

CHHINDWARA UNIVERSITY, CHHINDWARA

SYLLABUS PRESCRIBED FOR THE DEGREE OF MASTER OF SCIENCE IN
MICROBIOLOGY

(Academic Session 2019 – 2020 & Onwards)
[UNDER SEMESTER EXAMINATION AT PG LEVEL]

THIRD SEMESTER

Number & Title of the course	Max. Marks	Min. Marks for Passing	Min. Aggr. Marks For Passing
(A) THEORY PAPERS			4
IX Environmental Microbiology	40	15	
X Industrial & Food Microbiology	40	15	
XI Medical Microbiology	40	15	
XII Agricultural Microbiology	40	15	
(B) PRACTICALS			
I (based on Course XI & X)	50	20	
II (based on course XI & XII)	50	20	
(C) INTERNAL ASSESSMENT			
CCE *4 Written Test based on each course (each of 10 marks)	40	4 in each test	
Project/Assignment/Seminar	50	20	
TOTAL	350	-----	

* Candidate has to pass in each test separately.

Board of Studies

Prof. Anjana Sharma – Chairman

Anjana
06/07/2020

Prof. Satish Chile - Subject Expert

Prof. Akhilesh Ayachi - Subject Expert

Akhilesh

Prof. Hemant Verma - Subject Expert

Prof. Nikhil Kanungo - Subject Expert

COURSES OF STUDY IN M.Sc. MICROBIOLOGY

THIRD SEMESTER

Course No. IX : Environmental Microbiology

UNIT-I

Environment: Basic concepts and issues; environmental pollution: types and methods for the measurement; methodology of environmental management-problem solving approach, its limitations; air pollution and its control through biotechnology, air sampling techniques; biodiversity: conservation and management.

UNIT-II

Water pollution and its control: Water as a scarce natural resource, need for water management, sources and measurement of water pollution, waste water treatment-physical, chemical and biological treatment processes; algal blooms and human health.

UNIT-III

Microbiology of waste water treatment: Aerobic process-activated sludge, oxidation ditches, trickling filter, towers, rotating discs, rotating drums, oxidation ponds; anaerobic processes-anaerobic digestion, anaerobic filters, upflow anaerobic sludge blanket reactors; treatment schemes for waste waters of dairy, distillery, tannery industries; biotechnological application of microbes from extreme environment.

UNIT-IV

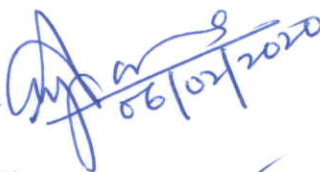
Microbial degradation of xenobiotics in the environment- ecological considerations, decay behaviour & degradative plasmids, hydrocarbons, substituted hydrocarbons, oil pollution, surfactants, pesticides; bioaccumulation of metals and radio-nucleids and detoxification: bioremediation.

UNIT-V

Biological N₂ fixation, H₂ production, biofertilizers and biopesticides; solid wastes; sources and management (composting, vermiculture and methane production). Single cell protein (Spirulina, yeast, mushroom); global environmental problems-ozone depletion, UV-B green house effect and acid rain, their impact and biotechnology approaches for management.

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COURSES OF STUDY IN M.Sc. MICROBIOLOGY

THIRD SEMESTER

Course No. X: Medical Microbiology

UNIT-I

Early discovery of pathogenic microorganisms; development of bacteriology as scientific disciplines; contribution made by eminent scientists. Normal microbial flora and the human host; role of resident flora; classification of medically important microorganisms, dermatophytes, dimorphic fungi, opportunistic fungal pathogens, laboratory diagnosis of pathogenic fungi.

UNIT-II

Mechanism of pathogenicity, virulence and protection, organs and cells involved in immune system and immune response; antigens, antigenic specificity, antigenic determinants, cellular and humoral basis of immunity; immunoglobulins, antigen and antibody reactions, immunological (serological as well as cellular) methods.

UNIT-III

Classification of pathogenic bacteria- Staphylococcus, Streptococcus, Pneumococcus, Corynebacteria, Bacillus, Clostridium, non-sporing anaerobes, organisms belonging to Enterobacteriaceae. Vibrios, non-fermenting bacilli, Yersinia, Haemophilus, Bordetella, Brucella, Mycobacteria, Spirochaetes, Actinomycetes, Rickettsiae, Chlamydiae.

UNIT-IV

Important RNA and DNA viral pathogens; virus host interactions; pox viruses, adenoviruses, picornaviruses, orthomyxoviruses, paramyxoviruses, arboviruses, rhabdoviruses; general properties of pathogenic protozoans and diseases caused by them, slow virus disease.

UNIT-V

Laboratory control of antimicrobial therapy; strategies/ approaches (conventional and modern) in the diagnosis of important disease/ syndrome; meningitis, urinary tract infection, sexually transmitted diseases, pyrexia of unknown origin, wound infection etc.

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COURSES OF STUDY IN M.Sc. MICROBIOLOGY

THIRD SEMESTER

Course No. XI : Industrial and Food Microbiology

UNIT-I

Biofermentation: designing and application, principles of biofermentation, monitoring and control of parameters (pH, oxygen, agitation, temperature, foam etc.), batch & continuous: production medium, raw materials, isolations, maintenance, preservation & improvement of industrial strains, computer control of fermentation processes.

UNIT-II

Downstream processing: filtration of fermentation broths, ultracentrifugation, recovery of biological products by distillation, superficial fluid extraction.

UNIT-III

Industrial production of solvents: ethyl alcohol, citric and acetic acids; enzymes: amylases, proteases, cellulases; vitamins: vitamin B₁₂, vitamin C; antibiotics (penicillin, streptomycin, tetracycline and griseofulvin). Microbes in petroleum industry (oil recovery). Immobilized cells & enzymes.

UNIT-IV

Microbiology of food: sources and types of microorganisms in food, foodborne pathogens, microbiological examination of food, spoilage of food, food preservation, fermented foods, microbial proteins.

UNIT-V

Dairy microbiology: sources and types of microorganisms in milk, microbial examination of milk, pasteurization and phosphatase test, sterilization of milk, grades of milk, dairy products, fermented milk, butter & cheese.

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COURSES OF STUDY IN M.Sc. MICROBIOLOGY

THIRD SEMESTER

Course No. XII : Agricultural Microbiology

UNIT – I

History, scope and development of agricultural microbiology, rhizosphere and phyllosphere: concept, importance, factors affecting microbial diversity.

UNIT – II

Soil health: crop residues, humus, mineralization, immobilization, soil-sickness, composting, vermicomposting, green manure. Effect of crop residues on plant growth; biodegradation of pesticides and pollutants; biodegradation fate, bioavailability, acceleration, bioremediation. Biofertilizers: types, production, formulation and constraints.

UNIT – III

General idea about major agricultural pests: Plant diseases- late blight potato, downy mildew of pea, stem gall of coriander, powdery mildew / rust / smut, rust of linseed, Ergot of bajara, Anthracnose of soybean, Tikka disease of groundnut, wilt of arhar, bacterial blight of paddy, citrus canker, leaf curl of papaya, little leaf of brinjal. Insects: gram, soybean. Weeds: parthenium, xanthium, waterhyacinth, cyperus, phalaris.

UNIT – IV

Post harvest losses of agricultural products: causes, problems and management recent trends in pest management: strategies, mass production, formulation and application technology, achievements, constraints

UNIT – V

Biotechnology in agriculture: the new green revolution, transgenic crops, gene protection technology, frost control technology, resistant varieties. Bioconversion futurology: exploitation of agricultural wastes for food / feed and fuel.

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