**MANONMANIAM SUNDARANAR UNIVERSITY – TIRUNELVELI – 12**
**B.Sc Microbiology (CBCS)**
**(For those who joined the course from the academic year 2020-2021)**

| Sem | Part | Title of the Subject | Status | Instruction hours/ week | Credits |
|---|---|---|---|---|---|
| I | I | Tamil | Language | 6 | 4 |
| | II | Communicative English | Language | 6 | 4 |
| | III | Core :I Fundamentals of Microbiology and Microbial Diversity | Core | 4 | 4 |
| | | Practical- I | Major Practical | 2 | 2 |
| | | Professional English for Life Sciences – I | Add on Major (Mandatory) | 4 | 4 |
| | | Allied I Bio-instrumentation | Allied | 4 | 3 |
| | | Practical- I | Allied Practical | 2 | 2 |
| | IV | Environmental studies | Common | 2 | 2 |
| | | Total (8 Courses) | | 30 | 25 |

| Sem | Part | Title of the Subject | Status | Instruction hours/ week | Credits |
|---|---|---|---|---|---|
| II | I | Tamil | Language | 6 | 4 |
| | II | English | Language | 6 | 4 |
| | III | Core II : Microbial Physiology and Biochemistry | Core | 4 | 4 |
| | | Major Practical II | Practical | 2 | 2 |
| | | Professional English for Life Sciences – II | Add on Major (Mandatory) | 4 | 4 |
| | | Allied II General Biology | Allied | 4 | 3 |
| | | Allied Practical II | Practical | 2 | 2 |
| | IV | Value Based Education / சமூகஒழுக்கங்களும் பண்பாட்டு விழுமியங்களும் / Social Harmony | Common | 2 | 2 |
| | | Total ( 8 courses) | | 30 | 25 |

**MSU/ 2020-21 / UG-Colleges /Part-III (B.Sc. Microbiology) / Semester – I /Core- I**

Major – I, Fundamentals of Microbiology and Microbial Diversity LTPC

Unit I 4004

Development of Microbiology as a discipline –Spontaneous generation vs biogenesis – Contributions of Anton von Leeuwenhock, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming, Martinus Beijerinck, Sergei N Winogradsky, Selman A. Waksman, Paul Ehrlich, Elie Metchnikoff, Edward Jenner.

Unit –II

Basic Microbiological Techniques – Microscopy – Principles and Applications – Bright field and Dark Field Microscopy- Electron Microscopy- SEM and TEM

Sterilisation Techniques – Principles and Types – Culture Media – Preparation and Types.

Unit – III

Bacteria – Cell Structure- Flagella – Fimbriae – Pili- Cell membrane- Cytoplasm- Nucleoid – Spore- Structure of Cell wall – Gram Positive – Gram Negative Cell wall Structure- Bacteria – Type study – Staphylococcus, Clostridium, Neisseria, E.coli.

Unit – IV

Archae bacteria and Special groups – Methanogens- Gliding – Budding and Appendaged Bacteria – Sulphur bacteria – Spirochaetes – Mycoplasma – Actinomycetes – Streptomyces.

Unit - V

Fungi – General Characteristics – Ultra structure – Type study – Aspergillus

Algae- General Characteristics – Ultra structure – Type study – Chlamydomonas-

Protozoa – General Characteristics Ultra Structure – Type study – Amoeba

Viruses - General Characteristics - Structure – Type study – TMV, Rabies Virus

Text books Recommended


1) Prescott LM Harley JP and Klein DA (2013) Microbiology Mcgraw ttill, New York
2) Salle A.J (1996) Fundamental Principles of Bacteriology
3) R.C. Dubey and Maheswari - 2014 A Text Book of Microbiology – Chand and Co New Delhi.

**MSU/ 2020-21 / UG-Colleges /Part-III (B.Sc. Microbiology) / Semester – I / Major Practical– I**

**FUNDAMENTALS OF MICROBIOLOGY AND MICROBIAL DIVERSITY**.

LTPC

0022

1. Laboratory precautions
2. Micrometry - Determination of size of bacteria or yeast
3. Methods of sterilization
4. Motility of bacteria – wet mount / hanging drop method .
5. Preparation and dispensing of culture media – solid and liquid (Nutrient broth and agar)
6. Preparation of agar slant, agar stab and agar plates.
7. Pure culture technique - streak plate and pour plate
8. Serial dilution technique.
9. Simple staining method
10. Gram's Staining method
11. Negative Staining Method.
12. Acid fast Staining method.
13. Spore Staining method.
14. Anaerobic culture technique - Alkaline pyrogallol (Demonstration).

References:


1. J.G. Cappuccino and N.Sherman 1996 Microbiology – A laboratory manual – Benjamin Cumins , New York.

2. M. Kannan 1996, Laboratory Manual in General Microbiology.

3. P. Gunasekaran -Laboratory Manual in Microbiology.

4. Dr. S. Rajan and Mrs. R. Selvi Christy – Experimental procedures in Life Sciences – Ajantha book house, Chennai.

5. Dr. S.M.Reddy and Dr. S.Ram Reddy - Microbiology A laboratory manual - BSC Publishers and Distributors - Hyderabad.

**BIOINSTRUMENTATION**

LTPC

4003

Unit - I Buffers - Preparation of Buffers – Standard Buffers – Molar and Normal Solutions PH - PH meter (PH electrode _ Calomel and glass electrode ) - Titrations curve - Techniques of PH measurement. [9L]

Unit II Principles and applications of Autoclave – Hot air oven – Incubator, Laminar air flow chamber / Biosafety cabinets , BOD Incubator,Lyophilizer.[9L]

Unit – III Chromatography - Paper, Thin layer, column, Ion - exchange, gas and HPLC, Centrifuge - Types of centrifuge and its application.[9L]

Unit - IV Electrophoresis - Principle - PAGE -SDS - Vertical and slab gel - Horizontal and tube gel types – Paper electrophoresis - Applications - Immuno electrophoresis.[8L]

Unit -V Colorimetry, Flame photometry - spectrometry - UV and Visible spectrophotometer - IR Spectroscopy - Raman Spectroscopy – X ray spectrometry (principle, Components, generation and detection) NMR (Principle and Construction) Continous

and pulsed types and uses.[10L] [Total;45L]

Text Books Recommended

1. J.Jayaraman, 1985 Laboratory Manual in Biochemistry wiley Eastern Ltd., New Delhi.

2. D.T.Plummer 1998, An Introduction to practical Biochemistry, Tata MaCraw Hil, New Delhi.

3. P.Palanivelu, 2001 Analytical Biochemistry and separation techniques.

4. Keith Wilson and J walker - 2003 Practical Biochemistry.

## BIOINSTRUMENTATION

LTPC
0022

1. Cleaning of glass wares.

2. Microscopy - Light, bright field and dark field.
3. Principles and application of Incubator / hot air oven / auto clave / centrifuge Laminar air flow / filteration unit.
4. Preparation of buffers – Acid and alkaline range.
5. Preparations of Molar Solutions.
6. Preparation of 0.1 and 1 Normal solutions.
7. Separation of Amino acid by paper Chromatography.
8. Estimation of free Amino acid by Ninhydrin Method .
9. Separation of Lipid by Thin Layer Chromatography.
10. Separation of Plant pigments by Coloumn Chromatography (Demonstration).
11. Beer Lamberts Law Veryfication.
12. Handling of Micro Pipette and checking their accuracy.
13. Separation of water and oil using centrifuge.
14. Paper Electro phoresis.

References:

1. J.G. Cuppuccino and N. Sherman 1996 Microbiology - A Laboratory manual Benjamin Cummins, New York.

2. M. kannan 1996 , Laboratory Manual in General Microbiology .
3. P. Gunasekaran - Laboratory Manual in Microbiology.
4. Dr. S.Rajan and Mrs. R.Selvi Christy – Experimental procedures in Life Sciences- Ajantha Book house, Chennai.

Major – II, Microbial Physiology and Biochemistry

LTPC

4004

Unit – I

Basic Concepts of Metabolism – Respiratory Pathways – Glycolysis – Kreb's Cycle – ETS – ATP generation - Fermentation Pathways – Alcohol Fermentation - Anaerobic respiration with special reference to dissimilatory nitrate reduction (Denitrification: nitrate / nitrite and nitrate / ammonia respiration)

Unit – II

Introduction to phototrophic metabolism – groups of phototrophic micro organisms, Anoxygenic vs, oxygenic photosynthesis with reference to photosynthesis in green bacteria and cyanobacteria – Introduction to nitrogen fixation (Ammonia assimilation / Assimilatory nitrate reduction).

Unit – III

Families of Monosacharides ; Aldoses and Ketoses, Trioses, Pentoses and Hexoses – Disaccharides - Reducing and Non reducing Sugars -Polysaccharides- Starch And Glycogen – Structural Polysaccharides – Cellulose - Peptidoglycan – Chitin

Unit – IV

Amino acids : , Non protein amino acids – D-alanine and D- glutamic acid , oligopeptides - Proteins – Primary – Secondary – Tertiary and Quarternary structure of Proteins.

Unit - V

Lipids : Major classes of storage and structural lipids – storage lipids – fatty acids

Structure and functions – Essential fatty acid – Saponification – sphingolipids - Lipid functions (cell signals , cofactors, prostaglandins) - Introduction of lipid micelles.

Text books Recommended.

1) Caldwell, D.R. (1995), Microbial Physiology and Metabolism, Wm.C.Brown Publishers, USA.

2) Prescott LM. Harley JP and Klein DA (2013) Microbiology Mccrawttill, Newe York.

3) Salle A.J. (1996) Fundamental Principles of Bacteriology .
4) Styrer ,L. 1995 , Biochemistry, Ed. W.H.Freeman and Company,
5) Dr.S.M.Reddy and Dr.S.Ram Reddy – Microbiology A laboratory manual – BSC Publishers

## MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY

**LTPC**
**0022**

1.IMVIC test series

2.Carbohytrate fermentation-Glucose and lactose

3.TSI –H2S Production

4.Quantitative test for carbohydrate (DNSA method)

5.Protein estimation(Lowry method)

6.Catalase test

7.Oxidase test

8.Urease test

9.Decarboxylase test

10.Measurement of growth and growth curve

11.Effect of Ph on growth

12. Effect of temperature on growth

13.Effect of salinity on growth

14.Effect of disinfectant-Phenol coefficient test

References

1. J.G. Cappuccino and N.Sherman 1996 Microbiology – A laboratory Manual – Benjamin Cummins, New York.
2. M.Kannan 1996,laboratory Manual in General Microbiology.
3. P.Gunasekaran – laboratory Manual in Microbiology.
4. Dr.S.Rajan and Mrs.R.Selvi Christy – Experimental procedures in Life Sciences – Ajantha book house , Chennai.
5. Dr. S.M. Reddyand Dr. Ram Reddy – Microbiology – A laboratory Manual – BSC Publishers

**GENERAL BIOLOGY** L T P C

4003

Unit – I Ultrastructure of Eubacteria – Cell membrane – Extra mural layer – slime capsule (cytoplasmic inclusions – Mesosomes – Nuclear material - Reserve materials – Pigments.

Unit – II Ultrastructure and functions of Enkaryotic Cell organelles – cell wall – cell membranes

– Mitochondtia, chloroplast – Endoplasmic reticulum – Golgi Complex – Nucleus – Ribosomes – Other cell inclusions and flagella.

Unit – III Cell Divisions in Bacteria – Binary fission – Cell division in Eukaryotes – Mitosis Meiosis – Reproduction in Microbes.

Unit – IV Botany – Ultrastructure of plant cell – General characters of Thallophyta - Bryophyta,Pteridophyta and Gymnosperms, plant adaptations in hydrophytes, xerophytes, Halophytes Economic Botany – Economic importance of cereals – Ragi Pulses – cow pea. Beverage

– coffee, oil – sunflower, Bio diesel – Jatropha , importance, propagating methods of horticultural plants.

Unit –V Zoology – General characteristics of vertebrate and invertebrate (type study – fish, human beings, earthworm) Human Physiology – Digestive system and Respiratory system. Economic Zoology: Aquaculture, Sericulture, Apiculture.

Text Books Recommended.

1. Prescott L.M.J.P.Harley and C.A.Klein 2014 Brown Publishers
2. Jain VK(2000) Fundamentals of Plant Physiology 5th Edition, Schand Co. Ltd., New Delhi.
3. Pandey B.P. (2007) Plant Anatomy S. Chand and Co. De-New Delhi.
4. Ekambarantha Ayyar and Ananthakrishnan TN 1993 outlines of Zoology Vol I and II Viswanathan and Co. Chennai.
5. Sambasivam I, Kamalakara Rao A.P.Augustine Chellappa S (1983) Text book of Animal Physiology S. Chand and Co., New Delhi.

GENERAL BIOLOGY

**LTPC**
**0022**

1.Capsule staining

2.Relationship between OD and CFU measurement

3.Observation of representative forms of Algae-Diatoms-Clamydomonas-Volvox-

Cyanobacteria(oscillatoria,Nostoc.Anabaena

3.Mitosis in Onion root

4.Meiosis in flower buds of Allium cepa (Onion)

5.Isolation of Chloroplast from spinach leaves

6.Silver staining for flagella

7. Albert staining

8.Bio diesel preparation (Demonstration)

9.Identification of invertebrate and vertebrates

10.Aqaculture( Demonstration)

11.Sericulture ( Demonstration)

12.Apiculture (Demonstration)

13.Horticulture(Demonstration)

14.Observation of fish digestive system

**Reference**

J.G. Cappuccino and N. Sherman 1996 Microbiology – A laboratory Manual – Benjamin Cummins, New York.

Dr. S. Rajan and Mrs. R.Selvi Christy – Experimental procedures in Life Sciences – Ajantha book house, Chennai.

Dr.S.M.Reddy and Dr.S.Ram Reddy – Microbiology A laboratory manual – BSC Publishers and Distributers – Hyderabad