

Department of Botany and Microbiology
St. Aloysius' College (Auto.)Jabalpur
M.Sc. Microbiology
Semester I
Choice Based Credit System
SCHEME OF EXAMINATION

(A) Continuous evaluation, Theory, Practical		Credits	Maximum Marks		
			Continuous Evaluation	End Semester Exam	Total
Course	Course Title				
I Core courses					
P I	Bacteriology	4	10	40	50
P II	Virology	4	10	40	50
P III	Mycology	4	10	40	50
	Practical based on P I & PII	4			50
	Practical based on P III & P IV/ P V	4			50
II Electives courses (Any one to choose)		4	10	40	50
P IV	Biomolecules				
P V	Bioenergetics and Intermediary Metabolism				
III Skill Development course					
	Skill Development	1	Grade Point will be provided by Skill Development Centre		
Total valid credits		25			

M.Marks

(B) Seminar and viva voce	2	25
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CBCS syllabus has been recommended by the experts and all the members of Board of studies for M.Sc(Microbiology) ,subject to the approval of relevant statutory body. (2019)

Max. Marks: 40(TH.)+10 CCE =50

Student learn the basics of bacteriology like History and scope; bacterial structure, physiology and functions. They will become equipped with skills in bacteriological techniques including microscopy, staining techniques, preparation and use of culture media, various means of sterilization, methods for identification of unknown bacteria and various methods of bacterial growth measurement. The content knowledge will be applicable in identifying the bacterial pathogen.

History, scope and development of bacteriology, sterilization, isolation, enrichment, pure culture and staining techniques, systematic study of bacteria; morphological, physiological, biochemical and serological studies, genetic characterization, identification & classification chart.

Habitat, structure, reproduction & classification of bacteria (morphological, biochemical, serological, chemical and molecular aspects). Actinomycetes, *Mycoplasma*, *Rickettsiae*, *Chlamydiae* and their significance.

The photosynthetic bacteria; cyanobacteria, green bacteria, halobacteria and their economic importance. Methanogenic bacteria and their significance. Chemoautotrophs and Methylo-trophs: nitrifying bacteria, sulfur oxidizers, iron bacteria, hydrogen bacteria and their economic importance.

Enterobacteriaceae and related organisms, their morphological & physiological characters, genetic interrelationship, taxonomic sub-division & their importance in human health. Myxobacteria, cytophage group, filamentous & gliding chaemoheterotrophs & filamentous sulphur oxidizing bacteria.

Gram positive spore forming bacteria; unicellular endospore formers- *Bacillus*, *Clostridia*. Miscellaneous bacteria; lactic acid bacteria. Micrococci, Corynebacteria, Mycobacteria.

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Class: M. Sc.

Subject: Microbiology

Title of Subject: Virology (Core Course)

Semester: I Semester

Paper: II

Max. Marks: 40(TH.)+10 CCE =50

Course Outcome:

The learner is taught about the architecture of viruses, their classification, interaction between viruses and their host cells and viruses as tools for various experiments in molecular biology and genetics. They get acquainted with techniques of isolating, purifying and culturing viruses as well as the role of viruses in oncogenesis. Enriched in virological aspects the students can contribute in preventing and treating viral infections.

UNIT-I

General virology: History and development of virology, origin, distinctive properties, ultrastructure and chemistry of viruses, virus related agents (viroids, prions), significance of viruses.

UNIT-II

General methods for isolation, identification, characterization and cultivation of viruses: Methodology for isolation, adsorption, One-step growth and burst size of virus. Determination of titre value, isolation of phage resistant strain, cultivation and maintenance of plant, animal and bacterial / cyanobacterial viruses, identification of viruses by physical, chemical and serological techniques.

UNIT-III

Bacterial/ cyanobacterial viruses: Structure and multiplication of lytic and lysogenic bacteriophage. Significance of lysogeny. Brief account of M13, Mu, T4 and λ , history, structure, genetics and life cycle of cyanophages, significance of bacteriophages and cyanophages.

UNIT-IV

Plant viruses: classification and nomenclature, structure and multiplication of plant viruses with special reference to TMV, cauliflower mosaic virus, effect of viruses on plants. Some common viral diseases of plants (TMV, CMV, leaf Curl of papaya). Transmission of plant viruses and control of viral diseases of plants.

UNIT-V

Animal viruses: Classification and nomenclature of animal and human viruses. Brief account of Adeno-, Herpes, Hepatitis, HIV and other oncogenic viruses. Prevention, treatment and control of viral diseases. Viral vaccines including DNA vaccines and interferons.

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St. Aloysius' College (Autonomous), Jabalpur, M.P.
Department of Botany and Microbiology
M.Sc I semester Microbiology
Choice Based Credit System
2019-20

Class: M. Sc.

Subject: Microbiology

Title of Subject: Mycology (Core Course)

Semester: I Semester

Paper: III

Max. Marks: 40(TH.)+10 CCE =50

Course Outcome:

Basic morphology, physiology, classification, genetics and methods for identifying fungi, training in laboratory techniques used in isolation, culturing, staining and identification of various fungi equips the learners with the world of mycology for their future career.

UNIT-I

Status of fungi in the living world, general features of fungi and fungus like organisms; recent trends in the classification of fungi; physiology and growth of fungi; nutritional and environmental factors affecting growth; saprotrophs, parasites and mutualistic symbionts; physiology of reproduction in fungi, phylogeny of fungi.

UNIT-II

Fungal diversity-major taxonomic group, structure, reproduction, life cycle and significance of the following representatives:

- Gymnomycota-general account – cellular slime moulds (*Dictyostelium*), plasmodial slime moulds (*Myxomycetes*).
- Mastigomycota- *Coelomomyces*, *Lagenidium*, *Achlya*, *Phytophthora*, *Peronospora*, *Plasmodiophora*.
- Amastigomycota- Zygomycotina- *Mucor*, *Syncephalastrum*, *Blakeclea*, *Cunninghamella*, *Entomophthora*.

UNIT-III

Fungal diversity contd. structure, reproduction, life cycle and significance of the following representatives:

- Ascomycotina- *Taphrina*, *Emmericella*, *Chaetomium*, *Morchella*, *Neurospora*, *Claviceps*, *Erysiphae*.
- Basidiomycotina- *Puccinia*, *Melampsora*, *Ustilago*, *Polyporus*, *Lycoperdon*, *Ganoderma*.
- Deutromycotina- *Fusarium*, *Cercospora*, *Curvularia*, *Beauveria*, *Microsporium*, *Phoma*, *Collectotrichum*.

UNIT-IV

Fungal genetics:

- Life cycle and sexual process in fungi; structure and organization of fungal genomes (mitochondrial genes, plasmids and transposable elements, virus and viral genes).
- Genetic variations in fungi- nonsexual variations-haploidy, heterokaryosis, parasexuality; sexual variations- mating or breeding systems- homothallism and heterothallism, mutation, physiological specialization; strain improvement.

UNIT-V

Fungi and biotechnology: production of alcoholic beverages, antibiotics, organic acids, ergot alkaloids; the cultivation of fungi for food-mushrooms, mycoprotein and mycofoods; role of fungi in agriculture and forestry- mycorrhizae and their application, mycopesticides, mycotoxins, conservation of fungal germplasm.

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2019-20

Class: M. Sc.
Subject: Microbiology
Title of Subject: Biomolecules (Elective Course)

Semester: I Semester
Paper: IV
Max. Marks: 40(TH.) + 10 CCE = 50

Course Outcome:

Knowledge of fundamental biochemistry like biomolecules and their role in biological systems, laws of thermodynamics and their application to biological systems analytical skills for identifying biomolecules, enzymatic reactions and their regulation enables the students to perform and assess biochemical tests required during the disease diagnosis.

UNIT I

Structure of water and its solvent properties, Acid- bases, pH and buffer. Bi and polyprotic buffer. Free energy and spontaneity of reactions, ATP and other phosphorylated compound with their free energy of hydrolysis. Phosphoryl group transfer. Biological oxidation reductions reaction. Coupled reaction and oxidative phosphorylation. Inhibitors and uncouplers.

UNIT II

Enzyme classification. Specificity. Active site. Enzyme kinetics. Michealis Menton equation. Determination of kinetic parameters. Bi-substrate reaction and their kinetics. Enzyme inhibition and kinetics. Allosteric enzyme. Kinetics and Allosteric regulation of phosphofructo kinase

UNIT III

Structure and chemistry of macromolecules, Proteins, Carbohydrates and Lipids. Protein folding. Structure and chemistry of biomolecules such as antibiotics, Pigments, Vitamins as coenzymes. Lipid analysis by GLC and Mass Spectrometry. Oligosaccharide and Polysaccharide analysis.

UNIT IV

Biosignaling molecular mechanism of signal transduction. Gated ion channels. Nicotinic acetyl choline receptor. Receptor enzyme. The insulin receptor. G- proteins and cyclic AMP membrane transport. Biomembrane. Nutrient transport across membranes. Active and passive diffusion. Symport. Antiport and uniport. Na^+ K^+ pumps and their metabolic significance.

UNIT V

Chromatographic technique. Paper and TLC . Gel filtration. Ion exchange. Affinity. HPLC. SDS. PAGE. Isoelectric focusing. Western blotting. Protein sequencing. Mass spectrometry. MALDI, TOF, MS.

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