

बरकतउल्ला विश्वविद्यालय,भोपाल
Barkatullah University, Bhopal

As per model syllabus of U.G.C. New Delhi, Approved by Board of
Studies Microbiology



जीव विज्ञान संकाय
Faculty of Life Science

पाठ्यक्रम एवं निर्धारित पुस्तकें
Syllabus & Prescribed Books

एम.एस.सी. (माइक्रोबायोलॉजी) चतुर्थ सेमेस्टर

M.Sc. (Microbiology) Fourth Semester

प्रकाशक
कुलसचिव
बरकतउल्ला विश्वविद्यालय,भोपाल

BARKATULLAH UNIVERSITY, BHOPAL
M.Sc. (Microbiology)
Fourth Semester Examination Scheme

1. Course Code	:		6. Maximum Theory Marks	:	500
2. Course Name	:	M.Sc. Microbiology	7. Minimum Passing Percentage	:	36
3. Total Paper	:	04	8. Laboratory	:	100
4. Compulsory Paper	:	04	9. Laboratory Passing Percentage	:	18
5. Laboratory	:	01			

Note :- For Those students who have secured less than 60% marks in first two semester

Title of the Paper	Theory		CCE		Total Marks		Practica 1		Total Marks	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
Microbial Diversity	85	31	15	05	100	36	---	---	100	36
Advance Techniques and Good Microbiological Practices	85	31	15	05	100	36	---	---	100	36
Dissertation (Three month)										
(a) Evaluation	---	---	---	---	---	---	---	---	100	36
(b) Presentation & Viva	---	---	---	---	---	---	---	---	100	36
Lab Course I: Based on the paper	---	---	---	---	---	---	50	18	50	18
Lab Course II: Based on the paper	---	---	---	---	---	---	50	18	50	18

Note :- For Those students who have secured less than 60% marks in first two semester (ATKT student are not eligible)

** Six month Dissertation	Evaluation	250
	Presentation & Viva	250
Total		500
Grand Total-		2000

Note- * for those students who have secured less than 60 percent in first two semesters.

****** For those students who have secured 60 percent and above in first two semesters.

BARKATULLAH UNIVERSITY, BHOPAL

Class	-	M.Sc.
Subject	-	Microbiology
Paper Name	-	MB-401 MICROBIAL DIVERSITY
Paper	-	13
Semester	-	Fourth

MM : 85

UNIT - I Biodiversity, characteristics and classification of Archaeobacteria -

Introduction to microbial biodiversity– distribution, abundance, ecological niche. Thermophiles: Classification, hyperthermophilic habitats and ecological aspects. Extremely Thermophilic Archaeobacteria, Thermophily, commercial aspects of thermophiles. Applications of thermozyms. Methanogens: Classification, Habitats, applications.

UNIT – II Alkalophiles, Acidophiles Halophiles and Barophiles-

Classification, alkaline environment, soda lakes and deserts, calcium alkalophily Applications .Acidophiles: Classification, life at low pH, acidotolerance, applications. Classification, Dead Sea, discovery basin, cell walls and membranes – Purple membrane, compatible solutes. Osmoadaptation/halotolerance. Applications of halophiles and their extremozymes. Barophiles: Classification, high-pressure habitats, life under pressure, barophily, death under pressure.

UNIT- III Space Microbiology-

Aims and objectives of Space research. Life detection methods a). Evidence of metabolism(Gulliver) b). Evidence of photosynthesis (autotrophic and heterotrophic) c). ATP production d).Phosphate uptake e). Sulphur uptake. Martian environment (atmosphere, climate and other details). Antarctica as a model for Mars. Search for life on Mars, Viking mission, Viking Landers, and Biology box experiment. Gas exchange, Label release and pyrolytic release experiments. Monitoring of astronauts microbial flora: Alterations in

the load of medically important microorganisms, changes in mycological auto flora, and changes in bacterial auto flora.

UNIT – IV Taxonomy and Diversity - Methods in Taxonomy of Bacteria (including archaeobacteria,) and Fungi: (Morphological Methods, Chemotaxonomy, Genetic Methods, Methodology of rRNA sequencing) Methodology of identification of unknown pure cultures: Strategy and methods. The expanse of microbial diversity, estimates of total number of species, measures and indices of diversity. Newer approaches for exploring unculturable bacteria: Culture independent molecular methods, Methods of extracting total bacterial DNA from a habitat.

UNIT – V Bioinformatics-Biological data type: literature data, sequence data, derived data, taxonomy data, genetic study data, molecular structure data, and expression pattern data. Classification of biological databases. Sequence alignment, scoring matrices, local and global alignment, dynamic methods, Needleman and Wunsch algorithm, Smith-Waterman algorithm, database search for homologous sequences, BLAST and FASTA versions.

REFERENCE BOOKS

- Microbial Diversity: Form and Function in Prokaryotes by [Oladele Ogunseitan](#), Wiley & Sons
- Principles of Microbial Diversity, 1st Edition by [James W. Brown](#)
- Microbial Diversity and Bioprospecting by [Alan Bull](#)

BARKATULLAH UNIVERSITY, BHOPAL

Class	-	M.Sc.
Subject	-	Microbiology
Paper Name	-	MB-402 ADVANCE TECHNIQUES AND GOOD MICROBIOLOGICAL PRACTICES
Paper	-	14
Semester	-	Fourth

MM : 85

UNIT-I Molecular techniques-Blotting: Principles, types of blotting, immunoblotting- Southern, Northern, Western and Dot blots. DNA amplification: PCR, RT- PCR. DNA sequencing: Various methods of DNA sequencing. Gene silencing: RNA interference (RNAi). Mapping of genome: Molecular markers as tools for mapping- Restriction Fragment Length Polymorphism (RFLP), randomly amplified polymorphic DNA (RAPD), simple sequence length polymorphism (SSCP), amplified fragment length polymorphism (AFLP). Functional genomics: entire genome expression analysis-microarrays, expressed sequence tags (ESTs), serial analysis of gene expression (SAGE), single nucleotide polymorphism (SNP).

UNIT- II Animal cell culture-Laboratory facilities for animal cell culture, cell lines, growth media, impact of serum in culture media, primary culture, and application of animal cell culture. Introduction to stem cell biology (renewal potency), definition of terms (adult stem cell, embryonic stem cell, germ line stem cell), cell differentiation, iPS cells, Stem cells & therapeutics.

UNIT-III Molecular biology of cancer-Benign and malignant tumors, types of cancer, properties of cancerous cells, stages in cancer development, functions of tumor suppressor gene products. cancer-causing agents, proto oncogenes and oncogenes, apoptosis, anti-apoptotic proteins and

DNA repair proteins, P53 as tumor suppressor genes, induced cell suicide, telomerase expression & immortalization of cells.

UNIT-IV Biosafety and bioethics- Biosafety guidelines, Risk and risk assessment, Biosafety levels, laboratory biosecurity concepts Pre-clinical and clinical trials, Basics of bioethics principles, international codes and guidelines in India, Ethics in post-genomic era

UNIT-V Regulatory affairs-Introduction to pharmacopoeia, good microbiological techniques and good laboratory practice (GLP) Basic principles of quality control (QA) and quality assurance (QC) Guidelines for QA and QC: raw materials, sterilization, media, stock cultures and products Validation study LAL test, sterility testing and bioassay Role of culture collection centre, public health laboratories and regulatory agencies.

REFERENCE BOOKS

- Molecular Biology and Biotechnology by John M. Walker, Ralph Rapley
- Genetics and Molecular Biology by Robert Schleif
- Animal Biotechnology by R.I. Freshney