



**I BSC MICROBIOLOGY**

**2020-2021**

**SEMESTER - I**

BATCH- 2020-23  
**FIRST YEAR – SEMESTER- I**  
**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’  
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, Ivanowsky, 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  
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**

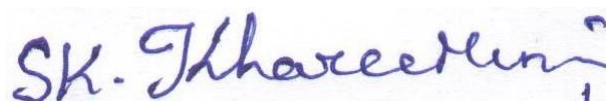
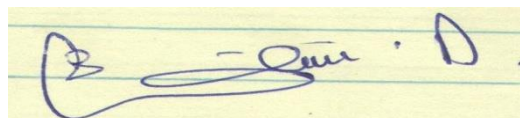
Principles of microscopy– Bright field and Electron microscopy ( SEM and TEM).

Staining techniques – simple and differential staining techniques ( gram staining, spore staining)

Sterilization and disinfection techniques – Physical methods : autoclave, hot –airoven, pressure cooker, laminar air flow, filter sterilization, radiation methods – uv rays, gamma rays.

Chemical methods: – alcohols, aldehydes, fumigants, phenols, halogens and hypochlorites.

**NOTE:-** IF APFCHE changes 1st year syllabus it will be placed in the next board of studies Meeting for its ratification.

Handwritten signature in blue ink on a white background, reading "SK. Thareedun".Handwritten signature in blue ink on a yellow background, reading "B. Suresh D.". The signature is stylized with a large initial 'B'.Handwritten signature in blue ink on a yellow background, reading "M. Chandra".Handwritten signature in blue ink on a yellow background, reading "A. Vidhya Srawan".

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**IBSC MICROBIOLOGY- PAPER (IA)**

**BLUE PRINT OF QUESTION PAPER**

**(2020-21)**

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

SK. Thareedun

Mr. Anand

B. S. D.

A. V. S.

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INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

**PRACTICAL SYLLABUS**

1. Microbiology Good Laboratory Practices & bio safety precautions
2. Preparation of culture media for cultivation of bacteria.
3. Preparation of culture media for cultivation of fungi
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), Cyanobacteria, Algae and Fungi.
8. Simple staining
9. Gram’s staining
10. Hanging-drop method.
11. Isolation of pure cultures of bacteria by streaking method.
12. Preservation of bacterial cultures by various techniques.
13. Diagrammatic or Electron photo micrographic observation of TMV, HIV, T4 phage and Adenovirus

**SUGGESTED READINGS:**

Alexopoulos, C.J., Mims, C.W. and Blackwell, M. (1996). **Introductory Mycology**, Wiley, New York.  
Atlas, R.A. and Bartha, R. (2000). Microbial Ecology. **Fundamentals and Application**, Benjamin Cummings, New York.

Dimmock, N.J., Easton, A.J. and Leppard, K.N. (2001). **Introduction to Modern Virology**, Blackwell Science Ltd, U.K.

Dube, R.C. and Maheswari, D.K. (2000) **General Microbiology**. S Chand, New Delhi. Edition), Himalaya Publishing House, Mumbai.

Frobisher, H., Hinsdil, R.D., Crabtree, K.T. and Goodhert, D.R. (2005). **Fundamentals of Microbiology**, Saunder and Company, London.

Jaya Babu (2006). **Practical Manual on Microbial Metabolisms and General Microbiology**. Kalyani

Publishers, New Delhi.

Madigan, M.T., Martinkl, J.M. and Parker, J. (2010). **Brock Biology of Microorganisms**, 9th Edition, MacMillan Press, England. Moore . Landecker, E. (1996). **Fundamentals of Fungi**, Prentice-Hall, NJ, USA.

Niclin, J. et al. (1999). **Instant Notes in Microbiology**. Viva Books Pvt. Ltd., New Delhi.

Pelczar, M.J., Chan, E.C.S. and Kreig, N.R. (1993). **Microbiology**. 5th Edition, Tata Mc Graw Hill Publishing Co., Ltd., New Delhi.

Gopal Reddy et al Laboratory **Experiments in Microbiology**

Power, C.B. and Dagainawala, H.F. (1986). **General Microbiology** Vol I & II (2nd

Prescott, M.J., Harley, J.P. and Klein, D.A. (2010). **Microbiology**. 5th Edition, WCB Mc GrawHill, New York.

Ram Reddy, S. and Reddy, S.M. (2007). **Essentials of Virology**. Scientific Publishers India, Jodhpur.

Rao, A.S. (1997). **Introduction to Microbiology**. Prentice-Hall of India Pvt Ltd., New Delhi. Black, J.G. (2005).

Reddy, S.M. (2003). **University Microbiology** .I . Galgotia Publications New Delhi.

Reddy, S.M. and Reddy, S.R. (1998). **Microbiology – Practical Manual**, 3 rd Edition, Sri Padmavathi Publications, Hyderabad.

Singh, R.P. (2007). **General Microbiology**. Kalyani Publishers, New Delhi.

Stanier, R.Y., Adelberg, E.A. and Ingram, J.L. (1991). **General Microbiology**, 5th Ed., Prentice Hall of India Pvt. Ltd., New Delhi.

Sullia, S.B. and Shantaram, S. (1998). **General Microbiology**, Oxford & IBH Publishing Pvt. Ltd., New Delhi.

Talaro, K. and Talaro, A. (1996). **Foundations in Microbiology**. 2nd Edition. UMC Brown

Publications. Webster, J. (1980). **Introduction to Fungi**, Cambridge University Press, Cambridge,

Wilson, K. and Walker, J. (1994). **Practical Biochemistry**. 4 th Edition, Cambridge University Press, England.

Zubay, G. (1998). **Biochemistry** WCB. Mc GrawHill, Iowa.

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मिथाना -

A. Vidhya Srawani

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**IBSC MICROBIOLOGY- PAPER (IA)**

**BATCH – 2020-23**

**MBT- 101 INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY**

**MODEL QUESTION PAPER**

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. 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 2<sup>nd</sup> edition of bergey's manual of systemic bacteriology?
7. Write the structure and multiplication of T4 bacteriophage?
8. Write about the general characteristics 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 ?

**PART-II**

**SECTION-C**

**Answer any five of the following questions**

**5X5=25M**

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

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**MBT- 101 INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY**

**PRACTICAL EXAM MODEL PAPER**

Duration -3hrs

Max.marks= 50

- |                          |     |
|--------------------------|-----|
| 1. Major Practical ..... | 20M |
| 2. Minor Practical ..... | 10M |
| 3. Spotters .....        | 5M  |
| 4. Viva and record.....  | 15M |

SK. Khareedun

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# SEMESTER - II

BATCH- 2020-23  
**FIRST YEAR – SEMESTER- II**

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IBSC MICROBIOLOGY- PAPER(IB)

**MICROBIAL BIOCHEMISTRY & METABOLISM**

**UNIT-I**

Outline classification and general characteristics of carbohydrates (monosaccharides, disaccharides and polysaccharides).general characteristics of amino acids and proteins. Structure of nitrogenous bases, nucleotides, nucleic acids. Fatty acids (saturated and unsaturated). Lipids (phospholipids, sterols and phospholipids).

**UNIT-II**

Principle and applications of calorimetry  
Chromatography (paper,thin-layer and column).  
Spectrophotometry (UV&visible).  
Centrifugation and gel electrophoresis.

**UNIT-III**

Properties and classification of enzymes.  
Biocatalysis-induced fit and lock and key models.  
Coenzymes and cofactors.  
Factors affecting catalytic activity.  
Inhibition of enzyme activity-competitive, noncompetitive, uncompetitive and allosteric

**UNIT-IV**

Microbial nutrition-nutritional requirements and uptake of nutrients by cells.  
Nutritional groups of microorganisms-autotrophs, heterotrophs, mixotrophs.  
Growth media-synthetic, complex, selective, enrichment and differential media.  
Microbial growth-different phases of growth in batch cultures, synchronous, continuous, biphasic growth.  
Methods for measuring microbial growth-direct microscopy, viable count estimates, turbidometry and biomass.

**UNIT-V**

Aerobic respiration-glycolysis, EMP pathway, ED pathway, TCA cycle, electron transport, oxidative and substrate level phosphorylation.  
Anaerobic respiration (nitrate).  
fermentation-alcohol & lactic acid fermentation.  
out lines of oxygenic & anoxygenic photosynthesis in bacteria

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IBSC MICROBIOLOGY- PAPER(IB)

**MICROBIAL BIOCHEMISTRY & METABOLISM**

**BLUE PRINT OF QUESTION PAPER: (2020-23)**

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

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IBSC MICROBIOLOGY- PAPER(IB)

**MICROBIAL BIOCHEMISTRY & METABOLISM**

**PRACTICAL SYLLABUS**

**MICROBIAL BIOCHEMISTRY & METABOLISM**

1. Qualitative analysis of carbohydrates.
2. Qualitative analysis of amino acids
3. Colorimetric estimation DNA by diphenylamine method.
4. Colorimetric estimation of proteins by biuret /lowry method.
5. Paper chromatographic separation of sugars and amino acids.
6. Preparation of different media-synthetic and complex media.
7. Setting and observation of winogradsky column.
8. Estimation of CFU count by spread plate method / pour plate method.
9. Bacterial growth curve.
10. Factors affecting bacterial growth-pH.
11. Factors affecting bacterial growth-temperature.
12. Factors affecting bacterial growth-salts

**SUGGESTED READING**

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.

Campbell, PN and Smith AD (2011) **Biochemistry** Illustrated, 4th ed.,  
Published by Churchill  
Livingstone

Elliot, W.H. and Elliot, D.C. (2001). **Biochemistry and Molecular Biology**, 2 nd  
Edition, Oxford University Press, U.S.A.

Gottschalk, G. (1986). **Bacterial Metabolism**, SpringerVerlag, NewYork.

Lehninger, A.L., Nelson, D.L. and Cox, M.M. (1993). **Principles of Biochemistry**,  
2 nd Edition, CBS Publishers and Distributors, New Delhi.

Madigan, M.T., Martinkl, J.M. and Parker, J. (2010). **Brock Biology of  
Microorganisms**, 9th Edition, MacMillan Press, England.

Moat, A.G. and Foster, J.W. (1995). **Microbial Physiology**, JohnWiley, New York.  
Nelson DL and Cox MM (2008) Lehninger **Principles of Biochemistry**, 5th Edition.,

Prescott, M.J., Harley, J.P. and Klein, D.A. (2010). **Microbiology**. 5th Edition, WCB Mc  
GrawHill, New York.

Reddy, S.R. and Reddy, S.M. (2004). **Microbial Physiology**, Scientific Publishers, Jodhpur, India.

Sashidhara Rao, B. and Deshpande, V. (2007). **Experimental Biochemistry: A student Companion**. I.K. International Pvt. Ltd.

Stanier, R.Y., Adelberg, E.A. and Ingram, J.L. (1991). **General Microbiology**, 5th Ed., Prentice Hall of India Pvt. Ltd., New Delhi.

Tymoczko JL, Berg JM and Stryer L (2012) **Biochemistry: A short course**, 2nd ed., W.H. Freeman

Voet, D. and Voet J.G (2004) **Biochemistry** 3<sup>rd</sup> edition, John Wiley and Sons

White, D. (1995). **The Physiology and Biochemistry of Prokaryotes**, Oxford University Press, New York.

Wiley MJ, Sherwood, LM & Woolverton C J (2013) Prescott, Harley and Klein's **Microbiology** by. 9th Ed., McGrawHill

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**IBSC MICROBIOLOGY- PAPER(IB)**

**BATCH- 2020-23**

**FIRST YEAR – SEMESTER- II**

**TITLE: MICROBIAL BIOCHEMISTRY & METABOLISM**

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. Write about general characters and classification of carbohydrates?
2. .Describe briefly about fatty acids?
3. Write about the principle and application of calorimeter?
4. Write about the principle and applications of paper chromatography?
5. Write the properties and classification of enzymes?

**SECTION –B**

6. Explain the aerobic respiration of glycolysis, HMP pathway, ED pathway, and TCA cycle?
7. Write an essay on nutritional requirements of growth?
8. What are the factors effecting bacterial bacteria?
9. Explain the factors effecting catalytic activity?
10. What is the inhibition of enzyme activity and write about competitive and non Competitive?

**PART-II**

**SECTION-C**

**Answer any five of the following**

**5x5=25**

11. General characteristics of aminoacids
12. Structure of DNA
13. Resolving power
14. PH of biological fluids
15. Mordent
16. Buffers
17. Tryptophan
18. Polysaccharides

BATCH- 2020-23  
**FIRST YEAR – SEMESTER- II**

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**IBSC MICROBIOLOGY- PAPER(IB)**

**TITLE: MICROBIAL BIOCHEMISTRY & METABOLISM**

**PRACTICAL EXAM MODEL PAPER**

Duration -3hrs

Max.marks:50

1. Major Practical ..... 20M
2. Minor Practical ..... 10M
3. Spotters ..... 5M
4. Viva and record.....15M

SK. Jhaverdun,

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SEMESTER - III



BATCH- 2020-23  
**SECOND YEAR – SEMESTER- III**

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**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 in bacteria -*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:**

1. 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 Bartlett Publishers, London.

5. Ram Reddy, S., Venkateshwarlu, K. and Krishna Reddy, V. (2007) A text Book of Molecular Biotechnology. Himalaya Publishers, Hyderabad.
6. Sinnot E.W., L.C. Dunn and T. Dobzhansky. (1958). Principles of Genetics. 5<sup>th</sup> Edition. McGraw Hill, New York.
7. Smith, J.E. (1996). Biotechnology, Cambridge University Press.

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**II BSC MICROBIOLOGY- PAPER (IIA)**

***BLUE PRINT OF QUESTION PAPER***

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

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BATCH- 2020-23  
**SECOND YEAR – SEMESTER- III**

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II BSC MICROBIOLOGY- PAPER (IIA)

**PRACTICAL SYLLABUS**

1. Study of different types of DNA and RNA using micrographs and model / schematic representations.
2. Study of semi-conservative replication of DNA through micrographs / schematic representations
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.

SK. Jhaveri

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BATCH- 2020-23  
**SECOND YEAR – SEMESTER- III**

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II BSC MICROBIOLOGY- PAPER (IIA)

**II A: 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**

**5x5=25**

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

18. Plasmid vectors

BATCH- 2020-23  
SECOND YEAR – SEMESTER- III

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II BSC MICROBIOLOGY- PAPER (IIA)

**II A: Molecular Biology and Microbial Genetics**

**PRACTICAL MODEL 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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A. Vidhya Sraavan

**SEMESTER - IV**

BATCH- 2020-23  
**SECOND YEAR – SEMESTER- IV**  
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II BSC MICROBIOLOGY- PAPER (IIB)

**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 complex formation 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. Fungal diseases - 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

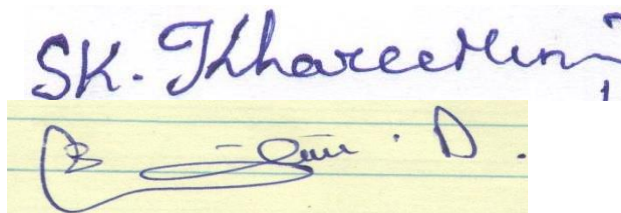


## RECOMMENDED TEXT BOOKS:

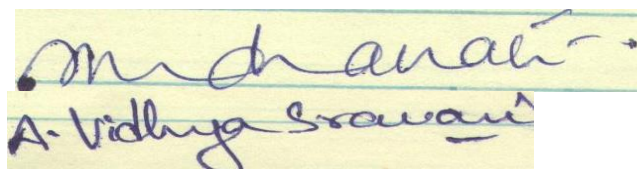
1. Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication.
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2013) Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication.
3. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th 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.
3. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education.



SK. Thareedun



A. Vidhya Sraavan

**SRI Y.N. COLLEGE NARSAPUR(AUTONOMOUS),NARSAPUR**  
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Recognized by UGC as college with ‘potential for excellence’  
**IIBSC MICROBIOLOGY- PAPER (IIB)**

***BLUE PRINT OF QUESTION PAPER***

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

SK. Khareedun

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A. Vidhya Srawan

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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*) using laboratory 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 swab method.
12. Evaluation of Hand Sanitizer Effectiveness by Filter Paper Disc Method & thumb impression 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 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.
4. Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.

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

BATCH- 2020-23  
SECOND YEAR – SEMESTER- IV

**SRI Y.N. COLLEGE NARSAPUR (AUTONOMOUS),NARSAPUR**

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IIBSC MICROBIOLOGY- PAPER(IB)

Immunology and Medical Microbiology

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**

**5x5=25M**

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

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**IIBSC MICROBIOLOGY- PAPER(IB)**

**Immunology and Medical Microbiology**

**IMMUNOLOGY AND MEDICAL MICROBIOLOGY**

**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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SEMESTER - V

### **THIRD YEAR – SEMESTER- V**

**SRI Y.N. COLLEGE NARSAPUR (AUTONOMOUS),NARSAPUR**

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**IIIBSC MICROBIOLOGY- PAPER (V)**

#### **MBT- 501 ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY**

##### **UNIT – I:**

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

##### **UNIT – II:**

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.

##### **UNIT – III:**

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.

##### **UNIT – IV:**

Plant Growth Promoting Microorganisms - Mycorrhizae, Rhizobia, *Azospirillum*, *Azotobacter*, *Frankia*, phosphate-solubilizers and Cyanobacteria. Outlines of biological nitrogen fixation (symbiotic, non-symbiotic). Biofertilizers - *Rhizobium*.

##### **UNIT – V:**

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

**ADDITIONAL INPUT:** Management of soil nutrients , Conversion of waste lands in to fertile lands.

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***BLUE PRINT OF QUESTION PAPER***

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
<b>TOTAL</b>	<b>10</b>	<b>8</b>

SK. Jhaveddin

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IIIBSC MICROBIOLOGY- PAPER (V)

**MBP- 501 ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY**  
**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**. 4<sup>th</sup> edition. Benjamin/Cummings Science Publishing, USA
- Barton LL & Northup DE (2011). **Microbial Ecology**. 1<sup>st</sup> 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**. 14<sup>th</sup> edition. Pearson/Benjamin Cummings
- Maier RM, Pepper IL and Gerba CP. (2009). **Environmental Microbiology**. 2<sup>nd</sup> edition, Academic Press
- Martin A. (1977). **An Introduction to Soil Microbiology**. 2<sup>nd</sup> edition. John Wiley & Sons Inc. New York & London.
- Okafor, N (2011). **Environmental Microbiology of Aquatic & Waste systems**. 1<sup>st</sup> edition, Springer, New York.
- Singh A, Kuhad, RC & Ward OP (2009). **Advances in Applied Bioremediation**. Volume 17, Springer-Verlag, Berlin Heidelberg
- 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. New Delhi.

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

SK. Khareedun;

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A. Vidhya Sraavan

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**IIIBSC MICROBIOLOGY- PAPER(V)**

**THIRD YEAR – SEMESTER- V**

**TITLE: MBT- 501 ENVIRONMENTAL &  
AGRICULTURAL 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. 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**

6. Write about Aeromicroflora and dispersal of microbes?
7. Discuss the role of microorganisms in carbon cycle?
8. Write the methods of solid waste disposal?
9. Write in detail about biological symbiotic nitrogen fixation?
10. Describe the concept and principles of plant disease control?

**PART-II**

**SECTION-C**

**Answer any five of the following**

**5x5=25M**

11. Extremophiles
12. MPN
13. Antagonism
14. BOD
15. Trickling filter
16. Rhizobium
17. Citrus canker
18. Non symbiotic nitrogen fixation

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**PRACTICAL MODEL QUESTION PAPER**

**MBT- 501 ENVIRONMENTAL & AGRICULTURAL  
MICROBIOLOGY**

**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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**THIRD YEAR – SEMESTER- V**  
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**IIIBSC MICROBIOLOGY- PAPER(VI)**

**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 and vitamin B12.

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

SK. Jhaveri

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A. Vidya Suman

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**IIIBSC MICROBIOLOGY- PAPER (VI)**

***BLUE PRINT OF QUESTION PAPER***

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
<b>TOTAL</b>	<b>10</b>	<b>8</b>

SK. Jhaveddin

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Mr. Anand

A. Vidhya Srawan

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**IIIBSC MICROBIOLOGY- PAPER(VI)**

**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) Limited Publishers, New Delhi, India.

Banwart JM. (1987). **Basic Food Microbiology**. 1st edition. CBS Publishers and Distributors, Delhi, India.

Casida LE. (1991). **Industrial Microbiology**. 1st edition. Wiley Eastern Limited.

Crueger W and Crueger A. (2000). **Biotechnology: A textbook of Industrial Microbiology**. 2nd Edition. Panima Publishing Company, New Delhi

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

Jay JM, Loessner MJ and Golden DA. (2005). **Modern Food Microbiology**. 7<sup>th</sup> edition, CBS Publishers and Distributors, Delhi, India

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

Stanbury PF, Whitaker A and Hall SJ. (2006). **Principles of Fermentation Technology**. 2nd edition, Elsevier Science Ltd.

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

9th Edition. Pearson Education

Willey JM, Sherwood LM AND Woolverton CJ (2013), Prescott, Harley and Klein's

**Microbiology.** 9th Edition. McGraw Hill Higher education

1. SK. Jhaveri

B. S. D.

2.

M. Chandra

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**IIIBSC MICROBIOLOGY- PAPER(VI)**

**THIRD YEAR – SEMESTER- V**

**TITLE: MBT- 601FOOD & INDUSTRIAL  
MICROBIOLOGY**

**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. 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**

**5x5=25M**

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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**IIIBSC MICROBIOLOGY- PAPER(VI)**

**PRACTICAL MODEL QUESTION PAPER**

**MBT- 601 FOOD & INDUSTRIAL**  
**MICROBIOLOGY**

**TIME: 3hrs**

**Max.marks: 50M**

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

SK. Jhaveri  
B. S. D.

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A. Vidya Srao

**SEMESTER - VI**

**CLUSTER ELECTIVE**

Batch-2020-2021

THIRD YEAR – SEMESTER- VI

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IIIBSC MICROBIOLOGY- PAPER(VII)

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

SK. Khareedun

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**MBT- 701 MICROBIAL BIOTECHNOLOGY**

**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

**UNIT- II:**

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

**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 algal 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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**IIIBSC MICROBIOLOGY- PAPER (VII)**

**BLUE PRINT OF QUESTION PAPER**

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
<b>TOTAL</b>	<b>10</b>	<b>8</b>

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**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

**SUGGESTED READING:**

Crueger W, Crueger A (1990) **Biotechnology: A text Book of Industrial Microbiology** 2nd edition Sinauer associates, 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**, 2<sup>nd</sup> edition, Cambridge University Press Glick BR, Pasternak JJ, and

Patten CL (2010) **Molecular Biotechnology** 4<sup>th</sup> edition, ASM

Press Gupta PK (2009) **Elements of Biotechnology** 2<sup>nd</sup> edition, Rastogi Publications

Prescott, Harley and Klein's **Microbiology** by Willey JM, Sherwood LM, Woolverton CJ (2014), 9th edition, 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., Elsevier Science

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

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**IIIBSC MICROBIOLOGY- PAPER(VII)**  
**THIRD YEAR – SEMESTER- VI**  
**MBP- 701 MICROBIAL BIOTECHNOLOGY**

**Time: 3Hrs**

**Section-A**

**Max.Marks:75**

**Answer any FIVE 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 FIVE of the following questions**

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

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**IIIBSC MICROBIOLOGY- PAPER(VII)**  
**THIRD YEAR – SEMESTER- VI**  
**MBP- 701 MICROBIAL BIOTECHNOLOGY**

**PRACTICAL MODEL QUESTION PAPER**

TIME: 3hr

Max.marks: 50M

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

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THIRD YEAR – SEMESTER- VI  
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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

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**IIIBSC MICROBIOLOGY- PAPER (VII)**

**BLUE PRINT OF QUESTION PAPER**

UNITS	ESSAY QUESTIONS	SHORT QUESTIONS
UNIT-I	2	1
UNIT-II	2	2
UNIT-III	2	1
UNIT-IV	2	2
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<b>TOTAL</b>	<b>10</b>	<b>8</b>

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**MBT- 801 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS**

**PRACTICAL SYLLABUS**

1. 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, Staphylococcus aureus and Streptococcus spp) by studying their morphology, cultural character, Biochemical reactions, and other tests.
4. Maintenance and preservation of stock culture.

***SUGGESTED READING:***

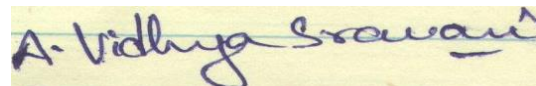
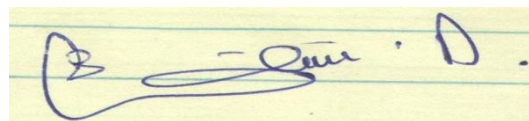
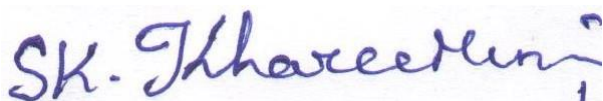
Ananthanarayan R and Paniker CKJ (2009) **Textbook of Microbiology**, 8th edition, Universities Press Private Ltd.

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

Collee JG, Fraser, AG, Marmion, BP, Simmons A (2007) Mackie and McCartney Practical **Medical Microbiology**, 14<sup>th</sup> edition, Elsevier.

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

Tille P (2013) Bailey's and Scott's **Diagnostic Microbiology**, 13<sup>th</sup> edition, Mosby



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**IIIBSC MICROBIOLOGY- PAPER(VII)**

**THIRD YEAR – SEMESTER- VI**

**MBT- 801 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS**

Max.Marks:75

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**

**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 FIVE of the following**

**5X5=25M**

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

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**THIRD YEAR – SEMESTER- VI**  
**MBT- 801 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS**

**PRACTICAL MODEL QUESTION PAPER**

**TIME: 3hr**

**Max.marks: 50M**

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- IV. RECORD.....05M**
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**THIRD YEAR – SEMESTER-VI**  
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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.

**UNIT – II:**

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

**UNIT – III:**

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, Sabouraud 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, limitations Microbial Standards for Different Foods and Water – BIS standards for common foods and drinking water.

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**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 control in 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 Education  
Pharmaceutical Microbiology – Purohit  
Pharmaceutical Microbiology – W.B. Hugo

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**IIIBSC MICROBIOLOGY- PAPER(VII)**

**THIRD YEAR – SEMESTER- VI**

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

Time: 3hrs

Max. Marks:

75M

**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**

11. Incineration
12. Gel diffusion
13. Biosensors
- 14.Saborauds agar
15. MBRT
- 16.EMB agar
- 17.HACCP
- 18.Macconkey agar

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**THIRD YEAR – SEMESTER- VI**  
**MBP- 801-A2: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES**

**PRACTICAL MODEL QUESTION PAPER**

**TIME: 3hr**

**Max.marks: 50M**

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- II. RECORD..... 05M**
- III. VIVA VOCE..... 05M**

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THIRD YEAR – SEMISTER-VI

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**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 over chemical fertilizers. Symbiotic N<sub>2</sub> fixers: *Rhizobium* - Isolation, characteristics, types, inoculum production and field application, legume/pulses plants. *Frankia* from non-legumes 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 field application.

**UNIT – III:**

Phosphate solubilizing microbes - Isolation, characterization, mass inoculum production, field application

**UNIT – IV:**

Importance of mycorrhizal inoculum, types of mycorrhizae and associated plants, Mass inoculum production of VAM, field applications of Ectomycorrhizae and VAM.

**UNIT – V:**

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

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<b>TOTAL</b>	<b>10</b>	<b>8</b>

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**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 Academic Publishing GmbH KG

Subba Rao N.S (1995) **Soil microorganisms and plant growth** Oxford and IBH publishing co. Pvt. Ltd. New Delhi.

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**THIRD YEAR – SEMESTER- VI**  
**MBT- 801-A3: BIOFERTILIZERS AND BIOPESTICIDES**

**Time: 3hrs**

**Max.Marks:75**

**PART-I**  
**SECTION-A**

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

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 thuringiensis* 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 produvtn of VAM and field applications?
- 10.How NPV cultivated and its applications in field applications?

**SECTION –C**

Answer any **FIVE** of the following questions

**5x5=25M**

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

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**PRACTICAL MODEL QUESTION PAPER**

**TIME: 3hr**

**Max.marks: 50**

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- II. MINOR.....10M**
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