

Swami Ramanand Teerth Marathwada University Nanded.

Faculty of Science

B.Sc second year Syllabus

Semester Pattern effective from June 2010

Subject: Microbiology

Sr.No	Semester / Annual	Paper No	Title of paper	Total periods/ week	Total period	Total Marks
1	III	VI	Applied Microbiology	03	45	50
		VII	Immunology	03	45	50
2	IV	VIII	Food microbiology, 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 require to pass separately in theory and practical examination.

Marks distribution:

1) Theory exam : 40 marks (for each paper)

2) 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, 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 Stainer.
- 5) General microbiology Vol. II by Power C.H and H.F. Daginawala.
- 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- Antigen and Antibody 12

Antigen: Definition, general properties, antigen specificity, bacterial antigens with reference to *S. typhi*.

Antibody: Definition, structure of immunoglobulin, classification and properties of immunoglobulin classes.

Unit III- antigen antibody reaction. 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, Calcutta.
- 4) Microbiology by Davis, Dulbecco, Eisen Harper and Row Maryland.
- 5) Molecular biology by David freidfelder, marosa Publishing house, New Delhi.
- 6) Text book of immunology by B.S.Nagoba and D.V.Vedpathak. Paras Medical Publishers, Hyderabad.
- 7) Text book of Microbiology by R. Anantharayanan, C.K. Jayaram Panikar, Orient Longman, Mumbai.

SEMESTER – IV

Paper VIII: Food microbiology, Soil microbiology, and Microbial Ecology

Maximum Marks: 50

Periods: 45

Unit-I Food microbiology	12
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 poisoning and Salmonellosis)	
Unit-II Soil microbiology	11
Definition and composition of soil, types of soil, significance of microorganisms in soil, soil as a culture medium, microbiological examination of soil.	
Unit-III Elemental transformation in soil	13
Carbon cycle,	
Nitrogen cycle,	
Sulfur cycle,	
Phosphorus cycle.	
Unit-IV Microbial interaction, association and ecology.	09
Symbiosis, antibiosis, mutualism, parasitism (rhizosphere, rumen, lichens, mycorrhiza, bioluminescence)	
Concept of Population, community, Microbial succession, climax and adaptation.	

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.
5. Microbiology by Pelczar and Crick.
6. General Microbiology by Stainer.
7. Fundamental principles of bacteriology by A.J. Salle
8. Food microbiology by Frazer.
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 Marks-----

- 1) Microbial sampling of air from various sources- Indoor, Outdoor, hospital. 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)
- 3) Presumptive, confirmed, completed test, IMViC and MPN. .
- 4) Winogradsky's column for study of soil microflora.
- 5) Determination of R: S ratio.
- 6) Demonstration of i) Ammonification ii) Nitrification iii) Denitrification
 iv) Nitrate reduction v) Sulfate reduction.
- 7) Isolation and study of *Rhizobium* species from root nodules of leguminous plants.
- 8) Isolation and study of *Azotobacter sp.* From soil
- 9) Bacteriological analysis of milk: i) SPC ii) DMC iii) Reductase test.
- 10) Determination of efficiency of pasteurization by phosphatase test.
- 11) Bacteriological examination of food.

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.
- 18) Rocket immunodiffusion.