

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) तृतीय सेमेस्टर

M.Sc. (Microbiology) Third Semester

प्रकाशक
कुलसचिव
बरकतउल्ला विश्वविद्यालय,भोपाल

BARKATULLAH UNIVERSITY, BHOPAL
M.Sc. (Microbiology)

Third 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			

Title of the Paper	Theory		CCE		Total Marks		Practical		Total Marks	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
Immunology and Immunodiagnostic	85	31	15	05	100	36	---	---	100	36
Environmental Microbiology	85	31	15	05	100	36	---	---	100	36
Agricultural Microbiology	85	31	15	05	100	36	---	---	100	36
Medical Microbiology and Parasitology	85	31	15	05	100	36	---	---	100	36
Lab Course I: Based on the paper	---	---	---	---	---	---	50	18	50	18
Lab Course II: Based on the paper	---	---	---	---	---	---	50	18	50	18

BARKATULLAH UNIVERSITY, BHOPAL

Class	-	M.Sc.
Subject	-	Microbiology
Paper Name	-	MB-301 IMMUNOLOGY & IMMUNODIAGNOSIS
Paper	-	9
Semester	-	Third

MM : 85

UNIT-I Infection: Sources of infection, vehicles or reservoir of infection, spread of infection, Types of infection, predisposing factors, host parasite relationship, Inflammation: Symptoms and mechanism, Acute and chronic inflammation. History and scope of immunology.

UNIT-II Immune response: Innate immune mechanism, Defense barriers, Adaptive or Acquired Immunity, Anatomical organization of immune system: Primary and Secondary lymphoid organs, Cells of immune system: Mononuclear cells and granulocytes, Antigen presenting cells(APC), T and B Cells and their subsets, NK cells and Dendritic cells.

UNIT-III Antigen and Hapten: Structure, properties and type, I immunoglobulin, structure, heterogeneity, types, structures and properties, Hybridoma Technology and production of Monoclonal antibodies and their use in research and therapy, Complements system: structure, component, properties and pathways of complements, biological consequences of complement activation. Antigen-Antibody reaction: Agglutination, Precipitation, complement fixation, Immunofluorescence Assay (IFA), ELISA , Radio Immuno Assay (RIA) and Flowcytometry.

UNIT-IV Transplantation immunology, Tumour immunology, Autoimmunity its mechanisms and related disorders, Immuno deficiency diseases.

UNIT-V Major Histocompatibility Complex (MHC) and HLA molecules, Hypersensitivity: Definition and classification, IgE mediated hypersensitivity: mechanism of mast cell degranulation, mediators of Type I reaction and consequences, Type II hypersensitivity-Antibody Dependent Cell Mediated Cytotoxicity (ADCC) and NK cell mediated

cytotoxicity, Type III Immune complex mediated and Type IV Cell mediated or Delayed Hypersensitivity, Cytokines and Their role in immune responses, disease related to cytokines and their therapeutic applications. Complement System

REFERENCE BOOKS

- Immunology: Lydyard, P.M., Whelan,A., Fanger, M.W. , 1st Ed., Viva Books
- Essential Immunology, Roitt, I.M., 9th Ed. (1997), Blackwell Scientific, Oxford, UK
- Immunology, Kuby, J. 3rd Ed. (1997), Freeman, W.H. ,Oxford

BARKATULLAH UNIVERSITY, BHOPAL

Class - **M.Sc.**
Subject - **Microbiology**
Paper Name - **MB-302 ENVIRONMENTAL MICROBIOLOGY**
Paper - **10**
Semester - **Third**

MM : 85

- UNIT-I** Microorganisms of air, enumeration of air microflora, significance of microorganisms in air, control of air borne microorganisms. Some common diseases caused due to airborne microflora Interdisciplinary approach of air borne microorganisms.
- UNIT-II** Microbial assessment of water quality: test for coliforms (presumptive test confirmed test and completed test), MPN of coliforms. Purification of water. Brief account of water borne diseases and their control measures. Microorganisms of sewage, small scale sewage treatment (cesspools, septic tanks), large scale sewage treatment (primary treatment, secondary and tertiary treatment (lagoons, trickling filter, activated sludge, anaerobic digesters).
- UNIT-III** Microbial degradation of biogenic compounds: cellulose and lignins. Microbiology of degradation of xenobiotics: ecology considerations, decay behavior and degradative plasmids. Microbial degradation of hydrocarbons and substituted hydrocarbons Microbial degradation of surfactant, pesticides and synthetic polymers.
- UNIT-IV** Bioremediation, principles and strategies. Phytoremediation - Types of energy sources and their uses, Biofuels-biogas, bioethanol, biohydrogen, biodiesel.
- UNIT-V** Mining with microorganisms: Bioleaching and bioextractive metallurgy. Accumulation of metals by microbial cells. Microbial restoration of wastes and degraded land. Microbial toxins in the environment: bacterial and algal toxins.

REFERENCE BOOKS

- Odum, E.P., Fundamentals of Ecology
- Metcalf & Eddy, Wastewater Engineering – Treatment, Disposal and Reuse, 3rd ed., Tata McGrawhill
- Rao, C.S., Environmental Pollution Control Engineering, New Age International, 1999
- Arceiwala, S.J., Wastewater treatment for pollution control, 2nd Ed. TMH

BARKATULLAH UNIVERSITY, BHOPAL

Class	-	M.Sc.
Subject	-	Microbiology
Paper Name	-	MB-303 AGRICULTURAL MICROBIOLOGY
Paper	-	11
Semester	-	Third

MM : 85

- UNIT-I** Microorganisms of soil, Rhizosphere and phyllosphere microflora. Brief account of microbial interactions. Symbiosis, mutualism commensalisms, synergism and parasitism. Nutrient cycle: Carbon cycle, Nitrogen cycle, phosphorous cycle and sulphur cycle.
- UNIT-II** Role of enzymes and toxins in pathogenesis. Fungal Diseases of plants: rust of wheat, green ear disease of bajra. Bacterial diseases of plants: citrus canker, yellow rot of wheat. Viral diseases of plants leaf curl of papaya, leaf curl of tomato.
- UNIT-III** Physical and chemical control of plant diseases. Integrated Pest Management, Bacterial control of phytopathogens *Bacillus thuringiensis* as bacterial insecticide. Viral control of phytopathogens nuclear polyhedrosis viruses (NPV) and cytoplasmic polyhedrosis viruses. Fungal control of phytopathogens: Entomopathogenic fungi: *metarthinium anisopliae*, *Beauveria bassiana*, *verticillium lacani*, *Hirsutella thmpsoni*.
- UNIT-IV** Storage fungi: categories of storage fungi, conditions during storage in relation to damage of seeds, harmful effects. Mycotoxins and their effect on human being. General idea about quarantine, Deterioration of fruit and vegetables and control measures
- UNIT-V** Biofertilizers: Types, Production and application. Mycorrhizae: Types and their application in agriculture and forestry. Vermicomposting, Production of edible mushrooms.

REFERENCE BOOKS

- Chakraborty-Post harvest technology of cereals, pulses and oil seeds, 1995
- Boumans, G., Grain Handlings and storage, Development in Agricultural Engg., 4. Elsevier, Tokyo, 1985.

BARKATULLAH UNIVERSITY, BHOPAL

Class	-	M.Sc.
Subject	-	Microbiology
Paper Name	-	MB-304 MEDICAL MICROBIOLOGY AND PARASITOLOGY
Paper	-	12
Semester	-	Third

MM : 85

UNIT-I Early discovery of pathogenic microorganisms: Classification of medically important microorganisms, Normal Microflora of human and animal system, Pathogenesis: Virulence factors, establishment, spread group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis, Spreading and tissue damage, Mechanism of bacterial adhesion, colonization, invasion and invasion on mucous membrane of respiratory, enteric and urogenital tracts. General characters of medically important parasites: Nematodes: *Ancylostoma*, *Ascaris lumbricoides*, *Necator* ; Cestodes: *Taenia solium*, *Taenia saginata*, *Diphyllobothrium*, *Echinococcus granulosus* and Trematodes

UNIT-II Staphylococcal group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Streptococcal group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Enterobacteriaceae group of infection of bacteria *E.coli*, *Pseudomonas*, *Klebsiella*, *Proteus*, *Salmonella*, *Shigella*, *Vibrio*, *Yersinia*, *Helicobacter* and *Campylobacter* group of bacteria and their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Mycobacterium group of infection of bacteria *M.tuberculosis*, *M. leprosy*, their identification, pathogenesis, disease production, immunity and laboratory diagnosis.

UNIT-III Candiadisis group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Histoplasmosis group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Aspergillosis group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Cryptococcosis group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis.

UNIT-IV Pneumotrophic viral disease influenza viruses group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Dermatotropic viral diseases: Herpes, Chicken pox, Small pox, Measles and Rubella group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Viscerotrophic viral diseases group of infection of Dengue fever, Hepatitis and AIDS group of infection and their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Neurotrohic group of infection of Rabies, Poliomyelitis and slow group of viruses their identification, pathogenesis, disease production, immunity and laboratory diagnosis.

UNIT-V Tropical diseases: Malaria, Filaria, Kalazar group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Helmenthic Diseases: Round worm, Hook worm and Flat group of infection of bacteria their identification, pathogenesis, disease production, immunity and laboratory diagnosis. Chemotherapeutic agents: Mode of action and drug resistance.

REFERENCE BOOKS

- Medical Microbiology and Infection at a Glance by [Stephen Gillespie](#), [Kathleen Bamford](#), Blackwell Publishers
- Medical Microbiology by [Patrick R. Murray](#), [Ken S. Rosenthal](#) and [Michael A. Pfaller](#)