

Swami Ramanand Teerth Marathwada University Nanded.

Faculty of Science
Subject: *Microbiology*
B.Sc Second year
Syllabus: Semester (MCQ) Pattern:
Effective from June 2012

Sr. No	Semester / Annual	Paper No	Title of paper	Total periods/ week	Total Periods/ Semester	Total Marks
1	III	VI	Applied Microbiology	03	45	50
		VII	Immunology	03	45	50
2	IV	VIII	Food, Soil Microbiology, and Microbial Ecology	03	45	50
		IX	Medical Microbiology	03	45	50
3	Practical (Annual pattern)	X	Practical's based on theory paper VI & VIII.	04	----	100
4	Practical (Annual pattern)	XI	Practical's based on theory paper VII & IX	04	----	100

- The syllabus is based on six (3x2) theory periods and 4x2 practical periods per batch per week.
- Candidates are required to pass separately in theory and practical examination.

Distribution of Marks:

- Theory examination: 40 marks MCQ (for each paper)
- Internal evaluation: 10 marks

SEMESTER III

Paper VI: Applied Microbiology

Maximum Marks: 50

Periods: 45

Unit-I	Air Microbiology	12
	Definition and composition of air, sources of microorganisms in air, significance of microorganisms in air, droplet, droplet nuclei and droplet infection, air borne diseases, enumeration of microorganisms in air, control of microorganisms in air, air pollution.	
Unit-II	Water Microbiology	10
	Types of water, Sources of microorganisms in water, Significance of microorganisms in water, Fecal contamination of water, Index of water pollution, Different indicator microorganisms, Coliform bacteria, Microbial examination of water, Water borne diseases	
Unit-III	Sewage Microbiology	10
	Definition of sewage, composition and strength of sewage (BOD and COD), Microbiology of sewage, Domestic sewage treatment, Municipal sewage treatment, Water purification, Water reclamation.	
Unit-IV	Milk Microbiology	13
	Definition and composition of milk, sources of contamination of milk, desirable and undesirable changes in milk, milk borne diseases, bacteriological examination of milk, reductase test, pasteurization of milk, application of microorganisms in dairy industry (examples and microflora).	

References:

1. Air Microbiology An environment And Health Prospective by Aithal, Wakte & Manwar. Cinnamonteal print and publishing Margao, Goa-403601.
2. Fundamental principles of bacteriology by A.J. Salle.
3. Fundamentals of Microbiology by Martin Frobisher.
4. General Microbiology by Stanier. Ingraham, Wheelis, Painter: Macmillan Press Ltd. London.
5. General Microbiology Vol. II by Power C.H and H.F. Dagainawala. Himalaya Publishing House, Mumbai.
6. Microbiology by Pelczar and Crick.
7. Text book of Microbiology by Dubey and Maheshwari.
8. Text of Applied Microbiology by Dr. B.M Sandikar.

Paper VII: Immunology

Maximum Marks: 50

Periods: 45

Unit- I	Infection, Immunity and Immune response.	13
	Infection- definition, sources, mode of transmission, course of infection, aggressive factors of pathogens.	
	Immunity- definition and classification with suitable examples.	
	Immune response- Humoral and cellular. Theories of antibody production.	
Unit- II	Antigens and Antibodies	12
	Antigen: Definition, general properties, antigen specificity, bacterial antigens with reference to <i>S. typhi</i> .	
	Antibody: Definition, structure of immunoglobulin, classification and properties of immunoglobulin classes.	
Unit –III	Antigen antibody reactions	10
	Mechanism and applications of the following reaction with suitable examples- Agglutination, precipitation, complement fixation, virus neutralization, toxin neutralization reaction, Enzyme linked immunosorbent assay.	
Unit-IV	Hypersensitivity and Allergy	10
	Hypersensitivity: Definition and classification of hypersensitivity reactions:	
	Type I reactions: Reaginic	
	Type II reactions: cytolytic and cytotoxic	
	Type III reactions: Immune complex disease	
	Type IV reactions: Delayed Hypersensitivity	

References:

- 1) Basic Immunology by Joshi and Osarano. Agrobotanical publishers Ltd. Bikaner.
- 2) Elementary Microbiology Vol.I and II Dr. A.H Modi. Akta Prakashan. Nadiad.
- 3) Medical Microbiology. N.C.Dey and T.K. Dey. Allied agency, Culcutta.
- 4) Microbiology by Davis, Dulbecco, Eisen Harper and Row Maryland.
- 5) Molecular biology by David Freidfelder, Narosa Publishing house, New Delhi.
- 6) Text book of Immunology by B.S.Nagoba and D.V.Vedpathak. BI publications, New Delhi.
- 7) Text book of Microbiology by R. Anantharayanan, C.K. Jayaram Panikar, Orient Longman, Mumbai.

SEMESTER – IV

Paper VIII: Food, Soil Microbiology and Microbial Ecology

Maximum Marks: 50

Periods: 45

Unit-I	Food microbiology Definition and composition of food, Sources of contamination in food, Microbial examinations of food, Significance of microorganisms in food, Spoilage and its types (Different types of spoilages with suitable examples) Preservation of food, food poisoning (Botulinum, Staphylococcal intoxication and Salmonellosis)	12
Unit-II	Soil microbiology Definition and composition of soil, types of soil, significance of microorganisms in soil, soil as a culture medium, microbiological examination of soil.	11
Unit-III	Elemental transformation in soil Carbon cycle, Nitrogen cycle, Sulfur cycle, Phosphorus cycle.	13
Unit-IV	Microbial interaction, association and ecology. Symbiosis, antibiosis, mutualism, parasitism (rhizosphere, rumen, lichens, mycorrhiza, bioluminescence) Concept of Population, community, Microbial succession, climax and adaptation.	09

References:

1. A Manual of Environmental Microbiology. 2nd Edition. 2001 by Christon J. Hurst (Chief Editor), ASM Publications.
2. Environmental Biotechnology. Edited by C. F. Forster and D.A., John Wase. Ellis Horwood Ltd. Publication.
3. Environmental Microbiology edited by Ralph Mitchell. A John Wiley and Sons. Inc.
4. General microbiology Vol. I and II by Power C.H and H.F. Dagainawala. Himalaya Publishing House, Mumbai
5. Microbiology by Pelczar and Crick.
6. General Microbiology by Stanier. Ingraham, Wheelis, Painter: Macmillan Press Ltd. London
7. Fundamental principles of bacteriology by A.J. Salle
8. Food microbiology by Frazier.
9. Soil microbiology by Alexander.
10. Soil microbiology by Subba Rao.
11. Fundamentals of Microbiology by Martin Frobisher.
12. Text book of Microbiology by Dubey and Maheshwari

Paper IX: Medical microbiology

Maximum Marks: 50

Periods: 45

Unit-I	Bacterial infection	12
	Etiology, epidemiology, pathogenesis, symptomatology, laboratory diagnosis, treatment and prophylaxis of the following.	
	a) Cholera	
	b) Typhoid	
	c) Pyogenic staphylococcal infections.	
Unit II	Bacterial infection	10
	Etiology, epidemiology, pathogenesis, symptomatology, laboratory diagnosis, treatment and prophylaxis of the following.	
	a) Diphtheria	
	b) Tuberculosis	
Unit- III	Viral infection	13
	Etiology, epidemiology, pathogenesis, symptomatology, laboratory diagnosis, treatment and prophylaxis of the following.	
	a) AIDS	
	b) Polio	
	c) Hepatitis	
Unit VI	Infection by other Microorganisms	10
	Etiology, epidemiology, pathogenesis, symptomatology, laboratory diagnosis, treatment and prophylaxis of the following.	
	a) Spirochetes,	
	b) Candidiosis.	
	c) Malaria	

References:

1. Medical Microbiology. N.C.Dey and T.K. Dey. Allied agency, Calcutta.
2. Microbiology by Davis, Dulbecco, Eisen Harper and Row Maryland.
3. Text book of Microbiology by R. Anantharayanan, C.K. Jayaram Panikar, Orient Longman, Mumbai.
4. Medical microbiology by Chrakrborthy.

Paper X- Practical
Based on theory paper VI & VIII

100 Mark

1. Assessment of air quality by solid, liquid impingement techniques and enumeration using plating and turbidity.
2. Bacteriological examination of water for potability (Qualitative and Quantitative analysis):
 - a) MPN method
 - b) Presumptive, confirmatory, completed test,
 - c) IMViC test
3. Determination of R: S ratio.
4. Demonstration of
 - i) Ammonification
 - ii) Nitrification
 - iii) Denitrification
 - iv) Nitrate reduction
 - v) Sulfate reduction
 - vi) Phosphate solubilization
5. Isolation and study of *Rhizobium* species from root nodules of leguminous plants.
6. Isolation and study of *Azotobacter sp.* from soil
7. Winogradsky's column for study of soil microflora
8. Bacteriological analysis of milk:
 - i) Reductase tests
 - ii) Phosphatase test.
9. Bacteriological examination of food.
 - i) SPC
 - ii) DMC

Paper: XI Practical
Based on theory papers VII & IX

100 Marks

- 1) Blood staining by Leishman's / Giemasa's method.
- 2) Metachromatic granule staining (any one method)
- 3) Acid fast staining.
- 4) Staining of blood for malarial parasite.
- 5) Separation of serum and plasma.
- 6) RBC counting.
- 7) WBC counting.
- 8) Study of haemolysin.
- 9) Study of coagulase.
- 10) Blood grouping.
- 11) Widal test.
- 12) RPR test.
- 13) Gel diffusion test.
- 14) Study of morphology, cultural and biochemical characteristics of the following,
 - a) Pyogenic *Staph. aureus*.
 - b) *Salmonella spp.*
 - c) *Vibrio cholerae*.
- 15) Antibiotic sensitivity tests for above pathogens by disc diffusion method.
- 16) Urine examination (Physical, chemical and microbiological).
- 17) Determination of blood sugar, blood urea, blood cholesterol.