

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

SYLLABUS FOR S.Y.B.SC. MICROBIOLOGY.

From: June 1993.

MICROBIOLOGY PRACTICAL COURSE-II

- I) Staining Methods For:-
- a) Spore (Dorner's and Schaeffer-Fulton's method)
 - b) Capsule (Maneval's & Hiss's method)
 - c) Flagella (Bailey's & Loeffler's methods)
 - d) Metachromatic granules (Albert's Niesser's method)
 - e) Lipid (Brudon's method)
 - f) Nuclear material (Feulgen's method)
- II) Detection of the activity of following enzymes
- a) Amylase
 - b) Gelatinase
 - c) Lecithinase
 - d) Catalase
- III) Growth curve of bacteria
- IV) Thermal Death Time of bacteria
- V) Air flora- Determination of Sedimentation rate
- VI) Effect of following environmental factors on growth of bacteria
- a) pH
 - b) Temperature
 - c) Salt (Sodium Chloride)
 - d) Heavy metals
- VII) Determination of phenol-coefficient of germicidal agents by Reidal Walker test.
- VIII) Estimation of following fermentation products.
- 1) Alcohol by specific gravity
 - 2) Vinegar by titrable acidity
- IX) Gradient plate Technique.

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MICROBIOLOGY PAPER IV.

- Unit-I: Microbial Enzymes : (25)
- a) Nature & Properties of Enzymes
 - (i) Enzyme specificity
 - (ii) Active Site of enzyme molecule
general mechanism of enzyme action
'Lock & Key' model
Koshland or 'induced fit' model
 - (iii) Catalytic property
 - b) Nomenclature of Enzymes as per IUB
 - c) Effect of PH, Temperature and substrate concentration on enzyme catalysed reaction
 - d) Detection of following microbial enzymes
 - (i) Amylase (ii) Catalase (iii) Gelatinase
 - (iv) Lipase (v) Lecithinase (vi) Coagulase
 - (vii) Beta galactosidase.
- Unit-II: Bacterial Catabolism : (12)
- a) Oxidation of Glucose-
 - (i) EMP pathway (ii) Kreb's Cycle
 - b) Stickland reaction.
- Unit-III: Nutrition & Cultivation Of Bacteria : (10)
- a) Enrichment Culture Methodology
 - b) Isolation of the following using Enrichment culture Technique-
 - (i) Cellulose degraders.
 - (ii) Nitrifying Bacteria
 - (iii) Nitrogen fixers
 - (iv) Salmonella species
 - (v) Staphylococcus. Species
 - (vi) Sulfate reducers
 - (vii) Thiobacillus species.
- Unit-IV: Studies On Growth Of Bacteria: (15)
- a) Continuous culture technique and its application.
 - b) Working of chemostat & Turbidostat
 - c) Synchronous growth & its application
 - d) Methods of obtaining Synchronous growth
 - e) Diauxic growth.
- Unit-V: Basics In Industrial Microbiology (20)
- a) Screening.
 - (i) Primary Screening
 - (ii) Secondary Screening
 - b) Fermenter & its parts
 - c) Fermentation media
 - (i) Raw materials- Screening of media, pretreatment & Sterilization of media.
 - (ii) Buffers and antifoam agents
 - (iii) Control of contamination in fermentations.
 - d) Stock culture & Inoculum preparation
 - e) Fermentation Process & General parameters.
 - (i) Batch and continuous fermentations
 - (ii) General methods of recovery of fermentation products.
 - a) Centrifugation
 - b) Flocculation
 - c) Filtration

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- d) Solvent extraction
- e) Adsorption and elution
- f) Distillation
- g) Precipitation
- h) Crystallization
- i) Ion-exchange resins.

Unit-VI: Water And Food Borne Infections

- a) Water borne infection.
Study of the following infection diseases in brief
 - i) Typhoid
 - ii) Shigellosis (Bacillary dysentery)
 - iii) Cholera
- b) Food borne infection-
Study of the following food borne infection in brief.
 - i) Salmonellosis
 - ii) *Vibrio parahaemolyticus* infection

Unit No. I, II, & III for term end examination.

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MICROBIOLOGY PAPER-III

- Unit-I: MICROSCOPY- Principle Working & Application of (15)
a) Phase Contrast Microscopy
b) Fluorescence Microscopy
c) Electron Microscopy (TEM & SEM)
- Unit-II: STAINING TECHNIQUES :- (12)
Principle & Procedures of the following Staining Techniques-
a) Cell wall
b) Spore
c) Capsule
d) Flagella
e) Nuclear Material
f) Lipids
g) Metachromatic granules.
- Unit-III: Outline Classification of Bacteria (08)
as per the Bergey's Manual of Systematic Bacteriology 9th edition-
Distinguishing features of Volume I, II, III & IV
- Unit-IV: Introduction To Medical Microbiology (12)
a) History
b) Normal flora of human body
c) Infection
Definition, types of infection terminologies & Mode of transmission
d) Virulence factors-
Toxins (Endo, exo); Enzymes ;
M-Protein; Capsules,
- Unit-V: Basic Immunology (16)
a) Three lines of defence
b) Immunity & its types
c) Concept of Antigen & Antibody
d) Types of Antibody, Structure of IgG.
- Unit-VI: Introduction To Bacterial Genetics- (28)
a) Structure and types (Right handed and left handed) of DNA
b) DNA replication- Conservative, Semiconservative, Dispersive, Watson & Creek's Model,
c) Genotype & Phenotype
d) Mutations & its types-
- Spontaneous (Fluctuation test, Replica Plate technique)
- Induced (Point & Frame Shift mutation)
e) Mutagenic Agents & their mode of action
f) Light & Dark repair Mechanism.
- Unit- No-I, II, III, & IV- for term end examination.