“Education for Knowledge, Science and Culture”

-Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha’s

VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

B.Sc.Part-I CBCS Syllabus

Semester: I

MICROBIOLOGY-DSC – 1010 A

Theory : 60 Hours (75 Lectures) Credits -4

VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

B.Sc.Part- I Semester –I
MICROBIOLOGY
THEORY ; 60 hrs (75 lectures)
Total Marks - 100 (paper –I and II, Credit IV)

PAPER I DSC 1010 A : INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

Credit II **Marks - 50**

Unit/credit – 1 (15 hrs)

Unit/credit – 2 (15 hrs)

PAPER II DSC 1010 A : BASIC TECHNIQUES IN MICROBIOLOGY

Credit II **Marks - 50**

Unit/credit – 1 (15 hrs)

Unit/credit – 2 (15 hrs)

B.Sc.Part- I Semester –I
MICROBIOLOGY
THEORY ; 60 hrs (75 lectures)
Total Marks - 100 (paper –I and II, Credit IV)

PAPER III DSC 1010 B : BASIC BIOCHEMISTRY AND MICROBIAL NUTRITION

Credit II **Marks - 50**

Unit/credit – 1 (15 hrs)

Unit/credit – 2 (15 hrs)

PAPER IV DSC 1010 B : APPLIED MICROBIOLOGY

Credit II **Marks - 50**

Unit/credit – 1 (15 hrs)

Unit/credit – 2 (15 hrs)

Programme Specific Outcomes

- **Upon completion of B.Sc. Microbiology programme , student will be able to –**

- **Perform the basic techniques related to screening, isolation and cultivation of microorganism from various sources Understand microorganisms and their relationship with the environment**
- **Understand microorganisms and their relationship with the environment**
- **Conduct the basic research with this microorganism and perform the diagnostic procedures required in food, milk and pharmaceutical industries.**
- **Follow the aseptic techniques and conduct the process of sterilization as well as perform the techniques to control the microorganism**
- **Produce and analyze the microbial product at laboratory level.**

B.Sc. PART-I

SEMESTER- I

DSC 1010 A : INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

Expected Course Outcomes –

Upon successful completion of course, students are expected to be able to-

- **Classify the organism on the basis of their nutritional requirements**
- **Explain the beneficial and harmful activities of microorganisms.**
- **Understand structure and functions of cytoplasmic components .**

	Paper I	**No. of Hours per Unit/Credit**
UnitI/ Credit I	**History and mile stones in microbiology**	**15**
	A. History and mile stones in microbiology: 1. Spontaneous generation *vs*. biogenesis. 2.Contributions of a)Antony von Leeuwenhoek b)Edward Jenner c)Louis Pasteur d)Robert Koch e)Ivanowsky f)Joseph Lister g)Alexander Fleming h)Martinus W. Beijerinck i)Sergei N. Winogradsky j)Hargobindsingh Khorana. 3. Classification of microorganisms – a) Whittaker's five kingdom b) Carl Woese three kingdom classification systems. 4.Taxonomic ranks 5. Beneficial and harmful activities of microorganisms. **B. Scope of Microbiology:** 1.Introduction to applied branches of Microbiology : a) Air b) Water c) Sewage d) Soil e) Dairy f) Food g) Medical h)Industrial i) Biotechnology j) Geomicrobiology **C. Bacterial systematics :** a) Common OR vernacular name b) Scientific name	

UnitII / Credit II	**A. Types of Microorganisms:** **1.General characteristics of different groups:** a) Acellular microorganisms-Viruses, Viroids, Prions b) Cellular microorganisms- with emphasis on distribution, occurrence and morphology. i)Bacteria, ii)Algae, iii)Fungi and iv)Protozoa; c) Structure of Prokaryotic and eukaryotic cell. d)Difference between prokaryotic and eukaryotic microorganisms. **B. Bacterial Cell organization** 1 . Cell size, shape and arrangement, 2. Cytology of Bacteria : Structure and Function of- a)Cell-wall: ii) Cell Membrane. b) Cell membrane c)Capsule and slime layer. d) Flagella and Pili. e) Ribosomes, f) Mesosomes, g) Inclusion bodies, h)Nucleoid, chromosome and plasmids i) Endospore 3. Reserve food materials – a) Nitrogenous b) Non-nitrogenous	**15**

DSC 1010 A : BASIC TECHNIQUES IN MICROBIOLOGY

Expected Course Outcomes –

Upon successful completion of course, students are expected to be able to-

- **Identify and differentiate organisms on the basis of their morphology and staining properties.**
- **Apply various physical and chemical methods for sterilization of different materials**.
- **Understand and explain the working of different types of microscopes.**

	Paper II	**No. of Hours per Unit/Credit**
UnitI / Credit I	**A. General Principles of Microscopy :** 1. Types of microscopes: a) light microscopes b) electron microscopes, 2.Light microscopy: a)Parts b)Image formation c)Magnification d)Numerical aperture e)Resolving power f) Working distance 2. Ray diagram, special features and applications of : a) Compound Microscope b) Phase Contrast Microscope c) Electron Microscope d) Fluorescence Microscope **B. Stains and Staining procedures** 1. Definition of dye and stain 2. Classification of stains – Acidic, Basic and Neutral 3. Principles, Procedure, Mechanism of staining procedures a) Monochrome staining b) Negative staining c) Differential staining : i) Gram's staining ii)Acid fast staining 4. Special staining methods a) Cell wall (Chance's method) b) Capsule (Manvel's method) c) Volutin granule (Albert's method)	**15**

UnitII/ Credit II	**A. Control of Microorganisms** 1. Definitions of – a)Sterilization b)Disinfection c)Antiseptic d)Germicide e)Microbiostasis f)Antisepsis g)Sanitization 2. Mode of Action and application of- a) Physical agents: i) Temperature – Dry heat, Moist heat, ii) Desiccation, iii) Ultrasonication iv) Radiations – U.V. Ray, Gamma rays, v) Filtration– Asbestos and Membrane filter b) Chemical Agents: i)Phenol and Phenolic compounds ii)Alcohols (Ethyl alcohol) iii)Halogen compounds (chlorine and iodine) iv)Heavy metals (Cu and Hg) v)Fumigation by Gaseous Agents – vi)Ethylene oxide, vii)Beta-propiolactone viii)formaldehyde ix)Osmotic Pressure .	

B.Sc. PART-I

SEMESTER- II

DSC 1010 B : BASIC BIOCHEMISTRY AND MICROBIAL NUTRITION		
Expected Course Outcomes – **Upon successful completion of course, students are expected to be able to-** • **.Classify the microorganisms on the basis of their nutritional requirement.** • **Understand the structure and function of various macromolecules.** • **Able to design the culture media for isolation and cultivation of organism.**		
	PAPER III	**No. of Hours per Unit/Credit**
UnitI/ Credit I	**BASIC BIOCHEMISTRY**	**15**
	A. Proteins : 1) Introduction to amino acids , peptide bond. 2) Types of amino acids based on R group – a) Nonpolar, aliphatic amino acids. b) Polar, Uncharged amino acids. c) Aromatic amino acids. d)Positively charged (basic) amino acids e) Negatively charged (acidic) amino acids. 3) Structural levels of proteins: primary, secondary, tertiary and quaternary. **B. Carbohydrates:** 1) Monosaccharides : Classification based on aldehyde and ketone groups; structure of Ribose, Deoxyribose, Glucose, and Fructose. 2) Disaccharides : Glycosidic bond, structure of lactose and sucrose. 3) Polysaccharides : Structure of starch, glycogen and cellulose. **C. Lipids :** 1) Simple lipids – Fats, oils and waxes. 2) Compound lipids – Phospholipid, Glycolipids 3) Derived lipids – Cholesterol **D. Enzymes:** 1)Definition and types of enzymes 2) Concept of apoenzyme, coenzyme, cofactor and active site 3) Mechanism of Enzyme Action- Lock and key hypothesis, Induced fit hypothesis **E. Nucleic Acids :** 1) DNA – Structure (Watson and Crick Model) and function. 2) RNA – Types (m-RNA, t-RNA, r-RNA), structure and functions.	

UnitII/ Credit II	**MICROBIAL NUTRITION**	**15**
	A. Microbial Nutrition **1. Nutritional requirements of microorganisms:** a) Water; b) Micronutrients; c) Macronutrients d) Carbon, e) Energy source f) Oxygen and Hydrogen g) Nitrogen, h) Sulfur and Phosphorous i) growth factors. 2. Concept of auxotroph, Prototroph and fastidious organisms based on Growth factors. 3. Nutritional types of microorganism based on carbon and energy sources. a. Autotrophs b. Heterotrophs c. Phototrophs d. Chemotrophs e. Photoautotrophs f. Chemoautotrophs g.Photoheterotrophs h. Chemoheterotrophs. **B. Culture media:** 1. Components of media, 2. Types of media based on- a. Physical state- i.Solid media , ii. liquid media , iii semisolid media b. Chemical nature - i. Natural media, ii. Synthetic media iii. complex media c. Function - i. Selective media ii. Differential media iii. Enriched media iv. Enrichment media **C. Cultivation of microorganisms:** 1.Concept of enrichment media 2. Use of culture media for cultivation. 3. Conditions required for growth of the microorganisms	

DSC 1010 B : APPLIED MICROBIOLOGY		
Expected Course Outcomes – **Upon successful completion of course, students are expected to be able to-** • **Apply their knowledge to test the water microbial point of view.** • **Use various methods to isolate microorganisms from environment.** • **Able to Analyze the milk microbiologically**		
	Paper IV	**No. of Hours per Unit/Credit**
UnitI/ Credit I		**15**
	A. Water Microbiology: 1. Sources of microorganisms in water. 2. Fecal pollution of water. 3. Indicators of fecal pollution 4. Routine Bacteriological analysis of water. a. SPC b. Tests for Coli forms i) Qualitative test **Detection of coliforms** – Presumptive test, Confirmed Test, Completed test. **Differentiation between coliforms** – IMViC test, Eijkman test. ii) Quantitative – MPN, Membrane filter technique 5. Municipal water purification process and it's significance. **B. Milk Microbiology** 1. General composition of Milk. 2. Sources of contamination in milk 3. Spoilage of milk – a.Change in Colour and flavor, b.curdling and ropiness . 4. Microbiological examination of Milk – a.SPC b. dye reduction tests : i) MBRT test, ii) Resazurin test 5. Pasteurization (definition, types of methods used) – a. LTH (Low Temperature Holding)	

	b. HTST (High Temperature Short Time) c. UHT (Ultra High Temperature) 6. Efficiency of Pasteurisation – Phosphatase test (Qualitative)	
UnitII / Credit II	**A. Enrichement and Isolation of Microorganisms from natural environment.** 1.Pure culture techniques – a. Streak plate, b. Spread plate, c. Pour Plate. 2.Isolation and cultivation of anaerobic organisms by using media components and by exclusion of air. B**. Preservation of microbial cultures by –** 1.Subculturing, 2.overlaying cultures with mineral oils 3. storage at low temperature, 4. Lyophilization. **C. Systematic study of pure cultures:** 1 . Morphological characteristics. 2 .Cultural characteristics – Colony characteristics on solid media, growth in liquid media. 3.Biochemical Characteristics - i) Sugar fermentation ii) H_2S gas production iii) Detection of enzyme activity – Amylase Caseinase Catalase 4. Serological characters **D Concept of Culture collection centres.**	**15**

B.Sc. I Microbiology
Practical Course

Paper I	PRACTICAL COURSE-I: MBP- 101 INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY	No. of Hours per Unit/Credit
	1. Preparations of- a)stains (0.5% basic fuchsin, 0.5% crystal violet), b)Reagents (phosphate buffer of pH 7, 1 N and 1M solutions of HCL and NaOH), c)physiological saline. 2. Biosafety- a)Table disinfection, b)hand wash, c)use of aprons d)proper disposal of used material, e) Aseptic techniques, f)Cleaning and sterilization of glasswares. 3. Study of Laboratory instruments used in the microbiology laboratory: a)Laminar air flow, b) autoclave, incubator c)hot air oven d) colorimeter, e)colony counter f)bacteriological filter assembly 4. Study of compound microscope. 5. Microscopic observation of bacteria: a)Monochrome staining, b) Negative staining, c)Gram's staining, d)motility by Hanging-drop method. e)Cell wall staining (Chance's method), f)capsule staining (Manuval's method), g)Volutine granule staining (Albert' s method) h) Demonstration of Acid –Fast stainig (Ziehl-Neelsen's method).	**60**

	6. Preparation of liquid and solid culture media-. a)agar plates, b)slants; c)Peptone water, d)nutrient broth, e)nutrient agar; f)Sabourauds agar g)Potato Dextrose agar, h)Glucose yeast extract agar; i) MacConkey's agar. 7. Preparation of solid and liquid medium and assuring its sterility by autoclave and hot air oven. 8. Sterilization of glassware using Hot Air Oven and assessment for sterility 9. Fungal Mounting- *Penicillium and Aspergillus* 10. Demonstration of presence of microflora in air by exposure of nutrient agar plates to the air.	
Paper II	**PRACTICAL COURSE-II: MBP-102 – BACTERIOLOGY**	**No. of Hours per Unit/Credit**
	1. Enrichment of coliform from water by MacConkeys broth. 2. Personal hygiene- Demonstration of presence of bacterias from hands, Teeth and skin (swabbing) by cultivation methods. 3. Isolation of pure cultures of bacteria by four quadrant streaking method**,** and studies of Colony characteristics, Gram staining and motility of – i) *Escherichia coli* ii) *Bacillus species* iii) *Staphylococcus aureus* 4. Biochemical tests : i)Detection of production of indole, excess acid, acetoin and utilization of citrate as a carbon source by IMViC test ii) Detection of glucose and lactose fermentation ability of bacteria	**60**

	iii) Detection of H_2S production ability of bacteria 5. Detection of enzyme production ability of bacteria - i) Amylase ii) Catalas iii) Caseinase 6. Determination of bacteriological quality of milk by MBRT test. 7. Preparation of serial dilutions of water and soil for isolation of bacteria. 8. Isolation of bacteria from water (spread plate technique) and soil (pour plate technique) by preparation of serial dilutions. 9. Enumeration of bacteria from water and milk by SPC method.	

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New course structure

For B.Sc./BCA/B.Sc.Computer science (Entire)

Sr. No.	**Internal Examination DSC Course**				Total (a+b+c+d)	Conversion of 80 marks in **Total(I)** **(e)**	**SEE (Semester End Examination) DSC Course**		**Total (II)** (f+g)= **h**	**Total (I and II)** (e+h) = **i**
	Paper-I (Two tests each of 10 marks) (a)	Paper-II (Two tests each of 10 marks) (b)	Home assignment Paper I (c)	Home assignment Paper II (d)			Paper-I (f)	Paper-II (g)		
1	20	20	20	20	80	**20**	40	40	**80**	**100**

Nature of Internal and SEE(Semester End Examination)Examination

1) For internal examination, there shall be two tests (online/offline) of ten marks and one home assignment of 20 marks for each paper per semester.

2) For internal examination there shall be conversion of 80 marks in 20 marks and for passing 7 marks is required out of 20.

3) For SEE (Semester End Examination), there shall be two papers (Paper I and Paper II) of each DSC course per semester, each of 40 marks.

4) There shall be combined passing for SEE (Semester End Examination) of Paper-I and Paper -II i.e 28 marks is required out of 80.

4) There shall be separate passing is mandatory for both internal and SEE (Semester End Examination).

Practical Examination B.Sc.I (as per BoS guidelines)

Sr.No.	Lab work	Journal (Punctuality, Neatness)	Attendance, and participation in the practical's, motivation	Total
1	40	5	5	50

Nature of Question Paper (Except English)

Semester: I

Paper- I

Time : 2 hours **Total Marks: (40)**

Instructions: (1) **All** questions are **compulsory**.
(2) Figures to the **right** indicate **full** marks.
(3) Draw **neat** labeled diagrams **wherever** necessary.
(Paper setter may add or delete any instruction if required)

Q.1. **Select correct alternative**. **(8)**

(i)----------
a) b) c) d)
(ii)----------
a) b) c) d)
(iii)----------
a) b) c) d)
(iv)----------
a) b) c) d)

(v)----------
a) b) c) d)
(vi)----------
a) b) c) d)
(vii)----------
a) b) c) d)
(viii)----------
a) b) c) d)

Q. 2. Attempt any two **(16)**

(i)
(ii)
(iii)

Q.3. Attempt any four **(16)**

(i)
(ii)
(iii)
(iv)
(v)
(vi)

Nature of Question Paper (Except English)

Semester: I
Paper- II

Time : 2 hours **Total Marks: (40)**

Instructions: (1) **All** questions are **compulsory**.
(2) Figures to the **right** indicate **full** marks.
(3) Draw **neat** labeled diagrams **wherever** necessary.
(Paper setter may add or delete any instruction if required)

Q.1. **Select correct alternative**. **(8)**

(i)----------
a) b) c) d)
(ii)----------
a) b) c) d)
(iii)----------
a) b) c) d)
(iv)----------
a) b) c) d)

(v)----------
a) b) c) d)
(vi)----------
a) b) c) d)

(vii)----------

a) b) c) d)

(viii)----------

a) b) c) d)

Q. 2. Attempt any two **(16)**

(i)

(ii)

(iii)

Q.3. Attempt any four **(16)**

(i)

(ii)

(iii)

(iv)

(v)

(vi)

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Vivekanand College Kolhapur, (Autonomous).

New course structure to be implemented after sanction(Draft)

For B.A/B.Com./BBA

Sr. No.	**Internal Examination DSC Course**		**Total = I** (a + b)	**Conversion of 30 marks in Total (I)** **(c)**	**SEE (Semester End Examination) DSC Course** **(d)**	**Total (II) (c + d)**
	Two tests each of 10 marks (a)	Home assignment (b)				
1	20	10	30	10	40	**50**

Nature of Internal and SEE(Semester End Examination)Examination

1) For internal examination, there shall be two tests (online/offline) of ten marks and one home assignment of 10 marks for each paper per semester.

2) For internal examination there shall be conversion of 30 marks in 10 marks and for passing 4 marks is required out of 10.

3) For SEE (Semester End Examination), there shall be examination of 40 marks of each course per semester, and for passing 14 marks is required out of 40.

5) There shall be separate passing is mandatory for both internal and SEE (Semester End Examination).

VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

B.Sc.Part- I

MICROBIOLOGY

Old Syllabus (2018)	New Syllabus (2021)
Paper I **INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY** **(Credit - 4)**	**Paper I** **INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY** **(Credit - 2)**
Paper I **BACTERIOLOGY & APPLIED MICROBIOLOGY** **(Credit - 4)**	**Paper II** **BASIC TECHNIQUES IN MICROBIOLOGY** **(Credit - 2)**
	Paper III **BASIC BIOCHEMISTRY AND MICROBIAL NUTRITION (Credit - 2)**
	Paper IV **APPLIED MICROBIOLOGY** **(Credit - 2)**

VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

Old Syllabus (2018)	New Syllabus (2021)
Paper I **A. General Principles of Microscopy :** 1. Types of microscopes: a) light microscopes b) electron microscopes, 2.Light microscopy: a)Parts b)Image formation c)Magnification d)Numerical aperture e)Resolving power f) Working distance 2. Ray diagram, special features and applications of : a) Compound Microscope b) Phase Contrast Microscope c) Electron Microscope **B. Stains and Staining procedures** 1. Definition of dye and stain 2. Classification of stains – Acidic, Basic and Neutral 3. Principles, Procedure, Mechanism of staining procedures a) Monochrome staining b) Negative staining c) Differential staining : i) Gram's staining ii)Acid fast staining 4. Special staining methods a) Cell wall (Chance's method) b) Capsule (Manvel's method) c) Volutin granule (Albert's method)	**Paper II** **A. General Principles of Microscopy :** 1. Types of microscopes: a) light microscopes b) electron microscopes, 2.Light microscopy: a)Parts b)Image formation c)Magnification d)Numerical aperture e)Resolving power f) Working distance 2. Ray diagram, special features and applications of : a) Compound Microscope b) Phase Contrast Microscope c) Electron Microscope d) Fluorescence Microscope **B. Stains and Staining procedures** 1. Definition of dye and stain 2. Classification of stains – Acidic, Basic and Neutral 3. Principles, Procedure, Mechanism of staining procedures a) Monochrome staining b) Negative staining c) Differential staining : i) Gram's staining ii)Acid fast staining 4. Special staining methods a) Cell wall (Chance's method) b) Capsule (Manvel's method) c) Volutin granule (Albert's method)
Paper I	**Paper III**

A. Microbial Nutrition **1. Nutritional requirements of microorganisms:** a) Water; b) Micronutrients; c) Macronutrients d) Carbon, e) Energy source f) Oxygen and Hydrogen g) Nitrogen, h) Sulfur and Phosphorous i) growth factors. 2. Concept of auxotroph, Prototroph and fastidious organisms based on Growth factors. 3. Nutritional types of microorganism based on carbon and energy sources. a. Autotrophs b. Heterotrophs c. Phototrophs d. Chemotrophs e. Photoautotrophs f. chemoautotrophs g.Photoheterotrophs h. Chemoheterotrophs **B. Culture media:** 1) Components of media, 2) Types and use of- Natural and synthetic media, chemically defined medium, complex medium, selective, differential, enriched and enrichment medium. **C. Cultivation of microorganisms:** Use of culture media for cultivation, Conditions required for growth of the microorganisms.	**A. Microbial Nutrition** **1. Nutritional requirements of microorganisms:** a) Water; b) Micronutrients; c) Macronutrients d) Carbon, e) Energy source f) Oxygen and Hydrogen g) Nitrogen, h) Sulfur and Phosphorous i) growth factors. 2. Concept of auxotroph, Prototroph and fastidious organisms based on Growth factors. 3. Nutritional types of microorganism based on carbon and energy sources. a. Autotrophs b. Heterotrophs c. Phototrophs d. Chemotrophs e. Photoautotrophs f. chemoautotrophs g.Photoheterotrophs h. Chemoheterotrophs. **B. Culture media:** 1. Components of media, 2. Types of media based on- a. Physical state- i.Solid media , ii. liquid media , iiisemisolid media b. Chemical nature - i. Natural media, ii.Synthetic media iii. complex media c. Function i. Selective media ii.Differential media iii. Enriched media iv.Enrichment media **C. Cultivation of microorganisms:** 1. Use of culture media for cultivation. 2. Conditions required for growth of the microorganisms
Paper II **A. Enrichement and Isolation of Microorganisms**	**PaperIV** **A. Enrichement and Isolation of Microorganisms**

from natural environment. 1.Pure culture techniques – a. Streak plate, b. Spread plate, c. Pour Plate. 2.Isolation and cultivation of anaerobic organisms by using media components and by exclusion of air. B**. Preservation of microbial cultures by –** 1.Subculturing, 2.overlaying cultures with mineral oils 3. storage at low temperature, 4. Lyophilization. **C. Systematic study of pure cultures:** 1 . Morphological characteristics. 2 .Cultural characteristics – Colony characteristics on solid media, growth in liquid media. 3.Biochemical Characteristics - i) Sugar fermentation ii) H2S gas production iii) Detection of enzyme activity – Amylase Caseinase Catalase **D Concept Culture collection centres.**	**from natural environment.** 1.Pure culture techniques – a. Streak plate, b. Spread plate, c. Pour Plate. 2.Isolation and cultivation of anaerobic organisms by using media components and by exclusion of air. B**. Preservation of microbial cultures by –** 1.Subculturing, 2.overlaying cultures with mineral oils 3. storage at low temperature, 4. Lyophilization. **C. Systematic study of pure cultures:** 1 . Morphological characteristics. 2 .Cultural characteristics – Colony characteristics on solid media, growth in liquid media. 3.Biochemical Characteristics i)Sugar fermentation ii) H2S gas production iii)Detection of enzyme activity Amylase Caseinase Catalase 4. Serological characters **D Concept Culture collection centres.**

Old Syllabus (2018)	**New Syllabus (2021)**

PRACTICAL COURSE-I: MBP- 101 INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY	**PRACTICAL COURSE-I: MBP- 101 INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY**
1. Preparations of- a)stains (0.5% basic fuchsin, 0.5% crystal violet), b)Reagents (phosphate buffer of pH 7, 1 N and 1M solutions of HCL and NaOH), c)physiological saline. 2. Biosafety- a)Table disinfection, b)hand wash, c)use of aprons d)proper disposal of used material, e) Aseptic techniques, f)Cleaning and sterilization of glasswares. 3. Study of Laboratory instruments used in the microbiology laboratory: a)Laminar air flow, b) autoclave, incubator c)hot air oven d) colorimeter, e)colony counter f)bacteriological filter assembly 4. Study of compound microscope. 5. Microscopic observation of bacteria: a)Monochrome staining, b) Negative staining, c)Gram's staining, d)motility by Hanging-drop method. e)Cell wall staining (Chance's method), f)capsule staining (Manuval's method), g)Volutine granule staining (Albert' s method)	1. Preparations of- a)stains (0.5% basic fuchsin, 0.5% crystal violet), b)Reagents (phosphate buffer of pH 7, 1 N and 1M solutions of HCL and NaOH), c)physiological saline. 2. Biosafety- a)Table disinfection, b)hand wash, c)use of aprons d)proper disposal of used material, e) Aseptic techniques, f)Cleaning and sterilization of glasswares. 3. Study of Laboratory instruments used in the microbiology laboratory: a)Laminar air flow, b) autoclave, incubator c)hot air oven d) colorimeter, e)colony counter f)bacteriological filter assembly 4. Study of compound microscope. 5. Microscopic observation of bacteria: a)Monochrome staining, b) Negative staining, c)Gram's staining, d)motility by Hanging-drop method. e)Cell wall staining (Chance's method), f)capsule staining (Manuval's method), g)Volutine granule staining (Albert' s method)

6. Preparation of liquid and solid culture media-. a)agar plates, b)slants; c)Peptone water, d)nutrient broth, e)nutrient agar; f)Sabourauds agar g)Potato Dextrose agar, h)Glucose yeast extract agar; i) MacConkey's agar. 7. Preparation of solid and liquid medium and assuring its sterility by autoclave and hot air oven. 8. Sterilization of glassware using Hot Air Oven and assessment for sterility 9. Fungal Mounting- *Penicillium and Aspergillus* 10. Demonstration of presence of microflora in air by exposure of nutrient agar plates to the air.	h) Demonstration of Acid –Fast stainig . 6. Preparation of liquid and solid culture media-. a)agar plates, b)slants; c)Peptone water, d)nutrient broth, e)nutrient agar; f)Sabourauds agar g)Potato Dextrose agar, h)Glucose yeast extract agar; i) MacConkey's agar. 7. Preparation of solid and liquid medium and assuring its sterility by autoclave and hot air oven. 8. Sterilization of glassware using Hot Air Oven and assessment for sterility 9. Fungal Mounting- *Penicillium and Aspergillus* 10. Demonstration of presence of microflora in air by exposure of nutrient agar plates to the air.