



B.Sc. (Microbiology)

SEMESTER – I

SEMESTER PATTERN:

- The Course content has been designed on **Semester pattern**.
- The workload for Theory & Practicals is allotted on Semester pattern.
- There shall be **01 Theory papers 70 marks each** of 2.5 Hours duration [70+30 marks Internal = 100 marks]
- Microbiology Practical Examination shall be of **70 marks** of **05 hours duration** in University Examination.
- There shall be **Two Semesters** in an academic Year. (Semester-1 & 2)

SEMESTER-I

Number of the paper	Name of the paper	Total marks ext.+int* = total	Passing standard ext.+int = total	Total teaching hours	Credits
MIC-CC-101	Introduction to Microbial World	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	04
MIC-CC-102	Microbiology Practical	100	40	15 WEEKS X 6 HOURS =90	06

INTERNAL MARKS: 30



DETAILED CURRICULUM B. Sc. Sem. I MICROBIOLOGY
Effective from June – 2016

Paper No: Mic-cc-101

Title of the Paper: **Introduction to microbial world**
Mic-cc -101

Credits: 04

Marks: 70

Marks: Semester End Examination: **70Marks**

Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
1	History and Scope of Microbiology (a) Discovery of Microbial world: Establishment of theory of biogenesis. Development of pure culture techniques. (b) Establishment of Germ theory of diseases & fermentation. Work of Lister & principle of aseptic surgery. (c) Scope of Microbiology:- - Pure & Applied areas of Microbiology. - Introduction to Genetic engineering and Biotechnology.	12	14
2	The Microbial World (a) Distribution of microorganisms in nature. (b) Introduction to prokaryotic world, eukaryotic microorganisms. (c) Types of Microorganisms (Bacteria, Viruses, Fungi, Yeasts, Actinomycetes, Protozoa).	12	14
3	Microscopy and Microscope (a) Principles of microscopy, magnification and Resolving power. (b) Light microscopy: - Simple and compound microscope. - Bright field and dark field microscopy. - Principles and applications of phase contrast and Fluorescence microscopy. (c) Principles and applications of Electron microscopy: SEM & TEM.	12	14



4	Techniques used to study microorganisms. (A) Smear Preparation and Fixation. (B) Use of mordant, intensifier & decolorizer. (C) Wet mounting: Vital & supravital staining. (D) Cultivation methods of bacteria: - Use of broth & solid media	12	14
5	Introduction of Biomolecules Classification and functions of: (a) Carbohydrate (b) Protein (c) Lipids	12	14



DETAILED CURRICULUM B. Sc. Sem. I MICROBIOLOGY
Effective from June – 2016

Paper MI-cc- 102

Title of the Paper: Microbiology Practical

Credits: 03

Marks: 70

Marks: Semester End Examination: **70 Marks**

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper MI-cc- 101]

Students have to prepare their Practical journals of Microbiology for Laboratory work and they have to submit certified journals in the University practical exams.

Students are not allowed in the laboratory without certified journals in the University practical examination.

Detailed Syllabus for Microbiology practical

1. Study of principles and working of laboratory instruments
Light microscope, Autoclave, Hot air oven, Incubator, Rotary shaker, pH meter, Spectrophotometer, Centrifuge, bacteriological filters & laminar air flow.
2. Cleaning and preparation of glasswares for sterilization
3. Disposal of laboratory waste and cultures
4. Study of Hay infusion
5. Study of bacterial motility - Slide & stab culture
6. Staining of bacteria
 - a. Simple staining
 - i. Positive staining
 - ii. Negative staining
 - b. Differential staining: Gram staining
7. Study of permanent slides
 - a. Prokaryotes: Bacteria
Cocci, Bacilli, Spirochete, Curved Bacteria, Filamentous Bacteria (Actinomycetes)
 - b. Eukaryotes:
 - Fungi: Yeast, *Mucor*, *Rhizopus*, *Aspergillus*, *Penicillium*
 - Algae: Diatoms, Spirogyra
 - c. Protozoa: Amoeba, Paramecium, Plasmodium
8. Preparation of Standard Solutions.
9. pH adjustment of media by use of pH strip, pH meter .
10. Preparation of media: N-agar, N-broth.
11. Cultivation by liquid culture technique.
12. Cultivation by solid culture technique.
13. Qualitative analysis of Carbohydrates.
14. Qualitative analysis of Proteins.



TEXT BOOKS RECOMMENDED FOR PAPER Mic-cc-102 & Mic-cc-102

Microbiology: Pelczar M J, Chan E C S and Kreig N R Tata Mc Grow Hill

Suggested reading:

General Microbiology: R Y Stanier, Adelberg E A and J L Ingraham, Mac Millan Press Inc

Introduction to microbiology: Ingraham J L and Ingraham C A Thomson Brooks/Cole

Principles of microbiology: R M Atlas Wm C brown Publishers

Brock's biology of Microorganisms Madigan M T and Martinko J M Pearson Education Inc.

Microbiology: An introduction: Tortora G J, Funke B R and Case C L Pearson Education Inc.

Elementary Microbiology: H.A. Modi, volume-i&ii

General Microbiology: R.C. Dubey.

Practical Microbiology: R.J.Patel by Aditya Publications



DETAILED CURRICULUM B. Sc. Sem.: II MICROBIOLOGY
Effective from June – 2016

SEMESTER-II

Detailed Syllabus (With effect from Academic Year 2016-2017)

B.Sc.

Year: First

Semester: II

Paper no.	Name of the paper	Total marks Ext.+Int* = Total	Passing Standard Ext.+Int. = Total	Total Teaching Hours	Exam Hours.	Credits
Mic-cc-201	Basic Bacteriology	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	02.5	04
Mic-cc-202	Microbiology Practical	70+30=100	28+12=40	15 WEEKS X 3 HOURS X 02DAYS =90	03	06

INTERNAL MARKS:30



DETAILED CURRICULUM B. Sc. Sem. II MICROBIOLOGY
Effective from June – 2016
Detailed Syllabus (With effect from Academic Year 2016-2017)

B.Sc.

Year: First

Semester: II

Paper Mic-cc- 201

Title of the Paper: Basic Bacteriology

Credits: 04

Marks: 70

Marks: Semester End Examination: 70Marks

Continuous Internal Evaluation: 30 Marks

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
1	Morphology and fine structure of bacteria. a. The size, shape & arrangement of bacterial cells. b. Bacterial cell structure, composition & functions. - External:- cell wall, cell envelope, pili (fimbriae) & flagella, capsule & sheath, prosthecae. - Internal:- Cytoplasmic membrane, cytoplasm, cytoplasmic inclusions, nuclear material & Ribosomes. c. Bacterial endospore: Spore structure, sporulation and spore germination.	12	14
2	Introduction to bacterial nutrition. a. Nutritional requirements of bacteria. b. Nutritional types of bacteria. c. Culture media: Principles of media formulation, media ingredients & types of culture media. d. Physical conditions required for cultivation of bacteria (Temperature, gaseous requirement, acidity & alkalinity, osmotic pressure etc).	12	14
3	Pure culture techniques a. Definition : Pure culture and axenic culture b. Principles and methods of obtaining pure culture c. Maintenance and preservation of pure culture Culture collection centers	12	14
4	Introduction to bacterial taxonomy and nomenclature a. Principles of binomial system of nomenclature b. Whittaker's classification, the three domain concept. c. Introduction to Bergey's Manual of systematic bacteriology – Ed. II (Over view)	12	14



5	Principles of microbial control a. General principles of control. b. Characteristics of ideal antimicrobial agents. c. Chemical agents of microbial control: Major groups of antimicrobial chemical agent Phenolics, halogens, surfactant, alcohol, dyes, heavy metals & gaseous agents.	12	14
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Paper No: Mic-cc- 202

Title of the Paper: Practical

Credits: 06

Marks: 70

Marks: Semester End Examination: 70 Marks

Continous Internal Evaluation: 30 Marks

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper Mic-cc-201]

Students have to prepare journals for Microbiology Practicals.

Detailed Syllabus for Microbiology

1. Preparation and study of different types of culture media: Nutrient agar, MacConkeys's agar medium, Glucose yeast agar medium, Thioglycollate broth medium, Potato dextrose agar medium, Rose Bengal agar medium, Robertson's cooked meat medium
2. Isolation of bacteria
 - a. Streak plate method
 - b. Pour plate method
 - c. Spread plate method
3. Cultivation of anaerobic bacteria by use of
 - a. Robertson's cooked meat medium
 - b. Thioglycollate broth
 - c. Anaerobic Jar (Demonstration only)
4. Preservation of microbial cultures
 - a. Periodic subculturing and storage at Refrigeration temperature
 - b. Soil culture method for fungi.
 - c. Sealing with paraffin oil / wax
5. Study of pigmented bacteria
 - a. *Staphylococcus aureus*
 - b. *Staphylococcus epidermidis*
 - c. *Micrococcus luteus*
 - d. *Serratia marcescens*
 - e. *Pseudomonas aeruginosa*
6. Study of bacterial structure by use of structural staining
 - a. Endospore by use of Dorner's method
 - b. Cell wall by use of Dyer's method
 - c. Capsule staining by use of Hiss's method
7. Use of special staining technique to study bacteria
 - a. Spirochete by Fontana's staining method
8. Study of effect of various physical and chemical agents on growth of microorganisms
 - a. Study of effect of temperature , pH and osmotic pressure on growth of



microorganisms

b. Study of effect of chemicals on microbial growth

i. Study of effect of Heavy metals ions and their oligodynamic action on bacteria.

ii. Use of agar cup method to study effect of chemicals: Phenol, HgCl_2 and Crystal violet.

9. Study of presence of microorganisms in different habitat- environment.

a. Air

b. Water

c. Milk

d. Curd

e. Skin.

Students have to submit certified journals in the University practical examination.



TEXT BOOKS RECOMMENDED FOR PAPER MI-103 & MI-104

Microbiology: Pelczar M J, Chan E C S and Kreig N R Tata Mc Grow Hill

Suggested reading:

General Microbiology: R Y Stanier, Adelberg E A and J L Ingraham, Mac Millan Press Inc.

Introduction to microbiology: Ingraham J L and Ingraham C A Thomson Brooks/ Cole

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