial agent like anti-biotic. Understand the general strategy of metabolism Understand and explain various metabolic processes operating in living cell Understand the mechanism by which energy is generated in human body Explain and describe the process of protein formation in living cell Explain and describe the process of replication of DNA
3.	B.Sc.	Part-II (Paper-I)	Microbial Physiology & Genetics	 Understand the basic nutritional requirements of bacteria Describe various types of nutrient media for cultivation and isolation of bacteria Explain typical growth curve of bacteria Understand the factors that responsible for bacterial growth Explain mechanism of bacterial cell injury by an anti-microbial agent like anti-biotic.

				6 To give the Students a knowledge of Genetic
				recombination
				7. To give the Students a knowledge of DNA
				Papair and restriction
4	R So	Dort II	Dringingle of	1 Understand and explain basic principles and
4.	D.SC.	(Domon II)	Principals of Disingtrumontation	different kinds of microscope
		(Paper-II)		2 Explain the process of different staining
			& rechniques	2. Explain the process of different standing
				2 Understand and compare various types of stains
				ond duce
				Analysis the determination of apositic putrients
				4. Analyse the determination of specific nutrents
				5 Explain the courses of gone mutation and their
				offect on cell
				6 Explain the tech of different types of
				chromatography
				7 Understand the different Electrophoresis
				<i>technique to separate proteins and amino acids</i>
				8 Understand and explain the principles
				methodology and application of various bio
				instruments like spectrophotometer
				electrophoresis, chromatography, centrifuge etc
5.	B.Sc.	Part-III	Molecular Biology	1. Understand the tools and techniques of genetic
	2.00	(Paper-I)	& Genetic	engineering
		(Engineering	2. Understand and describe DNA, fingerprinting
			8 . 8	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. Understand and describe various concepts
				related with gene and its regulation
				8. Understand and explain various processes by
				which gene transfer occurs amongst microbes
				9. Explain the causes of gene mutation and their
				effect on cell
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6.	B.Sc.	Part-III	Environmental &	1. Understand and explain the stages of infectious
		(Paper-I)		alseases
			witcrobiology	2. Describe various modes by which infections
				Spread III community
				5. Describe various methods that can be adopted to
				4. Understand and evenies hearital hearit
				4. Understand and explain various nospital borne,
				5 Understand how to advasta the people shout
				5. Onderstand now to educate the people about taking care of health
				6 Understand the role of drugs in discoss control
	1		i de la companya de la company	TO, UNDERSIGNED THE FOLE OF GRUPS IN DISEASE CONTROL.

7. Understand and explain the significance of
bacteriological analysis of drinking water
8. Understand and describe various methods
applied for treatment of water and waste water
9. Explain the methods for disposal of industrial
wastes
10.Understand the role of microbes of soil in
various important processes
11.Describe and explain the applications of
bacteria and fungi in bio fertilizers

Practical Course Outcomes (B.Sc. PART- I/II/ III – Microbiology)				
S.No	Name of Course	Year/Semester	Name of Subject/Paper	Practical Course Outcomes
1.	B.Sc.	Part-I (Paper-I & II)	General Microbiology & Basic Techniques and Biochemistry & Physiology	 Understand working and mechanism of different equipment's and tools used in microbiology Prepare various nutrients media for cultivating microbes in laboratory Perform the staining technique of various bacteria Design an experiment to isolate specific bacteria in pure form from sample Determine the sensitivity of specific bacteria to given antibiotics Design practical experiments to identify carbohydrates from given sample Demonstrate enzyme activity by bacteria Understand the techniques to estimate proteins, RNA, DNA from given sample Design an experiment to produce ethanol by fermentation technique Demonstrate application of Yeast in baking industry
2.	B.Sc.	Part-II (Paper-I & II)	Microbial Physiology & Genetics and Principals of Bioinstrumentation & Techniques	 Enumerate bacterial load in the food sample in quality unit Cultivate bacteria in the lab by using aerobic & anaerobic techniques Demonstrate antimicrobial power of heavy metal ion against any bacteria Demonstrate effect UV radiations of bacterial growth. Analyse proper chromatography technique to find out unknown organic compounds from sample

3.	B.Sc.	Part-III	Molecular Biology &	1. Understand the techniques to isolate microbes
		(Paper-I & II)	Genetic Engineering	from water and waste water(sewage)
		_	and Environmental	2. Understand and demonstrate chlorination of
			& Medical	water
			Microbiology	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.
				6. Understand the techniques for isolation of
				DNA and RNA from living cell
				7. Understand and describe liver function test by estimating creatinine from patient's serum
				8. Analyse proper chromatography technique to
				find out unknown organic compounds from sample
				9. Understand and design the experiment to
				diagnose pathogenic organism from patient.
				10.Understand the techniques to isolate microbes
				from soil and air.

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