

I CBM MICROBIOLOGY 2021-2022

SENESTER - I

BATCH- 2021-24 FIRST YEAR – SEMESTER- I SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR (Affiliated to Adikavi Nannaya University)

Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41

Recognized by UGC as college with 'potential for excellence'

IBSC MICROBIOLOGY- PAPER (IA)

MBT- 101 INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

UNIT I:

History of Microbiology & Place of Microorganisms in the living world: History of Microbiology in the context of contributions of Anton von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Ivanovsky, Martinus Beijerinck and Sergei Winogradsky. Importance and applications of microbiology, Place of Microorganisms in the Living World Haeckel's three Kingdom concept, Whittaker's five kingdom concept, three domain concept of Carl Woese

UNIT II:

Prokaryotic microorganisms and Viruses: Ultra-structure of Prokaryotic cell- Cell Wall, Cell Membrane, Cytoplasm, Nucleoid, Plasmid, Inclusion Bodies, Flagella, Pili, Capsule, Endospore General characteristics of Bacteria (Size, shape, arrangement, reproduction) General characteristics of Rickettsia, Mycoplasmas, Cyanobacteria, Archaea General characteristics of viruses, Cultivation of Viruses (in brief) Morphology, Structure and replication of TMV and Lambda Bacteriophage.

UNIT III:

Eukaryotic microorganisms: Fungi - Habitat, nutrition, vegetative structure and modes of reproduction; outline classification, Algae - Habitat, thallus organization, photosynthetic pigments, storage forms of food, reproduction.. Protozoa – Habitat, cell structure, nutrition, locomotion, excretion, reproduction, encystment, outline classification.

UNIT IV:

Isolation and Culture of Bacteria and Fungi: Growth media- Natural, synthetic and semi synthetic media. Selective, Enrichment, and Differential media Pure culture techniques - dilution-plating, Streak-plate, Spread-plate, Pour-Plate and micromanipulator. Preservation of microbial cultures - sub culturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature.

UNIT V:

Principles of Microscopy, Sterilization and Disinfection: Principles of microscopy - Bright field and Electron microscopy (SEM and TEM). Staining Techniques - Simple and Differential staining techniques (Gram staining, Spore staining). Sterilization and disinfection techniques – Physical methods - autoclave, hot- air oven, pressure cooker, laminar air flow, filter sterilization, Radiation methods - UV rays, Gamma rays. Chemical methods - alcohols, aldehydes, fumigants, phenols, halogens and hypochlorite's.

ADDITIONAL INPUT: Bacterial motility - hanging drop technique, cultivation of aerobes & anerobes

RECOMMENDED TEXT BOOKS:

- 1. Pelczar, M.J., Chan, E.C.S. and Kreig, N.R. (1993). Microbiology. 5th Edition, Tata McGraw Hill Publishing Co., Ltd., New Delhi.
- 2. Dube, R.C. and Maheswari, D.K. (2000) General Microbiology. S Chand, New Delhi. Edition), Himalaya Publishing House, Mumbai.
- 3. Power, C.B. and Daginawala, H.F. (1986). General Microbiology Vol I & II
- 4. Prescott, M.J., Harley, J.P. and Klein, D.A. (2012). Microbiology. 5th Edition, WCB McGrawHill, New York.
- 5. Reddy, S.M. and Reddy, S.R. (1998). Microbiology Practical Manual, 3 rd Edition, Sri Padmavathi Publications, Hyderabad.

REFERENCE BOOKS:

- 1. Singh, R.P. (2007). General Microbiology. Kalyani Publishers, New Delhi.
- 2. Stanier, R.Y., Adelberg, E.A. and Ingram, J.L. (1991). General Microbiology, 5th Ed., Prentice Hall of India Pvt. Ltd., New Delhi.
- 3. Microbiology Edited by Prescott
- 4. Jaya Babu (2006). Practical Manual on Microbial Metabolisms and General Microbiology. Kalyani Publishers, New Delhi.
- 5. Gopal Reddy et al., Laboratory Experiments in Microbiology

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K.L. Praty ustra

SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR

Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IBSC MICROBIOLOGY- PAPER (IA)

UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
UNIT- V	2	2
TOTAL	10	8

BLUE PRINT OF QUESTION PAPER

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MBT- 101 INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

Practical syllabus

- 1. Microbiology Good Laboratory Practices and Biosafety.
- 2. Preparation of culture media for cultivation of bacteria- Nutrient broth & Nutrient agar
- 3. Preparation of culture media for cultivation of fungi Sabourauds agar
- 4. Sterilization of medium using Autoclave
- 5. Sterilization of glassware using Hot Air Oven
- 6. Light compound microscope and its handling
- 7. Microscopic observation of bacteria (Gram +ve bacilli and cocci, Gram -ve bacilli), Algae and Fungi.
- **8.** Simple staining
- 9. Gram's staining
- **10.** Hanging-drop method& temporary wet mount (TWM) for observation of living microrganisms.
- **11.** Isolation of pure cultures of bacteria by serial dilution and Streak/Spread/Pour Plate Method.
- **12.** Preservation of bacterial cultures by Serial subculturing & Slant Preparation with mineral oil overlay.
- 13. Observation of electron micrographs of bacterial cells

RECOMMENDED TEXT BOOKS:

- 1. Pelczar, M.J., Chan, E.C.S. and Kreig, N.R. (1993). Microbiology. 5th Edition, Tata McGraw Hill Publishing Co., Ltd., New Delhi.
- 2. Dube, R.C. and Maheswari, D.K. (2000) General Microbiology. S Chand, New Delhi. Edition), Himalaya Publishing House, Mumbai.
- 3. Power, C.B. and Daginawala, H.F. (1986). General Microbiology Vol I & II
- 4. Prescott, M.J., Harley, J.P. and Klein, D.A. (2012). Microbiology. 5th Edition, WCB McGrawHill, New York.
- 5. Reddy, S.M. and Reddy, S.R. (1998). Microbiology Practical Manual, 3 rd Edition, Sri Padmavathi Publications, Hyderabad.
- 6. Singh, R.P. (2007). General Microbiology. Kalyani Publishers, New Delhi.
- 7. Stanier, R.Y., Adelberg, E.A. and Ingram, J.L. (1991). General Microbiology, 5th Ed., Prentice Hall of India Pvt. Ltd., New Delhi.
- 8. Microbiology Edited by Prescott
- 9. Jaya Babu (2006). Practical Manual on Microbial Metabolisms and General Microbiology. Kalyani Publishers, New Delhi.
- 10. Gopal Reddy et al., Laboratory Experiments in Microbiology

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MBT- 101 INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

MODEL OUESTION PAPER

Time: 3hrs

PART-I

Answer any <u>FIVE</u> of the following questions, atleast 2 from each section A&B Draw a labeled diagrams wherever necessary

5X10=50M

Max.marks: 75

SECTION-A

- 1. Write about the scope and importance of microbiology?
- 2. Write about the contribution of the following scientist:
 - (A) Louis Pasteur (B) Alexander Fleming
- 3. Explain in details about ultra structure of bacterial cell?
- 4. Write about the outline classification of whittaker?
- 5. Discuss the importance and applications of microbiology?

SECTION-B

- 6. Write the outline classification of bacteria 2nd edition of bergey's manual of systemic bacteriology?
- 7. Write the structure and multiplication of T4 bacterophage?
- 8. Write about the general chacteristics of the following organisms.(a) Mycoplasmas (b) cyanobacteria
- 9. Explain the sterilization and disinfection techniques of physical and chemical methods?
- 10. Write the general characteristics and classification of fungi, algae and protozoa ?

<u>PART-II</u> SECTION-C

Answer any <u>FIVE</u> of the following questions

11. Koch postulates

- 12. Spontaneous generation theory
- 13. Carl woese classification
 - 14. Structure of HIV
 - 15. General characters of viruses
 - 16. Lyophilization
 - 17. Micromanipulator
 - 18. Enrichment culturing

5X5=25M

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MBT-101 INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY PRACTICAL MODEL QUESTION PAPER

TIME: 3hr

Max.marks: 50M

I.	MAJOR	20M
II.	MINOR	10M
III.	SPOTTERS/PRINCIPLE	10M
IV.	RECORD	05M
v.	VIVA VOCE	05M

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BATCH- 2020-24 FIRST YEAR – SEMESTER- II SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR (Affiliated to Adikavi Nannaya University)

Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' I BSC MICROBIOLOGY- PAPER (IB)

Microbial Physiology and Biochemistry

UNIT I:

Biomolecules: General characters and outline classification of Carbohydrates (Monosaccharides-Glucose, Fructose, Ribose, Disaccharides-Sucrose, Lactose. Polysaccharides- Starch, glycogen, Cellulose) General characters and outline classification of fatty acids (Saturated & Unsaturated Fatty Acids) Lipids (Simple & complex lipids) General characteristics of Amino Acids and Proteins. Structure of Nucleic acids.

UNIT II:

Enzymes: Properties and classification of Enzymes. Biocatalysis- induced fit and lock and key models. Coenzymes and Cofactors. Inhibition of enzyme activity- competitive, noncompetitive, uncompetitive and allosteric. Factors effecting enzyme activity

UNIT III:

Analytical Techniques: Principle and applications of – Colorimetry, Chromatography (paper, thin-layer, and column), Spectrophotometry (UV & visible), Centrifugation and Gel Electrophoresis (Agarose and SDS).

UNIT IV:

Microbial Nutrition and growth: Nutritional requirements of Microorganisms Nutritional groups of microorganisms- autotrophs, heterotrophs, lithotrophs, organotrophs, phototrophs, chemotrophs Microbial Growth- different phases of growth in batch cultures; Synchronous, continuous, biphasic growth. Factors influencing microbial growth, Methods for measuring microbial growth - Direct microscopy, viable count estimates, turbidometry and biomass.

UNIT V:

Microbial metabolism: Aerobic respiration - Glycolysis, TCA cycle, ED Pathway, Electron transport Oxidative and substrate level phosphorylations. Anaerobic respiration (Nitrate and sulphate respiration) Fermentation- lacticacid and ethanol fermentations Outlines of oxygenic and anoxygenic photosynthesisin bacteria.

ADDITIONAL INPUT: Structural polymorphorism of DNA, HP-TLC

RECOMMENDED TEXT BOOKS:

- 1. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and CompanyCaldwell, D.R. (1995). Microbial Physiology and Metabolism, W.C. Brown Publications, Iowa, USA.
- 2. Lehninger, A.L., Nelson, D.L. and Cox, M.M. (1993). Principles of Biochemistry, 2nd Edition, CBS Publishers and Distributors, New Delhi.
- 3. Sashidhara Rao, B. and Deshpande, V. (2007). Experimental Biochemistry: A studentCompanion. I.K. International Pvt. Ltd.
- 4. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed.,
- 5. W.H.Freeman
- 6. Voet, D. and Voet J.G (2004) Biochemistry 3rd edition, John Wiley and Sons

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UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
UNIT- V	2	2
TOTAL	10	8

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IB -Microbial Physiology and Biochemistry Lab PRACTICAL SYLLABUS

- 1. Qualitative Analysis of Carbohydrates.
- 2. Qualitative Analysis of Aminoacids.
- 3. Colorimetric estimation of proteins by Biuret / Lowry method.
- 4. Separation of components of a given mixture using a laboratory scale centrifuge.
- 5. Separation of mixtures by paper / thin layer chromatography.
- 6. Demonstration of column packing in any form of column chromatography.
- 7. Effect of temperature /pH / Salt concentration on bacterial growth
- 8. Demonstration of electrophoretic technique
- **9.** Study and plot the growth curve of E. coli by Turbidometric and Standard Plate Countmethods

RECOMMENDED TEXT BOOKS & REFERENCE BOOKS:

- 1. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company Caldwell, D.R. (1995). Microbial Physiology and Metabolism, W.C. Brown Publications, Iowa, USA.
- 2. Lehninger, A.L., Nelson, D.L. and Cox, M.M. (1993). Principles of Biochemistry, 2nd Edition, CBS Publishers and Distributors, New Delhi.
- 3. Sashidhara Rao, B. and Deshpande, V. (2007). Experimental Biochemistry: A studentCompanion. I.K. International Pvt. Ltd.
- 4. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed.,
- 5. W.H.Freeman
- 6. Voet, D. and Voet J.G (2004) Biochemistry 3rd edition, John Wiley and Sons
- 7. White, D. (1995). The Physiology and Biochemistry of Prokaryotes, Oxford UniversityPress,New York.

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TITLE: MICROBIAL PHYSIOLOGY & BIOCHEMISTRY

Time: 3hrs

Max.Marks:75

PART-I

Answer any five of the following questions, at least 2 from each section A&B Draw labeled diagrams, wherever pagesery

Draw labeled diagrams wherever necessary

5X10=50M

SECTION-A

- 1. Write about general characteristics and classification of carbohydrates?
- 2. Write the properties and classification of enzymes?
- 3. Write about the principle and applications of colorimeter?
- 4. Write an essay on nutritional requirements of bacteria?
- 5. Explain the aerobic respiration of TCA cycle with flow chart?

SECTION -B

- 6. Write about the structure of nucleic acids?
- 7. Describe the factors that affect catalytic activity of enzyme?
- 8. Write about the principle and applications of paper chromatography?
- 9. What are the factors effecting bacterial growth?
- 10. Write about oxygenic and an oxygenic photosynthesis in bacteria?

PART-II SECTION-C

Answer any five of the following

5x5=25

- 11. General characteristics of amino acids
- 12. Coenzymes
- 13. Centrifugation
- 14. Glycolysis
- 15. Electron transport
- 16. Ethanol Fermentation
- 17. Induced fit theory
- 18. ED pathway

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TIME: 3hr

Max.marks: 50M

I.	MAJOR	20M
II.	MINOR	10M
III.	SPOTTERS/ PRINCIPLE	10M
IV.	RECORD	05M
V.	VIVA VOCE	05M

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BATCH- 2020-24 SECOND YEAR – SEMESTER- III SRI Y.N. COLLEGE(AUTONOMOUS), NARSAPUR

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Recognized by UGC as college with 'potential for excellence' II BSC MICROBIOLOGY- PAPER (IIA)

II A: Molecular Biology and Microbial Genetics

UNIT I:

Nucleic acids: DNA and RNA - Role in heredity-The central dogma Watson and Crick model of DNA, Types of RNA, structure, and functions, Organization of DNA in prokaryotes

UNIT II:

Genetic material and replication:Experiments which established DNA as genetic material RNA as genetic material, Mechanism of DNA Replication in Prokaryotes, Proof of semi conservative mechanism of replication (Meselson - Stahl Experiment)

UNIT III:

Gene expression and regulation: Concept of gene - Muton, recon and cistron. Genetic code Protein synthesis - Transcription and translation in Prokaryotes Regulation of gene expression inbacteria *-lac* operon

UNIT IV:

Mutations, damage and repair: Outlines of DNA damage and repair mechanism Mutations - spontaneous and induced Chromosomal aberrations - deletions, inversions, tandem duplications, insertions Point mutations- base pair changes, frame shifts Mutagens - Physical and Chemical mutagens Bacterial recombination-Transformation, Conjugation, Transduction (Generalized and specialized transductions)

UNIT V:

Genetic engineering: Basic principles of genetic engineering. Restriction endonucleases, DNA ligases. Vectors – plasmids (pBR322 & pUC8), Cosmids, Phagemids, lambda phage vector, M 13 vectors. Outlines of gene cloning methods. Polymerase chain reaction. Genomic and cDNA libraries. General account on application of genetic engineering in industry, agriculture, and medicine.

ADDITIONAL INPUT: Types of PCR and DNA fingerprinting

RECOMMENDED TEXT BOOKS:

- Freifelder, D. (1990). Microbial Genetics. Narosa Publishing House, New Delhi. Freifelder, D.(1997). Essentials of Molecular Biology. Narosa Publishing House, New Delhi.
- 2. Glick, B.P. and Pasternack, J. (1998). Molecular Biotechnology, ASM Press, Washington D.C., USA.
- 3. Lewin, B. (2000). Genes VIII. Oxford University Press, England.
- 4. Maloy, S.R., Cronan, J.E. and Freifelder, D. (1994). Microbial Genetics, Jones and BartlettPublishers, London.
- 5. Ram Reddy, S., Venkateshwarlu, K. and Krishna Reddy, V. (2007) A text Book of MolecularBiotechnology. Himalaya Publishers, Hyderabad.
- 6. Sinnot E.W., L.C. Dunn and T. Dobzhansky. (1958). Principles of Genetics. 5 th Edition.McGraw Hill, New York.
- 7. Smith, J.E. (1996). Biotechnology, Cambridge University Press.

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UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
UNIT- V	2	2
TOTAL	10	8

BLUE PRINT OF QUESTION PAPER

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SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR (Affiliated to Adikavi Nannaya university) Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' II BSC MICROBIOLOGY- PAPER (IIA) <u>II(A): Molecular Biology and Microbial Genetics</u> <u>PRACTICAL SYLLABUS</u>

- 1. Study of different types of DNA and RNA using micrographs and model / schematicrepresentations.
- 2. Study of semi-conservative replication of DNA through micrographs / schematicrepresentations
- 3. Isolation of genomic DNA from E. coli
- 4. Estimation of DNA using UV spectrophotometer.
- 5. Resolution and visualization of DNA by Agarose Gel Electrophoresis.
- 6. Resolution and visualization of proteins by Polyacrylamide Gel Electrophoresis (SDS -PAGE).
- 7. Problems related to DNA and RNA characteristics, Transcription and Translation.
- 8. Induction of mutations in bacteria by UV light.
- 9. Instrumentation in molecular biology Ultra centrifuge, Transilluminator, PCR

REFERENCE BOOKS:

- 1. Smith, J.E. (1996). Biotechnology, Cambridge University Press.
- 2. Snyder, L. and Champness, W. (1997). Molecular Genetics of Bacteria. ASM press,
- 3. Strickberger, M.W. (1967). Genetics. Oxford & IBH, New Delhi.
- 4. Verma, P.S. and Agarwal, V.K. (2004). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Co. Ltd., New Delhi.









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TITLE: Molecular Biology and Microbial Genetics

Time: 3hrs

Max.Marks:75

PART-I

Answer any five of the following questions, atleast 2 from each section A&B Draw labeled diagrams wherever necessary

5X10=50M

SECTION-A

- 1. Explain Watson and Crick model of DNA with a neat labeled diagram?
- 2. Explain DNA as a genetic material with an experimental proof?
- 3. Explain the important steps in protein synthesis with a diagram?
- 4. Explain different types of chromosomal mutations and point mutations?
- 5. Write the basic steps involved in gene cloning?

SECTION-B

- 6. Define RNA . Write about different types of RNA?
- 7. Explain the proof of semi conservative replication of DNA (Meselson & Stahl experiment)?
- 8. Explain the functioning of lac operon concept?
- 9. Explain the generalized & specialized transduction?
- 10. What are the application of genetic engineering in agriculture, medicine and industry?

PART-II

SECTION-C

Answer any five of the following

- 11. Central dogma
- 12. RNA as genetic material
- 13. Muton, Recon, Cistron
- 14. Genetic code
- 15. UV rays as mutagens
- 16. Conjugation in bacteria
- 17. PCR
- 18. Plasmid vectors

5x5=25

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Molecular Biology and Microbial Genetics

PRACTICAL MODEL QUESTION PAPER

TIME: 3hr

Max.marks: 50

I.	MAJOR	20M
II.	MINOR	10M
III.	SPOTTERS/PRINCIPLE	10M
IV.	RECORD	05M
v.	VIVA VOCE	05M







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SHARTER IV

BATCH- 2020-23 SECOND YEAR – SEMESTER- IV SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR

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II(B): Immunology and Medical Microbiology

UNIT I:

Immune System: Concept of Innate and Adaptive immunity Primary and secondary organs of immune system - thymus, bursa fabricus, bone marrow, spleen, lymph nodes. Cells of immune system- Identification and function of B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and esinophils Complement system (in brief)

UNIT II:

Immune response: Characteristics of antigen (Foreignness, Molecular size, Heterogeneity and solubility) Haptens. Antibodies - basic structure and types and functions (Immune complexformation and elimination - Agglutination, Precipitation, Neutralization, Complement fixation, Phagocytosis) Generation of Humoral Immune Response (Plasma and Memory cells) Generation of Cell Mediated Immune Response MHC- Functions of MHC I & II molecules Hypersensitivity- definition and types (in brief) Autoimmunity (in brief)

UNIT III:

Microbes in Health and Disease: Normal flora of human body. Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Opportunistic infections, Nosocomial infections. General account on microbial diseases – causal organism, pathogenesis, epidemiology, diagnosis, prevention, and control of the following Bacterial diseases - Tuberculosis, Typhoid. Fungaldiseases - Candidiasis. Protozoal diseases - Malaria. Viral Diseases –Corona virus and AIDS

UNIT IV:

Principles of Diagnosis: General principles of diagnostic microbiology- Collection, transport of clinical samples, Identification by Culturing & Biochemical characteristics (IMViC),Identification by molecular assays (PCR, RT-PCR, DNA probes), Identification by serological tests (ELISA, Immunofluorescence, Agglutination based tests, Complement fixation)

UNIT V:

Prevention and Treatment: Vaccines Monoclonal antibodies- Production and application Antimicrobial agents- General modes of action of antibacterial (Penicillin), antifungal (Amphotericin), antiviral (Amantadine)agents Interferons Tests for antimicrobial susceptibility (Disc diffusion) Antibiotic resistance in bacteria.

ADDITIONAL INPUT: SARS & MARS, COVID-19 - Treatment & prevention

RECOMMENDED TEXT BOOKS:

- Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication.
- Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication.
- **3.** Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology.11th edition Wiley-Blackwell Scientific Publication, Oxford.
- **4.** Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.

REFERENCE BOOKS:

- 1. Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.
- **2.** Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Microbiology. 4th edition. Elsevier Publication.
- Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education.

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UNITS	ESSAY QUESTIONS	SHORT QUESTIONS	
UNIT-I	2	1	
UNIT-II	2	2	
UNIT-III	2	1	
UNIT-IV	2	2	
UNIT- V	2	2	
TOTAL	10	8	

BLUE PRINT OF QUESTION PAPER











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II BSC MICROBIOLOGY-PAPER (II B)

II(B): Immunology and Medical Microbiology PRACTICAL SYLLABUS

1. Identification of human blood groups.

2. Separate serum from the blood sample (demonstration).

3. Immunodiffusion by Ouchterlony method.

4. Identification of any of the bacteria (*E. coli, Pseudomonas, Staphylococcus, Bacillus*) usinglaboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, urease production and catalase tests

5. Study of composition and use of important differential media for identification of bacteria:EMB Agar, McConkey agar, Mannitol salt agar

6. Antibacterial sensitivity by Kirby-Bauer method

7. Determination of Minimal Inhibitory Concentration (MIC) of an antibiotic

8. Study symptoms of the diseases with the help of photographs: Anthrax,Polio, Herpes,chicken pox, HPV warts, Dermatomycoses (ring worms)

- 9. Study of various stages of malarial parasite in RBCs using permanent mounts.
- 10. Phenol coefficient test

11. Isolation of Normal flora of human body (Hands, Feet, Nostrils, Teeth Surface) by swabmethod.

12. Evaluation of Hand Sanitizer Effectiveness by Filter Paper Disc Method & thumbimpression method.

RECOMMENDED TEXT BOOKS & REFERENCE BOOKS:

1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication.

2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication.

3. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential

Immunology.11th editionWiley-Blackwell Scientific Publication, Oxford.

4. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H.Freeman and Company, New York.

4. Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.

5. Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition.

McGraw HillMicrobiology. 4th edition. Elsevier Publication.

6. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott,

BATCH- 2020-23

SRI Y.N. COLLEGE(AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIBSC MICROBIOLOGY- PAPER(IB) SECOND YEAR – SEMESTER- IV <u>TITLE: Immunology and Medical Microbiology</u>

Time: 3hrs

Max.Marks:75

PART-I

Answer any five of the following questions, atleast 2 from each section A&B Draw a labeled diagrams wherever necessary

5X10=50M

SECTION-A

- 1. Explain types of immunity?
- 2. Explain antibody structure and its types?
- 3. Explain causal organism, pathogenesis, epidemiology, prevention and control of tuberculosis?
- 4. Write a note on collection and transportation of clinical samples?
- 5. Write about a vaccines?

SECTION-B

- 6. Write structure and functions of cells of immune system?
- 7. Write a cell mediated immune response?
- 8. Explain normal flora of human body?
- 9. Explain methods for identification of clinical samples by serological tests?
- 10. Explain the tests for antimicrobial susceptibility?

PART-II

SECTION-C

Answer any five of the following

- 11. Thymus
- 12. Macrophage
- 13. Hypersensitivity reactions
- 14. MHC molecules
- 15. Nosocomial infection
- 16. ELISA
- 17. Corona virus
- 18. Interferons

5x5=25M

SRI Y.N. COLLEGE(AUTONOMOUS), NARSAPUR

Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence'

IMMUNOLOGY AND MEDICAL MICROBIOLOGY PRACTICAL MODEL QUESTION PAPER

TIME: 3hr		Max.marks:	50M
I.	MAJOR	20M	
II.	MINOR	10M	
III.	SPOTTERS/PRINCIPLE	10M	
IV.	RECORD	05N	1
v.	VIVA VOCE	05N	1

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BATCH- 2020-23 SECOND YEAR – SEMESTER- IV SRI Y.N. COLLEGE(AUTONOMOUS), NARSAPUR

Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41

Recognized by UGC as college with 'potential for excellence' II BSC MICROBIOLOGY- PAPER (IIB2)

Microbial Ecology and Industrial Microbiology

UNIT I:

Microbial Ecology: Role of microorganisms in Biogeochemical cycles (Carbon, nitrogen, phosphorus) Microbe-microbe interactions - Synergism, mutualism, commensalism, antagonism, competition, parasitism, predation Plant- Microbe interactions - Plant growth promoting Microorganisms, Plant pathogens

UNIT II:

Microorganisms in Environment: Microbes in waste management- solid and liquid waste (aerobic and anaerobic) Microbes in degradation of Xenobiotics Microbes in drinking water-detection of potability by (a) standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coli forms (b) Membrane filter technique Microbes in food - intrinsic and extrinsic parameters that affect microbial growth in food.

UNIT III:

Industrial Microbiology: Industrial important Microorganisms- Yeasts & Moulds, Bacteria, Actinomycetes . Screening techniques. Strain improvement techniques.

UNIT IV:

Fermentation processes: Design of fermented (for control of pH, temperature, dissolved oxygen, foaming and aeration) Types of fermentation processes - solid state, liquid state, batch, fed-batch, continuous. Fermentation media (Carbon source, nitrogen source, minerals, vitamins & growth factors, Buffers, Precursors, Antifoam agents, water, oxygen)Examples of Crude media; molasses, corn- steep liquor, sulphite waste liquor, whey. Downstream processing - filtration, centrifugation, cell disruption, solvent extraction.

UNIT V:

Microbial Productions: Microbial production of Industrial products: Citric acid, Ethanol, Penicillin, Glutamic acid, vitamin B12, Amylase, Yogurt Microbial cells as food- SCP.

ADDITIONAL-INPUT: Techniques involved in selection of industrially importance of Metabolites from-microbes. Production of therapeutic enzymes

RECOMMENDED TEXT BOOKS:

- Atlas RM and Bartha R. (2000). **Microbial Ecology: Fundamentals & Applications.** 4th edition. Benjamin/Cummings Science Publishing, USA
- Barton LL & Northup DE (2011). Microbial Ecology. 1st edition, Wiley Blackwell, USA
- Campbell RE. (1983). Microbial Ecology. Blackwell Scientific Publication, Oxford, England
- Coyne MS. (2001). Soil Microbiology: An Exploratory Approach. Delmar Thomson Learning
- Lynch JM &Hobbie JE. (1988). Microorganisms in Action: Concepts & Application in Microbial Ecology. Blackwell Scientific Publication, U.K
- Madigan MT, Martinko JM and Parker J. (2014). **Brock Biology of Microorganisms**. 14th edition. Pearson/ Benjamin Cummings
- Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition, Academic Press

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SRI Y.N. COLLEGE(AUTONOMOUS), NARSAPUR

Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIBSC MICROBIOLOGY- PAPER (IIB2)

UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
UNIT- V	2	2
TOTAL	10	8

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SRI Y.N. COLLEGE(AUTONOMOUS), NARSAPUR Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' <u>Microbial Ecology and Industrial Microbiology</u>

PRACTICAL SYLLABUS

- 1. Microbial fermentation for the production and estimation of ethanol
- 2. Isolation of amylase producing microorganisms from soil
- 3. Isolation of food spoilage microorganisms from spoiled food sample.
- 4. MPN test
- **5.** Demonstration of fermenter
- 6. Production of wine from grapes
- 7. Growth curve and kinetics of any two industrially important microorganisms.
- 8. Microbial fermentation for the production and estimation of citric acid
- 9. Preparation of yoghurt.
- 10. Crowded plate technique
- 11. Isolation of microorganism from soil
- 12. Isolation of microorganism from different water samples

REFERENCE BOOKS:

- Martin A. (1977). An Introduction to Soil Microbiology. 2nd edition. John Wiley & Sons Inc. New York & London. Adams MR and Moss MO. (1995). Food Microbiology. 4th edition, New Age International (P) Limited Publishers, New Delhi, India.
- **2.** Banwart JM. (1987). **Basic Food Microbiology**. 1st edition. CBS Publishers and Distributors, Delhi,India.
- 3. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.
- **4.** Crueger W and Crueger A. (2000). **Biotechnology: A textbook of Industrial Microbiology**. 2nd Edition.Panima Publishing Company, New Delhi
- **5.** Frazier WC and Westhoff DC. (1992). **Food Microbiology**. 3rd edition. Tata McGraw-Hill PublishingCompany Ltd, New Delhi, India.
- **6.** Jay JM, Loessner MJ and Golden DA. (2005). **Modern Food Microbiology**. 7th edition, CBS Publishers and Distributors, Delhi, India

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BATCH- 2020-23

SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIBSC MICROBIOLOGY- PAPER(IB) SECOND YEAR – SEMESTER- IV

TITLE: Microbial Ecology and Industrial Microbiology

Time: 3hrs

Max.Marks:75

PART-I

Answer any five of the following questions, atleast 2 from each section A&B Draw labeled diagrams wherever necessary

5X10=50M

SECTION-A

- 1. Explain role of microorganism in nitrogen cycle?
- 2. Explain municipal waste treatment process?
- 3. Write a note on industrially important microorganisms?
- 4. Write types of fermentation process?
- 5. Write a note on industrial production of ethanol and its applications?

SECTION-B

- 6. Explain plant growth promoting microorganisms?
- 7. Write intrinsic and extrinsic factors that affect the microbial growth in food?
- 8. Explain methods for strain improvement?
- 9. Explain techniques involved in downstream processing?
- 10. Write a note on industrial production of vitamin B12?

PART-I

SECTION-C

Answer any five of the following

- 11. Mutualism
- 12. Azotobacter
- 13. Xenobiotics
- 14. Cell emplacement
- 15. Crowded plate
- 16. Centrifugation
- 17. SCP
- 18. Yogurt

5x5=25M

SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIBSC MICROBIOLOGY- PAPER(IB)

Microbial Ecology and Industrial Microbiology

PRACTICAL MODEL QUESTION PAPER

TIME: 3hr

Max.mar ks: 50M

I.	MAJOR20M
II.	MINOR 10M
III.	SPOTTERS/PRINCIPLE 10M
IV.	RECORD05M
V.	VIVA VOCE

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THIRD YEAR - SEMIESTER- V

SRI Y.N. COLLEGE(AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER (V) MBT- 501 ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY

<u>UNIT – I</u>:

Terrestrial Environment: Soil profile and soil microflora. Aquatic Environment: Microflora of fresh water and marine habitats, Atmosphere: Aeromicroflora and dispersal of microbes

<u>UNIT – II:</u>

Role of microorganisms in nutrient cycling (Carbon, nitrogen, phosphorus). Treatment and safety of drinking (potable) water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms (b) Membrane filter technique.Microbial interactions – mutualism, commensalism, antagonism, competition, parasitism, predation.

<u>UNIT – III:</u>

Outlines of Solid Waste management: Sources and types of solid waste, Methods of solid waste disposal(composting and sanitary landfill). Liquid waste management: Composition and strength of sewage (BOD and COD), Primary, secondary (oxidation ponds, trickling filter, activated sludge process and septic tank) and tertiary sewage treatment.

<u>UNIT – IV:</u>

Plant Growth Promoting Microorganisms - Mycorrhizae, Rhizobia, Azospirillum, Azotobacter, Frankia,

phosphate-solubilizers and Cyanobacteria. Outlines of biological nitrogen fixation (symbiotic, non-symbiotic).Biofertilizers - *Rhizobium*.

<u>UNIT – V:</u>

Concept of disease in plants. Symptoms of plant diseases caused by fungi, bacteria and viruses. Plantdiseases - groundnut rust, Citrus canker and tomato leaf curl. Principles of plant disease control.

<u>ADDITIONAL INPUT</u>: Management of soil nutrients , Convertion of waste lands in to fertile lands.

SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR

Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41Recognized by UGC as college with 'potential for excellence'IIIBSC MICROBIOLOGY- PAPER (V)

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UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
UNIT- V	2	2
TOTAL	10	8

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<u>MBP- 501 ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY</u> PRACTICAL SYLLABUS

1. Preparation of soil extract agar and any one culture media for algal growth

2. Isolation of microbes (bacteria and fungi) from soil.

3. Study of air micro flora by petriplate exposure method.

4. Microbiological Analysis of potable water Standard Plate Count

5. Determination of Dissolved Oxygen (DO) of water samples.

6. Isolation of *Rhizobium* from root nodules.

7. Isolation of actinomycetes on I.S.P. media (International Streptomyces project media) 8.Observation of photo micrographs of plant diseases of local importance (Citrus canker,Tikka disease of Groundnut, Bhendi yellow vein mosaic, Rusts, Smuts, Powdery mildews,Tomato leaf curl).

SUGGESTED READINGS

Atlas RM and Bartha R. (2000). **Microbial Ecology: Fundamentals & Applications.** 4th edition. Benjamin/Cummings Science Publishing, USA

Barton LL & Northup DE (2011). **Microbial Ecology**. 1st edition, Wiley Blackwell, USA CampbellRE. (1983). **Microbial Ecology**. Blackwell Scientific Publication, Oxford,

England.Coyne MS. (2001). Soil Microbiology: An Exploratory Approach. Delmar Thomson Learning.

Lynch JM & Hobbie JE. (1988). Microorganisms in Action: Concepts & Application in MicrobialEcology. Blackwell Scientific Publication, U.K.

Madigan MT, Martinko JM and Parker J. (2014). **Brock Biology of Microorganisms**. 14th edition. Pearson/Benjamin Cummings

Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition, Academic

PressMartin A. (1977). **An Introduction to Soil Microbiology**. 2nd edition. John Wiley & Sons Inc. New York &London.

Okafor, N (2011). Environmental Microbiology of Aquatic & Waste systems. 1st edition, Springer, NewYork.

Singh A, Kuhad, RC & Ward OP (2009). Advances in Applied Bioremediation. Volume 17, Springer-Verlag, Berlin Hedeilberg

Stolp H. (1988). Microbial Ecology: Organisms Habitats Activities. Cambridge University Press, Cambridge, England.

Subba Rao NS. (1999). **Soil Microbiology**. 4th edition. Oxford & IBH Publishing Co. NewDelhi.

Willey JM, Sherwood LM, and Woolverton CJ. (2013). **Prescott's Microbiology**. 9th edition. McGrawHill Higher Education.

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SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR

Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER(VI)

THIRD YEAR - SEMESTER- V

MBT- 501 ENVIRONMENTAL & AGRICULTURALMICROBIOLOGY

Time: 3hrs

PART-I

Max.Marks:75

Answer any five of the following questions, atleast 2 from each section A&B Draw a labeled diagrams wherever necessary

5X10=50M

SECTION-A

- 1. Describe soil profile and soil microflora?
- 2. Explain microbial interactions?
- 3. Give an account on sewage treatment?
- 4. Describe plant growth promoting microorganisms?
- 5. Discuss the symptoms of plant diseases caused by fungi and viruses?

SECTION-B

- 1. Write about Aeromicroflora and dispersal of microbes?
- 2. Discuss the role of microorganisms in carbon cycle?
- 3. Write the methods of solid waste disposal?
- 4. Write in detail about biological symbiotic nitrogen fixation?
- 5. Describe the concept and principles of plant disease control?

PART-I

SECTION-C

Answer any five of the following

- 1. Extremophiles
- 2. MPN
- 3. Antagonism
- 4. BOD
- 5. Trickling filter
- 6. Rhizobium
- 7. Citrus canker
- 8. Non symbiotic nitrogen fixation

5x5=25M

SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR

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Recognized by UGC as college with 'potential for excellence'

MBT- 501 ENVIRONMENTAL & AGRICULTURALMICROBIOLOGY PRACTICAL MODEL QUESTION PAPER

TIME: 3hr

Max.marks: 50

I. MAJOR	20M
II. MINOR	10M
III. SPOTTERS	10M
IV. RECORD	05M
V. VIVA VOCE	05M

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THIRD YEAR – <u>SEMIESTER- V</u> SRI Y.N. COLLEGE (AUTONOMOUS),NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' MBT- 601: FOOD AND INDUSTRIAL MICROBIOLOGY

UNIT-I:

Intrinsic and extrinsic parameters that affect microbial growth in food. Microbial spoilage of food - fruits, vegetables, milk, meat, egg, bread and canned foods Food intoxication (botulism). Food-borne diseases (salmonellosis) and their detection.

UNIT-II:

Principles of food preservation - Physical and chemical methods. Fermented Dairy foods – cheese and yogurt. Microorganisms as food – SCP, edible mushrooms (white button, oyster and paddy straw). Probiotics and their benefits.

UNIT –III:

Microorganisms of industrial importance – yeasts,(Saccharomyces cerevisiae) moulds,(Aspergillus niger)Bacteria(E.coli), actinomycetes (Streptomyces griseus). Outlines of Isolation and Screening and strain improvement of industrially-important microorganisms.

UNIT-IV:

Types of fermentation processes – solid state, liquid state, batch, fed-batch, continuous. Basic concepts of Design of fermenter. Ingredients of Fermentation media. Downstream processing - filtration, centrifugation, cell disruption, solvent extraction.

UNIT-V:

Microbial production of Industrial products - Citric acid, Ethanol, amylases, penicillin, glutamic acid andvitamin B12.

ADDITIONAL INPUT: Inter dependence of food production, food production & consumption pattern in different parts of india.

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SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR

Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' **IIIBSC MICROBIOLOGY- PAPER (VI)**

UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
UNIT- V	2	2
TOTAL	10	8

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SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR

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MBP-601 : FOOD AND INDUSTRIAL MICROBIOLOGY

PRACTICAL SYLLABUS

1. Isolation of bacteria and fungi from spoiled bread/fruits/vegetables

2. Preparation of Yogurt/Dahi . Determination of the microbiological quality of milk sample by MBRT

3. Isolation of antagonistic microorganisms by crowded plate technique

4. Design of Fermenter(identification of diagrams of various types of Fermentors and labelling of parts)

5. Microbial fermentation for the production and estimation of ethanol from Grapes.

6. Microbial fermentation for the production and estimation of citric acid. **SUGGESTED READING:**

Adams MR and Moss MO. (1995). **Food Microbiology**. 4th edition, New Age International (P) LimitedPublishers, New Delhi, India.

Banwart JM. (1987). **Basic Food Microbiology**. 1st edition. CBS Publishers and Distributors, Delhi,India. Crueger W and Crueger A. (2000). **Biotechnology: A textbook of Industrial Microbiology**. 2ndEdition. Panima Publishing Company, New Delhi

Frazier WC and Westhoff DC. (1992). **Food Microbiology**. 3rd edition. Tata McGraw-HillPublishing Company Ltd, New Delhi, India.

Jay JM, Loessner MJ and Golden DA. (2005). **Modern Food Microbiology**. 7th edition, CBSPublishers and Distributors, Delhi, India

Patel AH. (1996). **Industrial Microbiology** .1st Edition. MacMillan India Limited PublishingCompany Ltd. New Delhi, Indi

Tortora GJ, Funke BR, and Case CL. (2008). **Microbiology: An introduction**. 9th Edition. PearsonEducation

Willey JM, Sherwood LM AND Woolverton CJ (2013), Prescott, Harley and Klein's **Microbiology**. 9th Edition. McGraw Hill Higher education

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SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER(VI) THIRD YEAR – SEMESTER- V

TITLE: MBT- 601FOOD & INDUSTRIALMICROBIOLOGY

Time: 3hrs

PART-I

Answer any five of the following questions, atleast 2 from each section A&B Draw a labeled diagrams wherever necessary

5X10=50M

Max.Marks:75

SECTION-A

1. Write about intrinsic and extrinsic parameters that affect microbial growth in food?

- 2. Discuss the principles of food preservation?
- 3. Write about isolation and screening of industrially important microorganisms?
- 4. Discuss the various types of fermentations used in industry?
- 5. Discuss the industrial production of ethanol?

SECTION-B

- 6. Describe microbial spoilage of food?
- 7. Write an essay on microorganisms as food and fermented dairy foods?
- 8. Explain methods of strain improvement?
- 9. Give an account on downstream processing?
- 10. Write about microbial production of vitamin B12?

PART-II

SECTION-C

Answer any five of the following

- 11. Food intoxication
- 12. Probiotics
- 13. Fermentor
- 14. Salmonellosis
- 15. Amylase production
- 16. Industrial importance of actinomycetes
- 17. Ingredients of fermentation media
- 18. pencillin

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TION-A

SRI Y.N. COLLEGE (AUTONOMOUS),NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence'

MBT-601 FOOD & INDUSTRIAL MICROBIOLOGY

PRACTICAL MODEL QUESTION PAPER

TIME: 3hrs

Max.marks: 50

I.	MAJOR	20M
II.	MINOR	10M
III.	SPOTTERS	10M
IV.	RECORD	05M
v.	VIVA VOCE	05M

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THIRD YEAR – SEMESTER- VI SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER(VII)

Year	Semester	Paper	Title	Hours	Marks	Credits
III		VII (A)	Microbial Biotechnology	3	100	03
			Practical	2	50	02
	VI	**	Cluster Elective-A			
		VIII-A	VIII-A-1 : MICROBIAL DIAGNOSIS IN HEALTH CLINICS	3	100	03
			VIII-A-2 : MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES	3	100	03
			VIII-A-3: BIOFERTILIZERS AND BIOPESTICIDES	3	100	03
			VIII-A-1 : Practical VIII-A-2 : Practical VIII-A-3: Practical	2 2 2	50 50 50	02 02 02

THIRD YEAR – SEMESTER- VI **SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR** Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER(VII) <u>MBT- 701 MICROBIAL BIOTECHNOLOGY</u>

UNIT-I:

Microbial biotechnology: Scope and its applications in human therapeutics, agriculture (Biofertilizers, PGPR, Mycorrhizae), environmental, and food technology. Genetically engineered microbes for industrial application: Bacteria and yeast

<u>UNIT-II:</u>

Recombinant microbial production processes in pharmaceutical industries -Streptokinase, recombinant vaccines (Hepatitis B vaccine). Over view of production and applications of Microbial polysaccharides, Bioplastics and Microbialbiosensors

UNIT-III:

Microbial based transformation of steroids and sterols. Bio-catalytic processes and their industrial applications: Production of high fructose syrup and production of cocoa butter substitute. Immobilization methods and their application: Whole cell immobilization

UNIT- IV:

Bio-ethanol and bio-diesel production: commercial production from lignocellulosic waste and ligal biomass. Biogas production: Methane and hydrogen production using microbial culture. Microorganisms in bioremediation: Degradation of xenobiotics. Mineral recovery, removal of heavy metals from aqueous effluents.

UNIT-V:

Outlines of Intellectual Property Rights: Patents, Copyrights, Trademarks

ADDITIONAL INPUT : Bioenergetics – concept of free energy, entropy, enthalpy, & Redox potential.

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SRI Y.N. COLLEGE (AUTONOMOUS),NARSAPUR Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41 IIIBSC MICROBIOLOGY- PAPER (VII)

UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
UNIT- V	2	2
TOTAL	10	8

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SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' MBP- 701 MICROBIAL BIOTECHNOLOGY

PRACTICAL SYLLABUS

- 1. Yeast cell immobilization in calcium alginate gels
- 2. Enzyme immobilization by sodium alginate method
- 3. Pigment production from fungi (Trichoderma / Aspergillus / Penicillium)
- 4. Isolation of xylanase or lipase producing bacteria
- 5. Study of algal Single Cell Proteins

SUGGESTED READING:

Crueger W, Crueger A (1990) Biotechnology: A text Book of

Microbiology 2nd edition Sinauerassociates, Inc.

Demain, A. L and Davies, J. E. (1999). Manual of Industrial Microbiology and Biotechnology, 2nd Edition, ASM Press.

Glazer AN and Nikaido H (2007) Microbial Biotechnology, 2nd

edition, Cambridge University Press Glick BR, Pasternak JJ, and

Patten CL (2010) Molecular Biotechnology 4th edition, ASM

Press Gupta PK (2009) Elements of Biotechnology 2nd edition,

Rastogi Publications

Prescott, Harley and Klein's **Microbiology** by Willey JM, Sherwood LM, Woolverton CJ (2014), 9thedition, Mc Graw Hill Publishers.

Ratledge, C and Kristiansen, B. (2001). **Basic Biotechnology**, 2nd Edition, Cambridge University Press.

Stanbury PF, Whitaker A, Hall SJ (1995) **Principles of Fermentation Technology** 2nd edition., ElsevierScience

Swartz, J. R. (2001). Advances in Escherichia coli production of therapeutic proteins. CurrentOpinion in Biotechnology, 12, 195–201.

SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER(VII) <u>MBP-701 MICROBIAL BIOTECHNOLOGY</u>

Model Question Paper

Time: 3Hrs

Section-A

Max.Marks:75

Answer any <u>FIVE</u> of the following questions , atleast two from each sections A & B Draw labeled diagrams wherever necessary 5 x 10=50M

- 1. Discuss applications of microbial biotechnology?
- 2. Write production process of recombinant Hepatitis B vaccine?
- 3. Describe immobilization methods and applications?
- 4. Explain in bio-diesel production?
- 5. Outlines of intellectual property rights for patenting?

Section-B

6.Explain the industrial applications of genetically engineered microbes?

7. Explain production process and applications of microbial polysaccharides and bioplastics?

- 8. Explain microbial based transformation of steroids?
- 9. Describe the bioremediation of toxic substances?
- 10. Out lines of intellectual property rights for copyrights and trademarks?

Section - C

5x5=25M

Answer any <u>FIVE</u> of the following questions

- 11. Biofertilizer
- 12.Streptokinase
- 13.Biosensors
- 14. Whole cell immobilization
- 15.Xenobiotics
- 16.Patents
- 17.Bio ethanol
- **18.Bioplastics**

SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER(VII)

MBP-701 MICROBIAL BIOTECHNOLOGY

PRACTICAL MODEL QUESTION PAPER

TIME: 3hr

Max.marks: 50M

I.	MAJOR	
II.	MINOR	10M
III.	SPOTTERS	10M
IV.	RECORD	05M
V.	VIVA VOCE	05M

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THIRD YEAR - SEMESTER- VI SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' **IIIBSC MICROBIOLOGY-PAPER(VII)** CLUSTER PAPERS UNDER ELECTIVE 801 (801A, 801B & 801C) **MBT-801 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS**

UNIT-I:

Study of Bacterial, (Tuberculosis and Typhoid) Viral, (Influenza and HIV) Fungal (Aspergillosis and Candidiasis) and Protozoan (Malaria and Amebiasis) Diseases affecting humans.

UNIT-II:

Collection of clinical samples (oral cavity, throat, skin, blood, CSF, urine and faeces) and precautionsrequired. Method of transport of clinical samples to laboratory and storage.

UNIT-III:

Examination of sample by staining - Gram stain, Ziehl-Neelson staining for tuberculosis, Giemsa-stained thin blood film for malaria. Preparation and use of culture media - Blood agar, Chocolate agar, Lowenstein-Jensen, medium, MacConkey agar, Distinct colony properties of various bacterial pathogens

UNIT- IV:

Serological Methods - Agglutination, ELISA, immunofluorescence, Nucleic acid based methods -PCR, Nucleic acid probes. Typhoid, Dengue and HIV, Swine flu.

UNIT-V:

Importance, Determination of resistance/sensitivity of bacteria using disc diffusion method, Determination of Minimal inhibitory concentration (MIC) of an antibiotic by serial double dilution method.

ADDITIONAL INPUT: Bacterial resistance to Antibiotics, Classification & mode of action of disinfectants.

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UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
UNIT- V	2	2
TOTAL	10	8

BLUE PRINT OF QUESTION PAPER

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SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' MBT- 801 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS

PRACTICAL SYLLABUS

- Collection transport and processing of any one of the following clinical specimens (Blood/ Urine/Stool/Sputum). Receipts, Labeling, recording and dispatching clinical specimens.
- 2. Isolation of bacteria in pure culture and Antibiotic sensitivity.
- 3. Identification of common bacteria(E.coli, Staphylococus aureus and Streptococus sps) by studying theirmorphology, cultural character, Biochemical reactions, and other tests.
- 4. Maintenance and preservation of stock culture.

SUGGESTED READING:

Ananthanarayan R and Paniker CKJ (2009) **Textbook of Microbiology**, 8th edition, Universities Press Private Ltd.

Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's **MedicalMicrobiology**. 26th edition. McGraw Hill Publication

Collee JG, Fraser, AG, Marmion, BP, Simmons A (2007) Mackie and Mccartney Practical **Medical Microbiology**, 14thedition, Elsevier.

Randhawa, VS, Mehta G and Sharma KB (2009) **Practicals and Viva in Medical Microbiology** 2nd edition, Elsevier IndiaPvt Ltd

Tille P (2013) Bailey's and Scott's Diagnostic Microbiology, 13th edition, Mosby

SRI Y.N. COLLEGE (AUTONOMOUS),NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence'IIIBSC MICROBIOLOGY- PAPER(VII) THIRD YEAR – SEMESTER- VII MBT- 801 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS

Time: 3hrs

PART-I

Max.Marks:50M

Answer any five of the following questions, atleast 2 from each section A&B Draw a labeled diagrams wherever necessary 5X10=50M SECTION-A

- 1. What is tuberculosis? Describe the characters of the causal agent and discuss the pathogenesis of the disease?
- 2. Describe the various methods used to collect samples?
- 3. Write Grams staining and Giems-staining techniques for examination of clinical samples?
- 4. Explain serological methods for identification of pathogens ?
- 5. How the tests for antimicrobial drug susceptibility are beneficial / Describe serial dilution method?

Section-B

- 6. Describe the causal agent, labortary diagnosis, prevention and treatment of influenza?
- 7. Describe various methods of transport of clinical samples to laboratory and storage?
- 8. Write composition and preparation of culture media for identification of pathogens?
- 9. Describe the casual agent, laboratory diagnosis, and prevention & treatment of typhoid?
- 10. Write an account of disc diffusion tests for antimicrobial drug susceptibility?

Section-C

Answer any <u>FIVE</u> of the following

- 11. Aspergillosis
- 12. Malaria
- 13. Transport media
- 14. Ziehl-Neelson staining
- 15. Serial dilution
- 16. ELISA
- 17. Dengue
- 18 .MIC

5X5=25M

THIRD YEAR – SEMESTER- VII

SRI Y.N. COLLEGE (AUTONOMOUS),NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER(VII)

MBT- 801 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS

PRACTICAL MODEL QUESTION PAPER

TIME: 3hr

Max.marks: 50

I.	MAJOR	
II.	MINOR	10M
III.	SPOTTERS	10M
IV.	RECORD	05M
V.	VIVA VOCE	05M

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THIRD YEAR - SEMISTER-VI SRI Y.N. COLLEGE NARSAPUR (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' **IIIBSC MICROBIOLOGY- PAPER(VII)**

MBT- 801-A2: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

UNIT – I:

Good laboratory practices - Good microbiological practices. Biosafety cabinets – Working of biosafety cabinets, using protective clothing, specification for BSL-1,BSL-2, BSL-3. Discarding biohazardous waste - Methodology of Disinfection, Autoclaving & Incineration

UNI<u>T – II:</u>

Culture and microscopic methods - Standard plate count, Most probable numbers, Direct microscopic counts, Biochemical and immunological methods: Limulus lysate test for endotoxin.

gel diffusion, sterility testing for pharmaceutical products

<u>UNIT – III:</u>

Molecular methods - Nucleic acid probes, PCR based detection, biosensors.

UNIT - IV:

Enrichment culture technique, Detection of specific microorganisms - on XLD agar,

Salmonella Shigella Agar, Manitol salt agar, EMB agar, McConkey Agar, Saboraud Agar Ascertaining microbial quality of milk by MBRT, Rapid detection methods of microbiological quality of milk at milk collection centres (COB, 10 min Resazurin assay).

UNIT – V:

Hazard analysis of critical control point (HACCP) - Principles, flow diagrams, limitationsMicrobial Standards for Different Foods and Water - BIS standards for common foods and drinking water.

ADDITIONAL INPUT: Sources & Types of Microbial contamination & Spoilage of food, preservation of pharmaceutical products using antimicrobial agents

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UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
UNIT- V	2	2
TOTAL	10	8

BLUE PRINT OF QUESTION PAPER

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SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR

Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence'

MBP- 801-A2: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

PRACTICAL SYLLABUS

- 1. Microbiological laboratory safety- General rules & Regulations.
- 2. Sterility tests for Instruments Autoclave & Hot Air Oven
- 3. Disinfection of selected instruments & Equipments
- 4. Sterility of Air and its relationship to Laboratory & Hospital sepsis.
- 5. Sterility testing of Microbiological media
- 6. Sterility testing of any one Pharmaceutical product
- 7. Standard qualitative analysis of water.

8. Microbiological analysis of homogenized food samples by direct microscopic count

SUGGESTED READING

Baird RM, Hodges NA and Denyer SP (2005) Handbook of Microbiological Quality controlin Pharmaceutical and Medical Devices, Taylor and Francis Inc.

Garg N, Garg KL and Mukerji KG (2010) Laboratory Manual of Food Microbiology IK International Publishing House Pvt. Ltd.

Harrigan WF (1998) Laboratory Methods in Food Microbiology, 3rd ed.

Academic Press Jay JM, Loessner MJ, Golden DA (2005) Modern Food

Microbiology, 7th edition. Springer

Laboratory Exercises in Microbiology, George.A.Wistreich & Max.D.Lechtman, 3 rd Ed,Glencoe press, London. Manual of diagnostic microbiology, Dr.B.J.Wadher & Dr.G.L.Bhoosreddy, Firs.Ed., Himalayapublishing house, Nagpur. Microbiology - A laboratory manual, Cappuccino & Sherman, 6 th Ed, Pearson EducationPharmaceutical Microbiology – Purohit Pharmaceutical Microbiology – W.B. Hugo

SRI Y.N. COLLEGE (AUTONOMOUS),NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER(VII) THIRD YEAR – SEMESTER- VI MBP- 801-A2: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICALINDUSTRIES

Time: 3hrs

Max. Marks: 75

PART-I

Answer any five of the following questions, atleast 2 from each section A&B Draw a labeled diagrams wherever necessary

5X10=50M

SECTION-A

- 1. Discuss Biosafety in microbiology and biomedical laboratories?
- 2 Describe the various culture and microscopic methods to enumerate the microorganisms?
- 3 What are nucleic acid probes and what are they used for?
- 4 Write enrichment culture techniques?
- 5. Discuss various Hazard analysis of critical control points(HACCP)?

SECTION-B

6. How to discard biohazardous waste?

- 7. Write biochemical methods for endotoxin and sterility tests for pharmaceutical products?
- 8.Define PCR?write the detection and diagnosis of infectious diseases?
- 9. Discuss rapid detection methods of microbiological quality of milk?
- 10. Write BIS standards for drinking water?

PART-II

SECTION-C

Answer any five of the following

5x5=25

- Incineration
 Gel diffusion
 Biosensors
 Saborauds agar
 MBRT
 EMB agar
 HACCP
- 18.Macconkey agar

THIRD YEAR – SEMESTER- VI SRI Y.N. COLLEGE (AUTONOMOUS),NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER(VII)

MBP- 801-A2: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICALINDUSTRIES

PRACTICAL MODEL QUESTION PAPER

TIME: 3hrs

Max.marks: 50M

I.	MAJOR	М
II.	MINOR 10	Μ
III.	SPOTTERS10	M
IV.	RECORD	5M
V.	VIVA VOCE	5M

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THIRD YEAR - SEMISTER-VI

SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' **IIIBSC MICROBIOLOGY- PAPER(VII)**

MBT- 801-A3: BIOFERTILIZERS AND BIOPESTICIDES

UNIT – I:

General account of the microbes used as biofertilizers for various crop plants and their advantages overchemical fertilizers.

Symbiotic N₂ fixers: *Rhizobium* - Isolation, characteristics, types, inoculum production and fieldapplication, legume/pulses plants. Frankia from nonlegumes and characterization.

Cyanobacteria and Azolla, characterization, mass multiplication, Role in rice

Cultivation, crop response & field application.

UNIT – II:

Free living Azospirillum, Azotobacter - isolation, characteristics, mass inoculum production and fieldapplication.

UNIT – III:

Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, fieldapplication

UNIT – IV:

Importance of mycorrizal inoculum, types of mycorrhizae and associated plants, Mass inoculumproduction of VAM, field applications of Ectomycorrhizae and VAM.

<u>UNIT – V:</u>

General account of microbes used as bioinsecticides and their advantages over synthetic pesticides. Bacillus thuringiensis - production, Fieldapplications. Viruses -NPV cultivation and field applications.

ADDITIONAL INPUT: Methods of solid waste disposal, Principles & Degradation of common pesticides

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M. Guren K. Venicato Reddy

SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Thrice Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' **IIIBSC MICROBIOLOGY- PAPER (VII)**

UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
UNIT- V	2	2
TOTAL	10	8

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SRI Y.N. COLLEGE (AUTONOMOUS),NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' MBP- 801-A3: BIOFERTILIZERS AND BIOPESTICIDES

PRACTICAL SYLLABUS

- 1. Isolation of *Rhizobium* from root nodules.
- 3. Isolation of phosphate solubilizers from soil
- 4. Staining and observation of VAM
- 3. A visit to biofertilizer production unit.

SUGGESTED READINGS

Agarwal SK (2005) **Advanced Environmental Biotechnology**, APH publication.Kannaiyan, S. (2003). **Bioetchnology of Biofertilizers,** CHIPS, Texas.

Mahendra K. Rai (2005). **Hand book of Microbial biofertilizers**, The Haworth Press, Inc. New York.Reddy, S.M. et. al. (2002). **Bioinoculants for sustainable agriculture and forestry**, Scientific Publishers. Saleem F and Shakoori AR (2012) **Development of Bioinsecticide**, Lap Lambert AcademicPublishing GmbH KG Subba Rao N.S (1995) **Soil microorganisms and plant growth** Oxford and IBH publishing co. Pvt. Ltd.NewDelhi.

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SRI Y.N. COLLEGE (AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence' IIIBSC MICROBIOLOGY- PAPER(VII) THIRD YEAR – SEMESTER- VI MBT- 801-A3: BIOFERTILIZERS AND BIOPESTICIDES

Time: 3hrs

Max.Marks:75

PART-I

Answer any five of the following questions, atleast 2 from each section A&BDraw labeled diagrams wherever necessary <u>SECTION-A</u> 5X10=50M

Answer any <u>FIVE</u> of the following questions, atleast two from each section A & B Draw labeled diagrams wherever necessary

- 1. Write an account on microbes used as biofertilizers for various crops and their advantages?
- 2. Explain Isolation mass multiplication of Azospirillum and field application?
- 3. Describe isolation, mass multiplication field application of phosphate solubilizing microbes?
- 4. Explain various types of mycorrhizae? `
- 5. Discuss Bacillus thuringienesis production and field applications?

SECTION-B

6. Describe mass multiplication of cyanobacteria and field application in

rice cultivation?

7. Describe isolation mass multiplication field application of

azatobacter?

8.Describe various phosphate solubilizing microbes and its

importance?

9.Explain the mass production of VAM and field

applications?

10. How NPV cultivated and its applications in field applications?

SECTION-C

Answer any **<u>FIVE</u>** of the following questions: 5X5=25

11.Rhizobium
12.Frankia
13.Azolla
14.Bioinsecticides
15.Ectomycorrhiza
e 16.Biofertilizers
17.Sedarophores
18.Cyanobacteria

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SRI Y.N. COLLEGE(AUTONOMOUS), NARSAPUR Accredited by NACC at "A" Grade with CGPA OF 3.41 Recognized by UGC as college with 'potential for excellence'IIIBSC MICROBIOLOGY-PAPER(VII) THIRD YEAR – SEMESTER- VI

MBT- 801-A3: BIOFERTILIZERS AND BIOPESTICIDES

PRACTICAL MODEL QUESTION PAPER

TIME: 3hr

Max.marks: 50M

I. MAJOR	20M
II. MINOR	
III. SPOTTERS	
IV. RECORD	05M
V.VIVA VOCE	05M

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