

Session 2019-20
B.Sc. III
MICROBIOLOGY
PAPER – I
MOLECULAR BIOLOGY AND GENETIC ENGINEERING

Max. M. – 50
Min. M. - 17

Unit – 1

History of Molecular Biology, models system, Concepts of molecular biology. Early history of genetic engineering, Genetic Engineering concepts, Ethical Issues

Unit – 2

Mutation; spontaneous and induced, base pair change, frame shift, deletion inversion, tandem duplication, insertion, useful phenotypes (auxotrophs, conditional lethal, resistance). Reversion vs suppression, Ames' tests

Unit – 3

Functions of macromolecules; early observation on the mechanisms of heredity, DNA as genetic material; basic mechanism of replication, enzymes involved in replication, enzymes involved in transcription, translation, genetic code, regulation of gene expression- transcription, translation and control of gene expression in microbes

Unit – 4

DNA repair and restriction, types of repair systems, restriction modification system, types of restriction enzymes, properties and uses, Methylation

Biology of Plasmid and Bacteriophages, lytic vs lysogenic phages, single stranded DNA phages, M13 phages, restriction modification system and restriction enzymes

Unit – 5

Plasmid and phage vectors, restriction and ligation of vectors, passenger DNA, transformation of host cells, selection vs screening of recombinant colonies, analysis of recombinant clones, DNA sequencing, protein separation and identification methods

Marking Scheme

M.M.	Section A	Section B	Section C
50	01 X 10 = 10	03X 5 = 15	05 X 5 = 25

Name and Signatures

Chairperson/ HOD- Dr. Pragya Kulkarni	Departmental members
Subject Expert - Dr. Amia Ekka	1. Mrs. Rekha Gupta
Subject Expert - Dr. K.K.Patel	Student Nominee
VC Nominee - Dr. Ajay Manhar	1. Ku. Rimjhim Meshram

DIRECTIVES FOR STUDENTS, FACULTY AND EXAMINERS

1. There shall be three sections (Section A, B, and C) in each theory paper.
2. Section A shall contain very short answer type questions (One or two line answer) or objective type questions (fill in the blank). (**not multiple choice questions**) Altogether 10 questions will be set from the entire syllabus, and shall be compulsory. (**1X10 = 10**)
3. Section B shall contain short answer type questions with the maximum limit of 150 words. Altogether 10 questions to be set i. e. Two from each unit with the internal choice. The candidates are required to solve one from each unit. (**3X5 = 15**)
4. Section C shall contain long answer/ descriptive type questions. The students are required to answer precisely and the answer should not exceed the maximum limit of 350 words. Altogether 10 questions to be set i. e. Two from each unit with the internal choice. The candidates are required to solve one from each unit. (**5X5 = 25**)
5. The students are required to study the content mentioned in the curriculum exhaustively.

Recommended Books

1. Molecular Biology, A.V.S.S Sambamurthy., Narosa Pub.
2. Biochemistry, C.B Powar. and Chatwal, Himalaya Pub.
3. Molecular Biology, M.P Arora., Himalaya Pub.
4. Gene VII, Benzamin Lewin
5. A text book of Microbiology – R.C. Dubey and D.K. Maheshwari, S. Chand and Company Ltd., New Delhi.
6. Biotechnology, B.D Singh.,Kalyani Pub.
7. A text book of Biotechnology, R.C Dubey., S. Chand & Company Pub.
8. Biotechnology, S.N Jogdand.,Himalaya Pub.

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Session 2019-20
B.Sc. III
MICROBIOLOGY
PAPER – II
ENVIRONMENTAL AND MEDICAL MICROBIOLOGY

Max. M. - 50
Min. M. - 17

Unit – 1

Aerobiology; definition, droplet nuclei, aerosol, assessment of air quality, some important air borne diseases caused by bacteria (Diphtheria, Pneumonia, Meningitis), viruses (Influenza, Chicken pox, Measles) and Fungi, (mycosis), their symptoms and preventive measures

Unit – 2

Soil microbiology: Physical and chemical characteristics, Biological components, rhizosphere, rhizospheric effect, difference between rhizosphere and phyllosphere.

Brief account of microbial interactions: symbiosis, mutualism, commensalism, competition, ammensalism, synergism, parasitism and predation. Biofertilizers - biological nitrogen fixation, nitrogenase enzyme, nif genes, symbiotic nitrogen fixation and non-symbiotic nitrogen fixation (Azotobactor Azospirillum)

VAM- ecto-endo- ectendomycorrhizae

Unit – 3

Aquatic microbiology; ecosystem of fresh water (ponds, lakes, streams) and marine.

Water zonations: upwelling, eutrophication

Potability of water- microbial assessment of water quality.

Brief account of water borne diseases (Typhoid, Dysentery, Cholera, Hepatitis) and preventive measures

Unit – 4

Food spoilage and food borne infections. A brief mention about biodegradation, xenobiotics, bioaccumulation, biopesticides and deterioration

General concept of Industrial microbiology and their applications

Unit – 5

Waste Treatment – Types of wastes, characterization of solid and liquid wastes, waste treatment, solid saccharification, gasification, composting

Liquid waste treatment – aerobic; anaerobic primary, secondary and tertiary methods, Useful byproducts, mushroom, fuel, fertilizer. Biodegradation of industrial wastes

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2. Introduction to Soil Microbiology, Alecander Martin, Wiley Eastern Press.
3. Agricultural Microbiology, Rangaswami G. and Bagyaraj D.J., Prentice Hall India Ltd.
4. A text book of Microbiology – P.Chakraborty , New central book agency(P) Ltd. Kolkata.
5. General Microbiology I & II - C.B. Powar and H. F. Daginawala , Himalaya Publishing House Bombay.

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B.Sc. Part III
Microbiology
List of Practical Exercises
Session 2019-20

MM. 50

1. Estimation of total protein by Biuret Method
2. Protein profile study by SDS-PAGE
3. Determination of molecular size of DNA
4. Demonstration of plaque formation by bacteriophage
5. Isolation of Aeromycoflora by Petriplate Exposure Technique
6. Demonstration of centrifugal impact air sampler
7. Microbial assessment of water quality (Presumptive test and confirmative test)
8. Preliminary identification of enteric pathogens using Triple Sugar Iron Agar (TSIA) medium
9. Water Analysis for total bacterial population by SPC method
10. Isolation and enumeration of Rhizospheric and Non-rhizospheric fungi from soil and estimation of R:S ratio
11. Microscopic observation of root colonization by VAM Fungi
12. Isolation of Rhizobium from root nodules of leguminous plants
13. Study of Microbial interactions (Bacterial Antagonism/ Parasitism/ Association/ symbiosis)
14. Study of food adulterations, their effects on health and regulations given by BSI, AGMARK, FAO and FPA.

Marking Scheme

Q. 1	Q.2	Q. 3	Q.4	Spotting	Sessional	Viva	Total
10	05	10	05	10	05	05	50

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Aquatic microbiology; ecosystem of fresh water (ponds, lakes, streams) and marine. Water zonations: upwelling, eutrophication Potability of water- microbial assessment of water quality. Brief account of water borne diseases (Typhoid, Dysentery, Cholera, Hepatitis) and preventive measures

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Food spoilage and food borne infections. A brief mention about biodegradation, xenobiotics, bioaccumulation, biopesticides and deterioration General concept of Industrial microbiology and their applications

Unit – 5

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