।। सा विद्या या विमुक्तये ।।

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

"ज्ञानतीर्थ" परिसर, विष्णुपूरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

"Dnyanteerth", Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

25 1994 - 2019 SILVER JUBILEE YEAR

ACADEMIC (1-BOARD OF STUDIES) SECTION

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, **दिनांक ०८ जून २०१९ रोजी संपन्न झालेल्या ४४व्या मा. विद्या परिषद बैठकीतील ऐनवेळचा विषय क्र.११/४४–२०१९** च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या **संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे** खालील विषयांचे **C.B.C.S. (Choice Based Credit System) Pattern** नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९–२० पासून लागू करण्यात येत आहेत.

1. Agricultural Microbiology
2. Agrochemicals & Fertilizers
3. Analytical Chemistry
4. B.C.A.
5. B.Voc. (Food Processing, Preservation and Storage)
6. B.Voc. (Web Printing Technology)
7. Biochemistry
8. Bioinformatics
9. Biophysics
10. Biotechnology (Vocational)
11. Biotechonology
12. Botany
13. Chemistry
14. Computer Application (Optional)
15. Computer Science (Optional)
16. Computer Science
17. Dairy Science
18. Dyes and Drugs
19. Electronics
20. Environmental Science
21. Fishery Science
22. Food Science
23. Geology
24. Horticulture
25. Industrial Chemistry
26. Information Technology (Optional)
27. Mathematics
28. Microbiology
29. Network Technology
30. Physics
31. Software Engineering
32. Statistics
33. Zoology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.: शैक्षणिक–०१/परिपत्रक/पदवी–सीबीसीएस अभ्यासक्रम/२०१९–२०/२९२
दिनांक : ०३.०७.२०१९.

स्वाक्षरित/–
उपकुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :

१) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course Structure (New scheme)
Faculty of Science and Technology
Subject: Agricultural Microbiology
B. Sc. First Year (Semester –I &II)
Semester Pattern effective from June – 2019

Semester	Paper No./ Course No.	Name of the Course	Instruction Hrs/ week	Total period	Internal Evaluation	Marks of Semester	Total Marks	Credits
I	CCAMB I (Section A)	Introductory Agricultural Microbiology (PI))	03	45	10	40	50	2
	CCAMB I (Section B)	Cell Biology and Microbial Growth(PII)	03	45	10	40	50	2
II	CCAMB II (Section A)	Bioinstrumentation and Microbial Techniques (PIII)	03	45	10	40	50	2
	CCAMB II (Section B)	Basic Microbiology & Biochemistry (PIV)	03	45	10	40	50	2
	CCAMBP I [CCAMB I & II (Section A & B)]	Practical's based on Section A & Section B of CCAMB I & CCAMB II (PV)	04	20 Practical	20	80	100	4
				Total credits semester I and II: 12				

Semester	Course No.	Name of the Course	Instruction Hrs/ week	Total period	Internal Evaluation	Marks of Semester	Total Marks	Credits
III	CCAMB III (Section A)	Microbial Physiology and Metabolism(P-VI)	03	45	10	40	50	2
	CCAMB III (Section B)	Applied Microbiology (P-VII)	03	45	10	40	50	2
	CCAMBP II [CCAMB III & IV (Section A)]	Practical's based on P-VI & P-VIII (P-X)	04		10	40	50	2
	CCAMBP II [CCAMB III & IV (Section B)]	SEC I (1 Skill/ optional)			15×3 = 45	-	-	(02)*
IV	CCAMB IV (Section A)	Microbial Genetics (P-VIII)	03	45	10	40	50	2
	CCAMB IV (Section B)	Microbes in Agriculture (PIX)	03	45	10	40	50	2
	CCAMBP III [CCAMB III & IV (Section B)]	Practical's based on P-VII & P-IX (P-XI)	04	10 Practicals	10	40	50	2
	CCAMBP III [CCAMB III & IV (Section B)]	SEC II (1 Skill / optional)			15×3 = 45	-	-	(02)*
				Total credits semester III and IV				12(04)*

Semester/ Annual	Course No.	Name of the Course	Instruction Hrs./ Week	Total Periods	Internal Evaluation (CA)	End Semester Examination (ESE)	Total Marks	Credits
V Semester	DSEAMBI (Section A)	Molecular Biology (P – XII)	03	45	10	40	50	2
	DSEAMB I [Section B]	Industrial Microbiology (P – XIII A) Or Microbial enzymes and crop production (P – XIII B)	03	45	10	40	50	2
VI Semester	DSEAMB II (Section A)	Genetic Engineering (P-XIV)	03	45	10	40	50	2
	DSEAMB II [Section B]	Agricultural Biotechnology (P – XV A) Or Plant Microbial Interactions (P – XV B)	03	45	10	40	50	2
Annual Practicals / Skill	DSEAMBP I [DSEAMB I & II Section A]	Practicals Based onP – XII & P -XIV(P - XVI)	04	10 Practical	10	40	50	2
	SECAMB III (A OR B)	SEC III (1 Skill/ optional)	03	45	25	25	50	(02) *
Annual Practicals / Skill	DSEAMBP II [DSEAMB I & II (Section B I & II)	Practicals based on P -XIII A & B & P – XV A & B (P -XVII)	04	10 Practical	10	40	50	2
	SECAMB IV (A OR B)	SEC IV (1 Skill/ optional)	03	45	25	25	50	(02) *
	Total Credits Semester V & VI							12 (04*)

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course

B. Sc. First year (Semester - I)

AGRICULTURAL MICROBIOLOGY

CCAMB I (Section A)

INTRODUCTORY AGRICULTURAL MICROBIOLOGY (P-I)

Credits: 02 (Marks: 50) Periods: 45

UNIT I: INTRODUCTION **Periods:-10**

1.1 Scope of Microbiology
a) Definition and concept
b) General characters of Microorganisms
c) Distribution of Microorganisms in nature.
1.2 Role of microorganisms in
a) Agriculture
b) Human and animal health
c) Industries
d) Genetic Engineering
e) Beneficial & Harmful role of Micro-organisms with suitable examples.

UNIT II: Historical account **Periods:-12**

2.1 Historical developments in microbiology.
a) Early observation of microorganisms
b) Controversy over spontaneous generation – Contribution of different scientists:
c) Recognition of microbial role in diseases – Koch's postulates and contribution of Louis Pasteur, Edward Jenner, Winogradasky, Alexander Flemming, Beijerinck, Waksman.
d) Recognition of microbial role in Agro industries.
e) Discovery of microbial effect on organic and inorganic matter in Soil.

UNIT III: General characters of micro organisms **Periods:-10**

3.1General Characters and Structure (In Brief) of
a) Archaebacteria
b) Microalgae
c) Fungi
d) Actinomycetes
e) Protozoa
3:2 Ultra structure of Animal virus – HIV, Bacterial Virus, Plant Virus – TMV (Brief account with labeled figures)

UNIT IV: Taxonomy of Microbes **Periods:-13**

4.1 Microbial Classification and Nomenclature
a) Taxonomic Groups
b) Goals of classification
4.2 General Methods of classifying Bacteria
a) Intuitive Method
b) Numerical Taxonomy
c) Genetic Relatedness
d) Nomenclature
4.3 Introduction to Bergey's Manual of Bacteriology (9th edition)

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course
B. Sc. First year (Semester - I)
AGRICULTURAL MICROBIOLOGY
CCAMB I (Section B)
CELL BIOLOGY AND MICROBIAL GROWTH (P-II)
Credits: 02 (Marks: 50) Periods: 45

UNIT I: Eukaryotic and Prokaryotic cell **Periods: 07**

a) Morphology- size and arrangement of bacterial cell.
b) Ultra structure of animal and plant cell
c) Difference between Eukaryotic and Prokaryotic cell.

UNIT II: Ultra structure of bacterial cell **Periods: 14**

2.1Cytology of typical bacterial cell
a) Structure, Chemical composition and function of following:-
i) Capsule and slime layer
ii) Cell wall : Gram positive and gram negative bacteria
iii) Unit membrane
iv) Flagella: Arrangement, Mechanism of Flagella movement, Chemo taxis, Photo taxis, Magneto taxis
v) Pili.
vi) Ribosome
vii) Nuclear material, Mesosome, Plasmids
viii) Endospore -Types, Sporulating bacteria, Architecture of Endospore, Sporulation process, Germination process
ix) Reserve Food material- poly- ß hydroxy butyrate granules, Glycogen ,Microbial Poly phosphate granules and sulfur granules.

UNIT III: Growth **Periods: 12**

3.1 Bacterial Growth
a) Definition
b) Concept of Growth
c) Bacterial Growth Curve
d) Phases of Growth
e) Diauxic Growth
f) Synchronous Growth
g) Continuous Culture
h) Measurement of bacterial Growth
3.2 Bacterial Cell division -Binary fission
3.3 Effect of Environmental factors on Microorganisms
Temperature, pH, Nutrient concentration, Oxygen, Osmotic pressure, Hydrostatic pressure, Surface Tension, Heavy metals, Radiations

UNIT IV: Cultivation and Maintenance of Bacteria: **Periods: 12**

4.1 Pure culture Techniques.
a) Definition and Significance of Streak plate, Pour plate, Spread plate. Single Cell isolation.
4.2 Cultivation of Bacteria
a) Media used, Properties of good culture media.
b) Definition, Concept, Use and Types of different culture media.
c) Synthetic, Non-synthetic, Natural, Selective, Differential, Enriched, Enrichment, Assay, Minimal, Maintenance and Transport Medium. Buffers in culture medium
4.3 Cultivation of anaerobes. (Any two methods)

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course
B. Sc. First year (Semester - II)
AGRICULTURAL MICROBIOLOGY
CCAMB II (Section A)
BIONSTRUMENTATION AND MICROBIAL TECHNIQUES (P-III)
Credits: 02 (Marks: 50) Periods: 45

UNIT I: Microscopy **Periods: 12**

1.1 Introduction
a) Definition: Magnification, Resolving power, Depth of focus, Focal length.
Angular aperture, Numerical aperture
b) Objectives: Low, High, Oil immersion.
c) Oculars Function
d) Condensers: Abbes, Cardioids, Parabolic and their functions
1.2 Principle, Construction using ray diagram and applications of
a) Compound Microscope
b) Electron Microscope (Scanning Electron Microscope and Transmission Electron Microscope)
c) Introduction to Phase Contrast Microscope, Dark field Microscope Fluorescent Microscope in brief.

UNIT II: Principle and working of Instruments **Periods: 07**

a) Autoclave
b) Incubator
c) Hot air oven
d) Laminar Air flow
e) Colorimeter
f) Centrifuge
g) pH Meter

UNIT III: Microbial staining Techniques **Periods: 13**

3.1 Definition: Stain, Dye, Acidic stain, Basic stain, Auxochrome, Chromophore, Mordent, Chromogen, Leuco compound, Natural stain, Flurochrome, Decolourising agent and Counter stain.
3.2 Theories of Staining
3.3 Principles, Mechanism, Procedure and Observation of
a) Simple staining: Monochrome staining, Negative staining
b) Differential staining: Gram's staining and Acid Fast staining
c) Structural staining: Cell wall staining, Reserve food Material staining (PHB).

UNIT IV - Sterilization techniques **Periods: 13**

4.1 Definition of Sterilization, Disinfection, Antiseptic, Germicide, Sanitizer, Fungicide, Viricide, Bacteriostatic and Bactericidal agent.
4.2 Chemical Disinfectants
a) Characterization of ideal disinfectant
b) Chemical Agents:
i) Phenol and Phenolic compounds
ii) Alcohols
iii) Gaseous sterilizing Agents: Formaldehyde, Ethylene Oxide, ß- Propiolactone.
4.3 Evaluation of Disinfectant (Phenol Coefficient).
4.4 Sterilization by Physical Agent
a) Heat: Moist Heat, Dry heat, Boiling, Tyndallization, Pasteurization, Steam under pressure (Autoclave) Incineration, Hot air Oven.
b) Radiation:-Ionising and Nonionising radiations.
c) Filtration and Types of filters (Seitz Filter)

Swami Ramanand Teerth Marathwada University Nanded
Choice Based Credit System (CBCS) Course
B. Sc. First year (Semester - II)
AGRICULTURAL MICROBIOLOGY
CCAMB II (Section B)
BASIC MICROBIOLOGY & BIOCHEMISTRY (P-IV)
Credits: 02 (Marks: 50) Periods: 45

UNIT I: Biochemistry of Macromolecules I **Periods: 13**

1.1Carbohydrates
a) Definition and classification
b) Triose, Pentose, Hexose (Examples and Structure)
c) Disaccharides:-Glycoside linkage (Lactose, Maltose and Sucrose)
d) Oligosaccharides:-Trisaccharides(Structure of Raffinose)
e) Polysaccharides:-Homo and Heteropolysaccharides Structure (Starch, Cellulose, Mucopolysaccharides)
f) Biological Significance of carbohydrates

1.2 Lipids
a) Definition and Classification
b) Types of lipids
i) Simple Lipids:-Triglycerides
ii) Conjugated Lipids:-Phosphatidic Acid, Phospholipids and Cholesterol
c) Biological importance of Lipids,

UNIT II: Biochemistry of Macromolecules II **Periods: 12**

2.1 Nucleic Acids
a) Nucleosides and Nucleotides, Ribose, Deoxyribose sugars.
b) DNA:-Properties, Structure and Functions
c) RNA:-Properties, Structure and Functions
2.2 Proteins
a) Definition and classification
b) List of essential amino acids
c) Peptide bonds
d) Biological Significance of proteins

UNIT III Microbial Nutrition **Periods:10**

3.1 Microbial nutrition
a) Concept
b) Common nutritional requirements and their role
c) Energy sources
d) C,H,N,O,P,S, Micronutrients, Growth factors, Water etc.
e) Nutritional categories of microorganisms on the basis of carbon and energy source.

UNIT IV: Nutrients (uptakes in brief) **Periods:10**

a) Passive diffusion
b) Facilitated diffusion
c) Active transport mechanism
d) Group translocation
e) Uptake of amino acids and sugars (as examples)

Swami Ramanand Teerth Marathwada University Nanded

Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. First year

AGRICULTURAL MICROBIOLOGY

Practical Paper: CCAMBP-I (P-V)

(Annual practical Based on [CCMB I & II (Section A& B))

(Practical syllabus requires **four periods per batch per week for 2 consecutive days** B.Sc. First yearpractical includes studies of growth of microorganisms and life activities of Microorganisms.These studies need two consecutive days for completion of practical.)

Credits: 04 **(Marks: 100)**

1) Microscopy -Different parts of compound microscope. Use and care of compound microscope.
2) Construction, Operation and utility of laboratory equipments.
a) Autoclave, b) Hot air oven, c) Incubator, d) pH meter, e) High speed centrifuge, f) Colorimeter/Spectrophotometer ,g) Anaerobic jar, h) Bacterial filters, i) Laminar air flow
3) Staining
1. Simple staining: Monochrome, Negative
2. Differential : Grams staining
3. Structural staining: a) Cell wall staining (Chance's method) b)PHB staining (Burdon's method.)
4) Micrometry
5) Preparation of culture media
a) Nutrient broth and Agar, b) McConkey's Broth and Agar, c) Sugar Media
6) Isolation of bacteria from mixed culture
a) Streak plate method ,b) Spread plate method, c) Pour plate method
7) Effect of physical and chemical agents on growth of bacteria
a) pH
b) Temperature
c) Heavy metal ions (Oligodynamic Action)
d) U.V. rays
e) Antibiotics
8) Qualitative tests for
a) Carbohydrates: Benedict's test
b) Protein: Biuret test
c) Nucleic acid: Diphenylamine test (DPA) for DNA and Orcinol test for RNA.
9) Demonstration of cells of Yeast, Fungi, Actinomycetes, Algae and Protozoa.
10) Study of Bacterial Growth curve.
11) Hanging drop technique.

Books Recommended

1. Handbook of Microbiology. Bisen P.S., Varma K.: CBS Publishers and Distributors, Delhi.
2. Introduction to viruses: Vikas Publishing House Pvt. Ltd., New Delhi.
3. A textbook of fungi and Viruses by Dubey H.C.:,Vikas Publishing House Pvt. Ltd. Delhi.
4. A textbook of Microbiology by Dubey R.C. and D. K, Maheshwary, S Chand and Co. NewDelhi.
5. Fundamentals of Microbiology by Frobisher, Hinsdill, Crabtee, Goodheart:: W.B. SaundrsCompany, U.S.A. Toppan Company Ltd., Japan.
6. General Virology by Luria
7. Elementary Microbiology (Fundamentals of Microbiology) Vol. II, Modi H.A.: EktaPrakashan, Nadiad, Gujrat
8. Modern Microbiology by Parasher Y.K. Campas Books International, New Delhi.
9. Elements of Microbiology by Pelczar Michael J. Jr./E.C.S Chan, McGraw, HillInternational Book Company, New Delhi.
10. Microbiology: Concepts and applications by Pelczar Michael J., Jr. E.C.S Chan, Noel R. Krieg: -McGraw Hill Inc.
11. Microbiology by Pelczar Michael J., Reid R.D. and Chan E.C.S. Tata McGraw hill publishingCo. Ltd., New Delhi.
12. General microbiology Vol I and II by Powar C. B. and Daginawala H.I. Himalaya publishinghouse, Bombay.
13. Microbiolo by Prescott L.M. Harley J.P. and Klein Donald A., W. M. C. Brown publishers.
14. Microbiology: Fundamentals and Applications by Purohit S.S. Agro-Botanical publishersBikaner, India.
15. Microbiolo -Fundamentals and applications by R.A. Atlas
16. Microbiology by Singh R.P., Kalyani Publication.
17. General Microbiology by Stanier Roger Y., Adelberg Edward A. Ingraham Johan L.Prentice-Hall, Englewood Cliffs, New Jersey, Publishing Co. Ltd., New Delhi.
18. Introduction to Microbiology by Tauro P, Kapoor K.K., Yadav K.S. Wiley Eastern Ltd., NewDelhi.
19. Microbiology: an Introduction by Tortora G.J. Funke B. and Case Christine L, TheBenjaminPublishing Co. New York.
20. Microbiology by YadavManju, Discovery Publishing House,
21. Introduction to Microbial Techniques by Gunasekaran
22. Handbook of microbiological media, Hi-media.
23. Practical Microbiology by Dubey and Maheshwari.
24. General Microbiology: Seventh edition by Hans G Schlegel, Cambridge University Press.
25. Fundamentals of Microbiology, by Dr. B.M.Sandikar, Books and Allied ,Kolkatta