

BOARD OF STUDIES IN B.Sc MICROBIOLOGY 2021-2022

DEPARTMENT OF MICROBIOLOGY

SYLLABUS FOR B.Sc MICROBIOLOGY



PITHAPUR RAJAHS GOVERNMENT COLLEGE

Autonomous and Accredited with 'A' Grade by NAAC (3.17 CGPA)

KAKINADA – 533 001, E G Dist., ANDHRA PRADESH

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF MICROBIOLOGY

The Board of Studies meeting for MICROBIOLOGY subject during the academic year 2021-2022 is conducted at the Dept. of Microbiology on November 2021 with **Dr.B.Lakshmi**, Lecturer in-Charge in the chair along with the following members.

Name, Designation and Address

Signature

1. Chair Person:

Dr.B.Lakshmi

Lecturer in-Charge

Dept. of Microbiology PRGC(A),

Kakinada

2. AdiKavi Nannaya University Nominee:

Dr.D.Aruna,

Lecturer

S.R.R.&C.V.R College,

Vijayawada.

3. Members Nominated by Executive Council of the College:

Subject Expert

D.Jayasree

Lecturer,

A.S.D.Womens college

Kakinada

Dr.A.Sreenivasulu

Director

V.S.Laxmi Research center,

Kakinada, E.G.Dt., A.P

4. Members from the College:

1. G. SATHISH

Guest Faculty in Microbiology

b. Student members:

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA – 533001**Department of Botany & Microbiology****MICROBIOLOGY****Semester wise papers**

Year	Semester	Paper Title	Marks E+I	Credits
I YEAR	I	INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY	50+50	04
	I	PRACTICAL	25+25	01
	II	INTRODUCTION TO MICROBIAL BIOCHEMISTRY AND METABOLISM	50+50	04
	II	PRACTICAL	25+25	01
II YEAR	III	MICROBIAL GENETICS AND MOLECULAR BIOLOGY	60+40	03
	III	PRACTICAL	35+15	02
	IV	IMMUNOLOGY AND MEDICAL MICROBIOLOGY	60+40	03
	IV	PRACTICAL	35+15	02
III YEAR *	V	ENVIRONMENTAL&AGRICULTURAL MICROBIOLOGY	60+40	03
		PRACTICAL	35+15	02
	V	FOOD & INDUSTRIAL MICROBIOLOGY	60+40	03
		PRACTICAL	35+15	02
	VI ELCTIVE	MICROBIAL BIOTECHNOLOGY	60+40	03
	VI	PRACTICAL	35+15	02
	VI CI	MICROBIAL DIAGNOSIS IN HEALTH CLINICS	60+40	03
	VI	PRACTICAL	35+15	02
	VI C2	MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES	60+40	03
	VI	PRACTICAL	35+15	02
	VI C3	BIOFERTILIZERS & BIOPESTICIDES	60+40	03
	VI	PRACTICAL	35+15	02

P R GOVERNMENT COLLEGE (A), KAKINADA
DEPARTMENT OF MICROBIOLOGY

Objectives of Department of Microbiology

- ❖ To teach the historical events in Microbiology
- ❖ To provide knowledge on diversity of microorganisms.
- ❖ To instill students on laboratory techniques like microscopy, sterilization and culture of microbes.
- ❖ To give thorough knowledge on biomolecules and their characterization/quantification.
- ❖ To endow with basics of Enzymology and nutrition and metabolism in microbes.
- ❖ To give thorough knowledge on Microbial genetics and applications
- ❖ To impart the knowledge of Molecular biology.
- ❖ To acquaint to understand the importance of different types immunity, lymphoid organs cells of immune system it also deals with types of antigen and antibody and its interaction
- ❖ To impart knowledge to learn about on human pathogens, etiology and epidemiology of diseases caused by them.
- ❖ To gain knowledge on the role on normal microbial flora and general principles of diagnostic microbiology.
- ❖ To acquaint to understand the concept of plant diseases and soil microorganisms
- ❖ To impart knowledge of importance of microbes in different fields
- ❖ To inculcate knowledge in diagnosing bacteriological disease

P R GOVERNMENT COLLEGE (A), KAKINADA
DEPARTMENT OF MICROBIOLOGY

PROGRAMME OUTCOMES

For every degree program expectations are listed out by the institution under the Program Outcomes. For B.Sc Microbiology, Botany and Chemistry Stream the following are set as

Knowledge and understanding of:

1. Students to be able to acquire, articulate, retain and apply specialized language and knowledge relevant to microbiology.
2. Students will acquire and demonstrate competency in laboratory safety and in routine and specialized microbiological laboratory skills applicable to microbiological research or clinical methods, including accurately reporting observations and analysis.
3. Students will communicate scientific concepts, experimental results and analytical arguments clearly and concisely, both verbally and in writing.
4. Students will demonstrate engagement in the Microbiology discipline through involvement in research or internship activities

Intellectual skills – be able to

1. Think logically and organize tasks into a structured form.
2. Assimilate knowledge and ideas based on wide reading and through the internet.
3. Transfer of appropriate knowledge and methods from one topic to another within the subject.
4. Understand the evolving state of knowledge in a rapidly developing field.
5. Construct and test hypothesis.
6. Plan, conduct and write a report on an independent term project.

Practical skills

1. Understand the importance of laboratory security as it applies to working with hazardous chemicals, biohazards, recombinant material, and general Microbiology laboratory rules and regulations
2. Students will evaluate the accuracy of different types of measuring devices to accurate
3. Measure a solution. They will statistically analyze their data to determine the best measuring device to use.
4. Students will evaluate to learn isolation and identification different microbes from different samples.
5. Students evaluate different products of commercial production by using different raw materials
6. Characterize isolated DNA and RNA using agarose gel electrophoresis and analyze agarose gel data
7. Perform basic microbiological techniques such as sterile plating and isolation of single colonies, culturing bacteria in liquid broth.

8. PCR amplify target genomic DNA and ligate into vector and transform bacteria with rDNA.

Transferable skills

1. Use of IT (word-processing, use of internet, statistical packages and databases).
2. Communication of scientific ideas in writing and orally.
3. Ability to work as part of a team.
4. Ability to use library resources/Equipment.
5. Time management.

Problem analysis

1. Identify the taxonomic position of plants
2. Design solutions from medicinal plants for health problems, disorders and disease of human beings /animals which meet the specified needs
3. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,

Ethics

1. Apply ethical principles and commit to environmental ethics and responsibilities and norms of the environment

Individual and team work

1. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
2. Elicit views of others, mediate disagreements and help reach conclusions in group settings.

Communication

1. Communicate effectively on complex group activities and with society at large. Speak, read, write and listen clearly in person and through electronic media in English and in one Indian Language Manage projects and in multidisciplinary environments.

Critical Thinking:

1. Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

Effective Citizenship

1. Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

**P R GOVERNMENT COLLEGE (A), KAKINADA
DEPARTMENT OF MICROBIOLOGY**

PROGRAMME SPECIFIC OUTCOMES & COURSE OUTCOMES

SEMESTER – I: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

Programme specific outcomes

- ❖ Acquire skills and competency in microbiological laboratory practices applicable to microbiological research or clinical methods.
- ❖ Focus on different attributes of living cells.

Course outcomes

- ❖ Explain relationship and apply appropriate terminology relating to the structure, Genetics, metabolism and Ecology of prokaryotic microorganisms, Algae, Viruses and Fungi.
- ❖ Demonstrate appropriate laboratory skill and techniques related to isolation, staining, identification and control of microorganisms

SEMESTER – II: INTRODUCTION TO MICROBIAL BIOCHEMISTRY AND METABOLISM

Programme specific outcomes

- ❖ Impart knowledge on structure and biological functions of macromolecules.
- ❖ Impart knowledge on mechanism of enzyme catalysis.
- ❖ Impart knowledge on various metabolic pathways.

Course outcomes

- ❖ Explain working principle and applications of Calorimetry, Chromatography, Spectrophotometry, Centrifugation and Gel Electrophoresis.
- ❖ Knowledge on Microbial nutrition, bacterial growth, metabolism and Respiration.
- ❖ The student will get firsthand experience on separation methods

SEMESTER – III: MICROBIAL GENETICS AND MOLECULAR BIOLOGY

Programme specific outcomes

- ❖ Understand the concept of replication, gene expression and regulation.
- ❖ Acquire knowledge on different gene mutations and their causative agents.

Course outcomes

- ❖ Develop knowledge on microbial genetics and molecular biology and instrumentation.

SEMESTER – IV: IMMUNOLOGY AND MEDICAL MICROBIOLOGY

Programme specific outcomes

- ❖ Understand the concept of immune mechanism.
- ❖ Develop knowledge on different clinical immunological techniques.

- ❖ Provides knowledge on the role normal microbial flora and general principles diagnostic microbiology.

Course outcomes

- ❖ Explain Non-specific body defenses and the immune response
- ❖ Develop knowledge on disease transmission and control
- ❖ Demonstrate on collection and handling of laboratory specimens

SEMESTER – V: ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY

Programme specific outcomes

- ❖ To impart knowledge on soil microorganisms and role in nutrient cycles.
- ❖ To inculcate knowledge on plant diseases and their control.

Course outcomes

- ❖ The student will have fundamental concepts in soil microbiology, soil microbial diversity, basic concept of nitrogen fixation and plant growth promotion.
- ❖ Understands the role of microorganisms in treatment of solid and liquid waste.
- ❖ The student will acquire knowledge on application of microorganisms in agro – environmental fields.

SEMESTER – V: FOOD AND INDUSTRIAL MICROBIOLOGY

Programme specific outcomes

- ❖ To impart knowledge on microorganisms involved in food spoilage and their sources.
- ❖ To impart knowledge on isolation and screening of industrially important microorganisms.

Course outcomes

- ❖ The course aims to provide general principles of food microbiology.
- ❖ It is assumed that students will have got basic information on spoilage, principle of food preservation and Single cell proteins.

SEMESTER – VI: MICROBIAL BIOTECHNOLOGY

Programme specific outcomes

- ❖ Understand about crop development, callus culture, biotechnological applications of plants, Animal tissue culture, Animal products and their production.
- ❖ To understand concepts of IPR.

Course outcomes

- ❖ Student should be able to demonstrate with the wide diversity of microbes and their potential for use in microbial biotechnology
- ❖ It is assumed that students will have get outlines of intellectual property rights.

SEMESTER – VI: MICROBIAL DIAGNOSIS IN HEALTH CLINICS

Programme specific outcomes

- ❖ To acquire knowledge on human pathogens.

- ❖ Course will provide practical knowledge about different types of bacteria, virus and fungi found in environment

Course outcomes

- ❖ Develop knowledge and skills on microbiological laboratory safety- General rules and regulations

SEMESTER – VI: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

Programme specific outcomes

- ❖ To impart knowledge on different culture techniques.
- ❖ To learn the process of PCR.
- ❖ To learn Microbial Standards for Different Foods and Water.

Course outcomes

- ❖ Develop skills on disinfection of instruments and equipment's in laboratory and Hospitals

SEMESTER – VI: BIO FERTILIZERS AND BIO PESTICIDES

Programme specific outcomes

- ❖ To impart knowledge on microbes involved in nitrogen fixation process.
- ❖ to impart knowledge different plant growth promoting microbes.
- ❖ to impart knowledge on cultivation and field applications of different bio fertilizes.

Course outcomes

- ❖ Develop knowledge and skills on mass multiplication and field application of bio fertilizers and bio pesticides.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

I BSc., - Microbiology / I SEMESTER End (W.E.F. 2021-2022)

Introduction to Microbiology and Microbial Diversity (Course: MBT 1209)

Total Hrs. of Teaching- Learning: 60 @ 4h/ Week

Total Credits: 04

UNIT - I **12 Hrs**

1. History and mile stones in microbiology. Contributions of Anton von Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Ivanowsky.
2. Importance and applications of microbiology.
3. Classification of microorganisms – Haeckel’s three Kingdom concept, Whittaker’s five kingdom, concept, of three domain concept of Carl Woese.

UNIT – II **10 Hrs**

1. Outline classification of bacteria as per the second edition of Bergey’s Manual of Systematic Bacteriology.
2. General characteristics of Bacteria, Archaea, Mycoplasma and Cyanobacteria.
3. Ultra structure of Prokaryotic cell- Variant components and invariant components.
4. General characteristics of viruses. Morphology, Structure and replication of TMV, SARS CoV-2 and Dengue virus.

UNIT - III **10 Hrs**

1. General characteristics and outline classification of Fungi and Algae.
2. Principles of microscopy - Bright field and Electron microscopy (SEM and TEM).

UNIT - IV **8 Hrs**

1. Staining Techniques –Simple and Differential (Gram Staining and Spore Staining).
2. Sterilization and disinfection techniques - Physical methods – autoclave, hot- air oven, pressure cooker, laminar air flow, filter sterilization, Radiation methods – UV rays, Gamma rays.
3. Chemical methods – alcohols, aldehydes, fumigants, phenols, halogens and hypochlorite’s

UNIT – V **12 Hrs**

1. Isolation of Microorganisms from natural habitats.
2. Pure culture techniques – dilution-plating, Streak-plate, Spread-plate, Pour-Plate and micromanipulator. Enrichment culturing.
3. Preservation of microbial cultures – sub culturing, overlaying cultures with mineral oils, lyophilization, sand cultures, storage at low temperature

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
I B.Sc - Microbiology / I Semester End (W.E.F. 2021-2022)
Introduction to Microbiology and Microbial Diversity
(Course: MB 1209P)

Total Hrs. of Teaching- Learning:30 @ 2h/ Week

Total credits :01

PRACTICAL SYLLABUS

1. Microbiology Good Laboratory Practices and Biosafety.
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.
- ❖ Madigan, M.T., Martinkl, J.M. and Parker, J. (2010). Brock Biology of Microorganisms, 9th Edition, MacMillan Press, England.
- ❖ Pelczar, M.J., Chan, E.C.S. and Kreig, N.R. (1993). Microbiology. 5th Edition, Tata Mc Graw Hill Publishing Co., Ltd., New Delhi.
- ❖ Prescott, M.J., Harley, J.P. and Klein, D.A. (2010). Microbiology. 5th Edition, WCB Mc GrawHill, New York.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
I Year B.Sc., Program I Semester End
Microbiology I A: Introduction to Microbiology and Microbial Diversity
(Course Code MB1209 w.e.f.2021-2022)

Time :2½Hours

Max Marks :50M

SECTION - A

Answer any THREE of the following questions

3X10=30 M

1. Write the importance and applications of Microbiology.
2. Describe the ultrastructure of prokaryotic cell.
3. Write an essay on general characteristics of Fungi.
4. What is a Pure culture? Give a detailed explanation of bacterial pure culture techniques.
5. Describe the working and principle of Bright field microscopy.

SECTION - B

Answer any Four of the following questions

4X5 =20 M

6. Koch Postulates
7. Archaea
8. Mycoplasma
9. Differential medium
10. Lyophilization
11. Serial dilution technique
12. Spore staining
13. UV rays

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
I Year B.Sc., Program I Semester End
Microbiology I A: Introduction to Microbiology and Microbial Diversity
(Course Code MB1209 w.e.f.2021-2022)
MODEL QUESTION BANK

UNIT – I

Essay questions

1. Discuss the various contributions of Louis Pasteur and Edward Jenner.
2. Write about the classification of microorganisms.
3. Explain about the importance and applications of microbiology.

Short answer questions

1. Robert Koch.
2. History of microbiology.
3. Three domain concept of Carl Woese.

UNIT – II

Essay questions

1. Write in detail about the structure of prokaryotic cell.
2. Explain about the Berger's manual of systematic bacteriology
3. Write about the general characteristics of cyano bacteria and mycoplasma.

Short answer questions

1. Replication of TMV.
2. Archaea.
3. Structure of HIV.

UNIT – III

Essay questions

1. General characteristics and classification of algae.
2. Explain about SEM and TEM
3. General characteristics and classification of fungi.

Short answer question

1. Bright field microscopy.
2. Protozoa – characteristics.

UNIT – IV

Essay questions

1. Explain different staining techniques.
2. Essay on physical sterilization methods.
3. Essay on chemical sterilization methods.

Short answer question

1. Short notes on UV rays.
2. Short notes on Gram's staining technique.
3. Short notes on Autoclave.

UNIT – V

Essay question

1. Essay on pure culture techniques.
2. Essay on preservation of microbial cultures.
3. Essay on isolation of microorganisms from natural habitats.

Short answer questions

1. Spread plate technique
2. Lyophilization.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
I B.Sc., Microbiology - Practical Examinations
Paper I model at the end of I Semester (w.e.f. 2020-2021)
Introduction to Microbiology and microbial diversity (MB1209P)
Time: 1½ Hrs. Max. Marks: 25

1. Identify the given organism 'A' by Gram staining technique. 15 M

Scheme for valuation:

Preparation of slide (07M) + Description (5M) + Result (3M)

2. Record + Viva voce

5+5 = 10 M

Total = 25 M

25 MARKS FOR CCA

MODEL PAPER BLUE PRINT FOR THE QUESTION PAPER SETTER

COURSE MB1209: INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY

Chapter	Short answer Questions	Essay Questions	Marks allotted to the Module
UNIT – I	1	1	15
UNIT – II	2	1	20
UNIT – III	1	1	15
UNIT – IV	2	1	20
UNIT – V	1	1	15
Total marks allotted to all questions including choice =			85

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

I B.Sc., – Microbiology / II Semester End (w.e.f. 2021-2022)

Introduction to Microbial Biochemistry and Metabolism

(Course: MBT2209)

Total Hrs. of Teaching-Learning: 60 @ 4 h / Week

Total Credits: 04

Learning objectives:

1. To give thorough knowledge on biomolecules and their characterization/quantification.
2. To endow with basics of Enzymology and nutrition and Metabolism in microbes.

Learning out-comes:

1. Student can characterize different biomolecules and estimation them through instrumentation.
2. Learner will be able to explain nutrition and metabolism in microbes.

UNIT – I: BIOMOLECULES

12 Hrs

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

UNIT – II: INSTRUMENTATION TECHNIQUES

08 Hrs

1. Principle and applications of - Calorimetry
2. Chromatography (paper, thin-layer and affinity chromatography)
3. Spectrophotometry (UV & visible). Centrifugation

UNIT – III: BASICS OF ENZYMOLOGY

12 Hrs

1. Properties and classification of Enzymes. Bio catalysis- induced fit and lock and key models.
2. Role of Coenzymes and Cofactors in enzyme activity. Factors affecting catalytic activity of enzymes.
3. Inhibition of enzyme activity- competitive, noncompetitive, uncompetitive and allosteric.

UNIT – IV: NUTRITION AND GROWTH OF MICROBES

14 Hrs

1. Microbial Nutrition –Nutritional requirements and uptake of nutrients by cells. Nutritional groups of microorganisms- autotrophs, heterotrophs, mixotrophs.
2. Growth media- synthetic, complex, selective, enrichment and differential media.
3. Microbial Growth- different phases of growth in batch cultures, Synchronous, continuous, biphasic growth. Factors influencing microbial growth.
4. Methods for measuring microbial growth – Direct microscopy, viable count estimates, turbidometry and biomass.

UNIT – V: METABOLISM

12 Hrs

1. Aerobic respiration - Glycolysis, HMP path way, ED path way, TCA cycle, Electron transport, oxidative and substrate level phosphorylation. Anaerobic respiration (Nitrate).
2. Fermentation - Alcohol and lactic acid fermentations.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

I B.Sc – I Semester - Microbiology Practical Syllabus

(w.e.f. 2021-2022)

Introduction to Microbial Biochemistry and Metabolism

(Course: MB2209P)

Total Hrs. of Practical's: 30 @ 2 h / Week

Total Credits: 01

PRACTICAL SYLLABUS

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 / 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 READINGS:

1. Lehninger, A.L., Nelson, D.L. and Cox, M.M. (1993). Principles of Biochemistry, 2 nd Edition, CBS Publishers and Distributors, New Delhi.
2. Prescott, M.J., Harley, J.P. and Klein, D.A. (2010). Microbiology. 5th Edition, WCB Mc GrawHill, NewYork.
3. Reddy, S.R. and Reddy, S.M. (2004). Microbial Physiology, Scientific Publishers, Jodhpur, India.
4. Sashidhara Rao, B. and Deshpande, V. (2007). Experimental Biochemistry: A student Companion. I.K. International Pvt. Ltd. India Pvt. Ltd., New Delhi.
5. 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 3rd edition, John Wiley and Sons
- White, D. (1995). The Physiology and Biochemistry of Prokaryotes, Oxford University Press, New York.
6. Willey MJ, Sherwood, LM & Woolverton C J (2013) Prescott, Harley and Klein's Microbiology by.9th Ed., McGrawHill

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
I year B.Sc., Program II Semester End
Microbiology I B: Introduction to Microbial Biochemistry and Metabolism
(Course Code MBT 2209 w.e.f.2021-2022)

Time: 2½ hours

Max marks: 50M

SECTION – A

Answer ANY THREE of the following questions. Draw labeled diagrams wherever necessary

3X10=30 M

1. Write an essay on general characteristics of carbohydrates.
2. Write in detail about the principle and applications of colorimetry.
3. Discuss the properties and classification of Enzymes.
4. Explain in detail about nutritional groups of microorganisms.
5. Write an essay on Glycolysis.

SECTION – B

Answer any four of the following questions

4 X 5 = 20 M

6. Phospholipids
7. Paper chromatography
8. Cofactors
9. Factors influencing microbial growth
10. ED path way
11. Amino acids
12. Allosteric inhibition
13. Substrate level phosphorylation

MODEL QUESTION BANK

Unit – I

Essay question

1. Essay on general characteristics and classification of carbohydrates.
2. Explain about the structure of nitrogenous bases and nucleotides.
3. Write about the general characteristics of amino acids.

Short answer questions

1. Phospholipids
2. Disaccharides
3. Proteins – characteristics.
4. Sphingolipids.

Unit – II

Essay questions?

1. Write in detail about principle and applications of calorimetry.
2. Explain about affinity chromatography.
3. Write about the principle and applications of spectrophotometry.

Short answer questions

1. Paper chromatography
2. Centrifugation

Unit – III

Essay questions

1. Discuss the properties and classification of enzymes.
2. Write about the types of enzyme inhibition.
3. Explain about the induced fit and lock and key model of enzyme catalysis.
4. Essay on factors affecting catalytic activity of enzymes.

Short answer questions

1. Cofactors in enzyme activity.
2. Biocatalysis.
3. Allosteric inhibition

Unit – IV

Essay question

1. Explain in detail about nutritional groups of microorganisms.
2. Write about the methods involved in the measurement of microbial growth.
3. Explain about the oxygenic and anoxygenic photosynthesis in bacteria.
4. Write about the nutritional requirement and uptake of nutrients by cell.

Short answer questions

1. Selective media
2. Synchronous cultures.
3. Enrichment media.
4. Factors influencing microbial growth.

Unit – V

Essay questions

1. Write essay on glycolysis
2. Write about the alcohol and lactic acid fermentation
3. Explain about the electron transport and oxidative phosphorylation.

Short answer questions

1. ED path way.
2. Nitrate respiration.
3. TCA cycle.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

I B.Sc., Microbiology - Practical Examinations

Paper I Model at the end of II Semester (w.e.f. 2021-2022)

Introduction to Microbial Biochemistry and Metabolism (MB2209P)

Time: 1½ Hrs.

Max. Marks: 25

1. Qualitative analysis of chemical 'A'. 15 M

Scheme for valuation:

Conduct of experiment (07M) + procedure (5M) + Result (3M)

2. Record + Viva voce

5 +5 = 10 M

TOTAL = 25 M

25 MARKS FOR CCA

MODEL PAPER BLUE PRINT FOR THE QUESTION PAPER SETTER

COURSE MB2209: INTRODUCTION TO MICROBIAL BIOCHEMISTRY AND METABOLISM

Module No./Title	Short answer Questions	Essay Questions	Marks allotted to the Module
UNIT - I	1	1	15
UNIT - II	2	1	20
UNIT -III	1	1	15
UNIT - IV	2	1	20
UNIT - V	1	1	15
Total marks allotted to all questions including choice =			85

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

II B.Sc., – Microbiology / III Semester End (W.E.F. 2020-2021)

Microbial Genetics and Molecular biology (Course: MBT3209)

Total Hrs. of Teaching-Learning: 60 @ 4 h / Week

Total Credits: 03

UNIT - I **12hrs**

DNA and RNA as genetic material.

Structure and organization of prokaryotic DNA.

Extra chromosomal genetic elements – Plasmids and Transposons in bacteria.

Replication of DNA – Semi conservative mechanism, Enzymes involved in replication.

UNIT - II **10hrs**

Mutations – spontaneous and induced, base pair changes, frame shifts, deletions, inversions, tandem duplications, insertions.

Mutagens - Physical and Chemical mutagens. Outlines of DNA damage and repair mechanisms.

Genetic recombination in bacteria – Conjugation, Transformation and Transduction.

UNIT - III **10hrs**

Types of RNA and their functions. Genetic code.

Structure of ribosomes.

16S r-RNA Strain Identification

UNIT - IV **08hrs**

Types of genes – structural, constitutive, regulatory Protein synthesis – Transcription and translation.viral replication-CRISPR-Cass

Regulation of gene expression in bacteria – lac operon.

UNIT - V **10hrs**

Basic principles of genetic engineering. Restriction endonucleases, DNA polymerases and ligases. Vectors like Pbr 322, M13.

Outlines of gene cloning methods.

Polymerase chain reaction. Genomic and cDNA libraries.

General account on application of genetic engineering in industry, agriculture and medicine.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II Year B.Sc., Program III Semester End
Microbiology II A: Microbial Genetics and Molecular Biology
(Course Code MB3209 W.E.F. 2020-2021)

Time :21/2 Hours

Max Marks :60M

SECTION - A

Answer all the following questions

5x2=10 Marks

1. Topoisomerases
2. Base analogue
3. Monocistronic RNA
4. Pribnow box
5. Ligase

SECTION – B

Answer Four questions

4x5 =20 Marks

1. Transposons
2. RNA as genetic material
3. Physical mutagens
4. DNA damage
5. Regulatory genes
6. Transcriptional factors
7. DNA polymerases
8. Genomic libraries

SECTION - C

Answer ANY THREE of the following questions. Draw labeled diagrams wherever necessary

3x10=30 Marks

1. Briefly describe the structure of Prokaryotic DNA
2. Write about DNA repair mechanisms
3. Explain the properties of Genetic code
4. Give a brief note on Translation mechanism in Prokaryotes
5. Write about the steps in gene cloning

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II Year B.Sc., Program III Semester End
Microbiology II A: Microbial Genetics and Molecular Biology
(Course Code MB3209 W.E.F. 2020-2021)
MODEL QUESTION BANK

Unit – I

Essay questions

1. Write an essay on semi conservative mechanism of DNA replication.
2. Write an essay on structure and organization of prokaryotic DNA.
3. Write an essay on enzymes involved in DNA replication

Short answer questions

1. Short notes on transformation experiment.
2. RNA as genetic material
3. DNA polymerases – types.
4. Blender experiment.

Very short questions

1. Topoisomerases
2. Transposons.

Unit – II

Essay questions

1. Essay on genetic recombination in bacteria.
2. Essay on types of mutations
3. Essay on Physical and chemical mutagens.

Short answer questions

1. Short notes on DNA damage
2. Short notes on conjugation
3. Base pair changes.

Very short questions

1. Spontaneous mutations
2. Transduction
3. Inversions.

Unit – III

Essay questions

1. Essay on types of RNA and their functions.
2. Essay on Genetic code.

Short answer questions

1. Short notes on structure of ribosome.
2. Short notes on t-RNA.

3. Wobble hypothesis.

Very short questions

1. m-RNA and r-RNA.
2. Initiation codon and stop codon.

Unit-IV

Essay questions

1. Define translation and explain steps involved in translation with neat labeled diagrams.
2. Essay on lac Operon.
3. Write an essay on steps involved in Transcription process.

Short answer questions

1. Regulatory genes.
2. Transcriptional factors.
3. Structural genes.

Very short answer questions

1. Pribnow box and sigma factor
2. Constitutive genes.

Unit – V

1. Write an essay on steps in gene cloning methods.
2. Applications of genetic engineering in industry, agriculture and medicine.
3. Essay on types of restriction endonucleases with their functions.

Short answer questions

1. Genomic DNA libraries.
2. Short notes PCR.
3. Ligases and restriction endonucleases.

Very short questions

1. Define plasmids.
2. Define cosmids
3. DNA polymerases.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

II year B.Sc., Program III Semester End Practical Syllabus

MBP- 3209 MICROBIAL GENETICS AND MOLECULAR BIOLOGY

TOTAL HOURS: 48

CREDITS: 2

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, Trans illuminator, RT-PCR
10. Plasmid DNA Isolation

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P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

II B.Sc., Microbiology - Practical Examinations

Paper II model at the end of III Semester (W.E.F. 2020-2021)

MICROBIAL GENETICS AND MOLECULAR BIOLOGY (MB3209P)

Time: 2 Hrs.

Max. Marks: 35

1. Isolation of Genomic DNA of E.coli 'A' 10 M

Scheme for valuation:

Conduct of experiment (05M) + procedure (3M) + Result (2M)

2. Description of the Instrument 'B' 05 M

Scheme for valuation:

Principle (2M) + Description (3M)

3. Identify and write notes on the following 5 x 2 = 10 M

C-

D-

E-

F-

G-

Scheme for valuation: Identification (1M) + Reasons (2M)

4. Record + Viva voce 6 + 4 = 10 M

Total = 35 M

15 MARKS FOR CCA

MODEL BLUE PRINT FOR THE QUESTION PAPER SETTER

Course MB-3209: Microbial genetics and Molecular Biology

Module No. / Title	Very Short Answer Questions	Short Answer Questions	Essay Questions	Marks allotted to the Module
UNIT-I	1	2	1	22
UNIT-II	1	2	1	22
UNIT-III	1	1	1	17
UNIT-IV	1	1	1	17
UNIT-V	1	2	1	22
Total marks allotted to all questions including choice =				100

Note: Question paper setters are requested to adhere strictly to the above blue print While preparing the said paper

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

II year B.Sc., Program IV Semester End 2020-2021

IV SEMESTER: B.Sc., MICROBIOLOGY

MBT- 4209 IMMUNOLOGY AND MEDICAL MICROBIOLOGY

TOTAL HOURS: 60

CREDITS: 3

UNIT – I: IMMUNOLOGY BASICS 12H

- ❖ Types of immunity – innate and acquired; active and passive; humoral and cell-mediated immunity.
- ❖ Primary and secondary organs of immune system – thymus, bursa fabricus, bone marrow, spleen and lymph nodes.
- ❖ Cells of immune system.
- ❖ Identification and function of B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils and eosinophils.

UNIT – II: ANTIGEN & ANTIBODIES 12H

- ❖ Antigens – types, chemical nature, antigenic determinants, happens. Factors affecting antigenicity.
- ❖ Antibodies – basic structure, types, properties and functions of immunoglobulin's. Types of antigen-antibody reactions - Agglutinations, Precipitation, Neutralization, complement fixation, blood groups.
- ❖ Labeled antibody based techniques – ELISA, RIA and Immunofluorescence. Monoclonal antibodies – production and applications.

UNIT – III: MICROBIOLOGY CONCEPTS 12H

- ❖ Normal flora of human body.
- ❖ Host pathogen interactions: infection, invasion, pathogen, pathogenicity, virulence and opportunistic infection, General account on nosocomial infection.
- ❖ General principles of diagnostic microbiology- collection, transport and processing of clinical samples.
- ❖ General methods of laboratory diagnosis - cultural, biochemical, serological and molecular methods.

UNIT – IV: MICROBIOLOGY- APPLICATIONS 12H

- ❖ Antibacterial Agents- Penicillin, Streptomycin and Tetracycline. Antifungal agents – Amphotericin B, Griseofulvin
- ❖ Antiviral substances - Amantadine and Acyclovir Tests for antimicrobial susceptibility.
- ❖ Brief account on antibiotic resistance in bacteria - Methicillin-resistant Staphylococcus aureus (MRSA).
- ❖ Vaccines – Natural and recombinant.

UNIT – V: MICROBES AND DISEASES 12H

- ❖ General account on microbial diseases – causal organism, pathogenesis, epidemiology, diagnosis, prevention and control
- ❖ Bacterial diseases – Tuberculosis and Typhoid
- ❖ Fungal diseases – Candidiasis. Protozoal diseases – Malaria. Viral Diseases - Hepatitis- A Ebola, Corona, MERS, SARS and AIDS

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II year B.Sc., Program IV Semester End
Microbiology IIB: Immunology and Medical Microbiology
(Course Code MB 4209 W.E.F. 2020-2021)

Time: 2½ hours

Max. Marks:60

SECTION – A

Answer all the following questions

5 X 2 = 10 M

1. Basophils
2. Hapten
3. Nosocomial infection
4. Acyclovir
5. Typhoid antigen

SECTION – B

Answer any FOUR questions

4X 5 = 20 M

1. Cell Mediated Immunity
2. Macrophages and its function
3. Factors affecting antigenicity
4. Applications of Monoclonal antibodies
5. Serological methods
6. Tests for antimicrobial susceptibility
7. MRSA
8. Malaria

SECTION – C

Answer ANY THREE of the following Questions. Draw labeled diagrams wherever necessary

3 X 10 = 30 M

1. Describe about Primary organs of Immune system.
2. Explain about any two antigen and antibody reactions
3. Write about the general methods laboratory diagnosis.
4. Briefly describe about antibacterial substances with its mode of action.
5. Give an account on causative organism, pathogenesis, diagnosis, prevention of Tuberculosis

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II year B.Sc., Program IV Semester End
Microbiology IIB: Immunology and Medical Microbiology
(Course Code MB 4209 W.E.F. 2020-2021)
MODEL QUESTION BANK

Unit – I

Essay questions.

1. Essay on cells of immune systems.
2. Essay on types immunity.
3. Essay on secondary lymphoid organs.

Short answer questions.

1. Short notes on primary lymphoid organs.
2. B and T lymphocytes.
3. Structure and functions of macrophages.

Very short answer questions.

1. Monocytes.
2. Bone marrow.
3. Spleen.

Unit – II

Essay answer questions

1. Essay on types of antigen – antibody interactions.
2. Essay on production and applications of monoclonal antibodies.
3. Essay on types of immunoglobulins and their functions.

Short answer questions

1. RIA
2. ELISA
3. Complement fixation.

Very short answer questions

1. Hapten
2. Antigen – types
3. Blood groups.

Unit – III

Essay answer questions

1. Write about the general methods of laboratory diagnosis.
2. Explain about the Host – Pathogen interactions.
3. Write notes on principles of diagnostic microbiology.

Short answer questions

1. Normal flora of human body
2. Nosocomial infection.
3. Serological methods.

Very short answer questions

1. Pathogenicity.
2. Transport of clinical samples.
3. Short notes molecular methods.

Unit – IV

Essay questions

1. Write about the antibacterial agents and its mode of action.
2. Explain about the natural and recombinant vaccines.
3. Write about the antifungal agents and its mode of action.

Short answer questions

1. MRSA.
2. Tests for anti-microbial susceptibility.
3. Amantadine.

Very short questions

1. Acyclovir.
2. Penicillin
3. Amphotericin – B

Unit – V

Essay questions

1. Give an account on organism, pathogenesis, diagnosis and prevention of tuberculosis.
2. Write about malarial life cycle.
3. Explain about the AIDS – pathogenesis, diagnosis, prevention and control.

Short answer questions

1. Typhoid antigen.
2. Candidiasis.
3. Hepatitis – A

Very short answer questions

1. AIDS
2. Tuberculosis.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

II year B.Sc., Program III Semester End Practical Syllabus

MBP- 4209P IMMUNOLOGY AND MEDICAL MICROBIOLOGY

TOTAL HOURS: 48

CREDITS: 2

PRACTICAL SYLLABUS

1. Identification of human blood groups.
2. Separate serum from the blood sample (demonstration).
3. Estimation of blood hemoglobin.
4. Total Leukocyte Count of the given blood sample.
5. Differential Leukocyte Count of the given blood sample.
6. Immunodiffusion by Ouchterlony method.
7. Identify bacteria (*E. coli*, *Pseudomonas*, *Staphylococcus*, *Bacillus*) using laboratory strains on the basis of cultural, morphological and biochemical characteristics: IMViC, urease production and catalase tests
8. Isolation of bacterial flora of skin by swab method.
9. Antibacterial sensitivity by Kirby-Bauer method
10. Study of various stages of malaria parasite in RBCs using permanent mounts.

REFERENCE BOOKS

- ❖ Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.
- ❖ Ananthanarayan R. and Paniker C.K.J. (2009) Textbook of Microbiology. 8th edition, University Press Publication
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P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

II B.Sc., Microbiology - Practical Examinations

Paper II Model at the end of IV Semester (w.e.f. 2020-2021)

IMMUNOLOGY AND MEDICAL MICROBIOLOGY (MB4209P)

Time: 2 Hrs.

Max. Marks: 35

1. Major Experiment- 'A' (Immunology/Medical microbiology) 10 M

Scheme for valuation:

Conduct of experiment (05M) + procedure (3M) +Result (2M)

2. Major Experiment- 'B' (Immunology/Medical microbiology) 05 M

Scheme for valuation:

Principle (2M) + Description (3M)

3. Identify and write notes on the following 5 x 2 = 10 M

C-

D-

E-

F-

G-

Scheme for valuation:

Identification (1M) + Reasons (2M)

4. Record + Viva voce 6 + 4 = 10 M

TOTAL = 35 M

15 MARKS FOR CCA

MODEL BLUE PRINT FOR THE QUESTION PAPER SETTER

COURSE MB-4209: IMMUNOLOGY AND MEDICAL MICROBIOLOGY

Module No. / Title	Very Short Answer Questions	Short Answer Questions	Essay Questions	Marks allotted to the Module
UNIT – I: IMMUNOLOGY BASICS	1	2	1	22
UNIT – II: ANTIGEN & ANTIBODIES	1	2	1	22
UNIT – III: MICROBIOLOGY CONCEPTS	1	1	1	17
UNIT – IV: MICROBIOLGY-APPLICATIONS	1	2	1	22
UNIT – V: MICROBES AND DISEASES	1	1	1	17
Total marks allotted to all questions including choice =				100

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc Program V - Semester End

V - SEMESTER: B.Sc - MICROBIOLOGY

MBT- 5209 ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY

TOTAL HOURS: 60@ 3h/Week

CREDITS: 3

UNIT – I **8H**

- ❖ Terrestrial Environment: Soil profile and soil micro flora
- ❖ Aquatic Environment: Micro flora of fresh water and marine habitats Atmosphere: Aero microflora and dispersal of microbes

UNIT – II **8H**

- ❖ Role of microorganisms in nutrient cycling (Carbon, nitrogen, phosphorus).
- ❖ Treatment and safety of drinking (potable) water, methods to detect portability 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 **6H**

- ❖ 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 **7H**

- ❖ Plant Growth Promoting Microorganisms - Mycorrhizae, Rhizobia, Azospirillum, Azotobacter, Frankia,
- ❖ phosphate-solubilizes and Cyanobacteria.
- ❖ Outlines of biological nitrogen fixation (symbiotic, non-symbiotic). Bio fertilizers Rhizobium.

UNIT – V **7H**

- ❖ 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.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc., Program, V-Semester End

Microbiology V: MBT- 5209 Environmental & Agricultural Microbiology

Time: 2½ hours

Max. Marks: 60M

SECTION – A

Answer all the following questions

5 X 2 = 10 M

1. Soil Profile
2. Predation
3. Sewage sludge
4. Leg Hemoglobin
5. Necrosis

SECTION – B

Answer any FOUR questions

4X 5 = 20 M

1. Micro flora of marine habitats
2. Aeromicroflora
3. Phosphorus Cycle
4. Mutualism
5. BOD
6. Sanitary land fills
7. Cyanobacteria
8. Citrus Canker

SECTION – C

Answer ANY THREE of the following Questions. Draw labeled diagrams wherever necessary

3 X 10 = 30 M

1. Write an account on Soil micro flora
2. Write an essay on role of microorganisms in carbon
3. Explain about methods of solid waste disposal
4. Write an essay on phosphate Solubilizing Microorganism.
5. Describe about symptoms of plant diseases caused by fungi

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., Program, V-Semester End
Microbiology V: MBT- 5209 Environmental & Agricultural Microbiology
MODEL QUESTION BANK

Unit – I

Essay answer questions

1. Explain soil microflora and soil profile.
2. Essay on micro flora of fresh water and marine habitats.

Short answer questions

1. Short notes aero micro flora.
2. Short notes on dispersal of microbes.

Very short answer questions

1. Terrestrial environment.
2. Aquatic environment.

Unit – II

Essay answer questions

1. Methods to detects the potability of drinking water.
2. Essay on microbial interactions.

Short answer questions

1. Short notes on carbon cycle
2. Short notes on nitrogen cycle.
3. Phosphorous cycle.
4. Treatment and safety of drinking water.

Very short questions

1. Predation and competition.
2. MPN test.
3. Antagonism.

Unit – III

Essay questions

1. Essay on Methods of solid waste disposal.
2. Essay on primary, secondary and tertiary sewage treatment.

Short answer questions

1. BOD and COD.
2. Types of solid waste.
3. Activated sludge process.

Very short questions

1. Liquid waste management.
2. Oxidation ponds and trickling filters.

Unit – IV

Essay questions

1. Essay on plant growth promoting microorganisms.
2. Outlines of biological nitrogen fixation.

Short answer questions

1. Phosphate solubilizers.
2. Cyanobacteria.
3. Biofertilizers.

Very short questions

1. Mycorrhizae.
2. Frankia and leghemoglobin.
3. Azospirillum

Unit – V

Essay questions

1. Essay on plant diseases – Citrus canker and tomato leaf curl.
2. Essay on plant diseases caused by fungi, bacteria with one example each.

Short answer questions.

1. Concept of diseases in plants.
2. Ground nut rust.
3. Plant diseases control – Principles.

Very short answer question

1. Tomato leaf curl.
2. Necrosis.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
Year B.Sc., Program V Semester End Practical syllabus
MBP- 5209 ENVIRONMENT AND AGRICULTURAL MICROBIOLOGY
TOTAL HOURS: 48 **CREDITS: 2**

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 Petri plate 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, Bheni 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
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P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III B.Sc., Microbiology - Practical Examinations
Paper III model at the end of V Semester (w.e.f. 2020-2021)
Environment and Agricultural microbiology (MB5209P)

Time: 2 Hrs.

Max. Marks: 35

1. Major Experiment- 'A' 10 M

Scheme for valuation:

Conduct of experiment (05M) + procedure (3M) +Result (2M)

2. Major Experiment- 'B' 05 M

Scheme for valuation:

Principle (2M) + Description (3M)

3. Identify and write notes on the following 5 X 2 = 10 M

C-

D-

E-

F-

G-

Scheme for valuation:

Identification (1M) + Reasons (2M)

4. Record + Viva voce 6 +4 = 10 M

TOTAL = 35 M

15 MARKS FOR CCA

MODEL BLUE PRINT FOR THE QUESTION PAPER SETTER

COURSE MB-5209: ENVIRONMENT AND AGRICULTURAL MICROBIOLOGY

Module No. / Title	Very Short Answer Questions	Short Answer Questions	Essay Questions	Marks allotted to the Module
UNIT-I	1	2	1	22
UNIT-II	1	2	1	22
UNIT-III	1	1	1	17
UNIT-IV	1	2	1	22
UNIT-V	1	1	1	17
Total marks allotted to all questions including choice =				100

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc Program V-Semester End

V-SEMESTER: B.Sc., MICROBIOLOGY

MBT-6209 FOOD AND INDUSTRIAL MICROBIOLOGY

TOTAL HOURS: 60@ 3h/Week

CREDITS: 3

UNIT – I **8H**

- ❖ 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 **7H**

- ❖ 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 **6H**

- ❖ 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 **8H**

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

UNIT – V **7H**

- ❖ Microbial production of Industrial products - Citric acid, Ethanol, amylases, penicillin, glutamic acid and vitamin B12.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc., Program V-Semester End

Microbiology V: MBT- 6209 Food and Industrial Microbiology

Time: 2½ hours

Max. Marks:60

SECTION – A

Answer all the following questions

5 X 2 = 10 M

1. Food Intoxication
2. Drying
3. Yeast
4. Impellor
5. Uses of vitamin B12

SECTION – B

Answer any FOUR questions

4 X 5 = 20 M

1. Intrinsic Parameters
2. Botulism
3. Yoghurt
4. Edible Mushrooms
5. Strain improvement
6. Moulds
7. Solvent Extraction
8. Glutamic Acid

SECTION – C

Answer ANY THREE of the following Questions. Draw labeled diagrams wherever necessary

3 X 10 = 30 M

1. Write an account on Food Spoilage
2. Explain about Probiotics
3. Describe briefly about Industrial Important Microorganisms
4. Write an essay on Types of Fermentation
5. Write an essay on production of Penicillin

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., Program V-Semester End
Microbiology V: MBT- 6209 Food and Industrial Microbiology
MODEL QUESTION BANK

Unit – I

Essay questions

1. Write an account of food spoilage.
2. Explain about the microbial spoilage of fruits, meat and egg.
3. Essay on food born diseases and their detection.

Short answer questions

1. Botulism.
2. Intrinsic parameters.
3. Salmonellosis.

Very short questions

1. Canned foods.
2. Food intoxication.
3. E.Coli

Unit – II

Essay questions.

1. Explain about probiotics and their benefits.
2. Write about the food preservation methods.
3. Explain about the production of dairy foods – Cheese and yogurt.

Short answer question

1. Edible mushrooms.
2. SCP.
3. Lyophilization

Very Short answer questions

1. Drying.
2. Chlorides

Unit – III

Essay questions

1. Describe briefly about industrial importance of microorganisms.
2. Write about screening and strain improvement of industrial important microbes
3. Essay on structure and reproduction of yeast.

Short answer questions

1. Moulds.

2. Isolation of microorganisms
3. Actinomycetes.

Very short questions

1. Yeast
2. E.coli
3. Primary screening

Unit – IV

1. Write an essay on types of fermentation
2. Explain about the downstream processing in fermentation.
3. Write about design of fermentor.

Short answer questions

1. Fermentation media
2. Solvent extraction
3. Solid state fermentation.
4. Centrifugation.

Very short answer question

1. Impeller.
2. Filtration
3. Batch fermentation.

Unit – V

Essay questions

1. Write an essay on production of Penicillin.
2. Explain about the process involved in the production of vitamin B 12 and glutamic acid.
3. Essay on steps involved in ethanol production.

Short answer questions

1. Glutamic acid
2. Citric acid.
3. Amylases.

Very short answer question

1. Uses of Vitamin B12
2. Yeast.
3. Aspergillus niger.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc., Program V-Semester End Practical Syllabus

MBP- 6209 Food and Industrial Microbiology

TOTAL HOURS: 48

CREDITS: 2

PRACTICAL SYLLABUS

1. Isolation of bacteria and fungi from spoiled bread/fruits/vegetables
2. Preparation of Yogurt/Dahi
3. Determination of the microbiological quality of milk sample by MBRT
4. Isolation of antagonistic microorganisms by crowded plate technique
5. Design of Fermenter (identification of diagrams of various types of Fermenters and labeling of parts)
6. Microbial fermentation for the production and estimation of ethanol from Grapes.
7. 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 West off 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. 7th 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

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III B.Sc Microbiology - Practical Examinations

Paper III Model at the end of V-Semester (w.e.f. 2020-2021)

FOOD AND INDUSTRIAL MICROBIOLOGY (MB6209P)

Time: 2 Hrs.

Max. Marks: 35

1. Major Experiment- 'A' 10 M

Scheme for valuation:

Conduct of experiment (05M) + procedure (3M) +Result (2M)

2. Major Experiment- 'B' 05 M

Scheme for valuation:

Principle (2M) + Description (3M)

3. Identify and write notes on the following 5 X 2 = 10 M

C-

D-

E-

F-

G-

Scheme for valuation:

Identification (1M) + Reasons (2M)

4. Record + Viva voce 6 + 4 = 10 M

TOTAL = 35 M

15 MARKS FOR CCA

MODEL BLUE PRINT FOR THE QUESTION PAPER SETTER

COURSE MB-6209: FOOD AND INDUSTRIAL MICROBIOLOGY

Module No. / Title	Very Short Answer Questions	Short Answer Questions	Essay Questions	Marks allotted to the Module
UNIT-I	1	2	1	22
UNIT-II	1	2	1	22
UNIT-III	1	1	1	17
UNIT-IV	1	2	1	22
UNIT-V	1	1	1	17
Total marks allotted to all questions including choice =				100

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc Program, VI-Semester End

VI SEMESTER: B.Sc MICROBIOLOGY

MBT- 7209 MICROBIAL BIOTECHNOLOGY

TOTAL HOURS: 60@ 3h/Week

CREDITS: 3

UNIT – I **8H**

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

UNIT – II **7H**

- ❖ 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 **10H**

- ❖ 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 **7H**

- ❖ 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 xenobiotic.
- ❖ Mineral recovery, removal of heavy metals from aqueous effluents.

UNIT – V **4H**

- ❖ Outlines of Intellectual Property Rights: Patents, Copyrights, Trademarks

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc., Program VI-Semester End

Microbiology: MBT- 7209 MICROBIAL BIOTECHNOLOGY

Time: 2½ hours

Max. Marks: 60

SECTION – A

Answer all the following questions

5 X 2 = 10 M

1. PGPR
2. Bioplastics
3. Sterols
4. Xenobiotics
5. Copyrights

SECTION – B

Answer any FOUR questions

4 X 5 = 20 M

1. Bio fertilizers
2. Yeast
3. Biosensors
4. Hepatitis B Vaccine
5. Whole cell Immobilization
6. Bioremediation
7. Copy rights
8. Algal biomass production

SECTION – C

Answer ANY THREE of the following Questions. Draw labeled diagrams wherever necessary

3 X 10 = 30 M

1. Write an account on genetically engineered microorganisms.
2. Explain about production and application microbial polysaccharides
3. Give an account on production of fructose syrup
4. Write an essay on degradation of xenobiotics
5. Write an essay on Trademarks

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., Program VI-Semester End
Microbiology: MBT- 7209 MICROBIAL BIOTECHNOLOGY
MODEL QUESTION BANK

Unit – I

Essay questions

1. Write an account on genetically engineered microbes.
2. Explain about scope and its applications in human therapeutics and agriculture.
3. Write about the applications in environmental and food technology.

Short answer questions

1. Bio fertilizers.
2. Yeast
3. PGPR.

Very short answer questions

1. Mycorrhizae.
2. Bacteria.
3. Therapeutic.

Unit – II

Essay questions

1. Explain about production and applications of microbial polysaccharides.
2. Write a note recombinant microbial production in pharmaceutical industries.

Short answer questions

1. Bioplastics.
2. Microbial biosensors.
3. Hepatitis B vaccine

Very short questions

1. Streptokinase
2. Recombinant vaccine

Unit – III

1. Write an account on production of high fructose syrup.
2. Explain about the microbial transformation of steroid and sterols.
3. Write about the immobilization methods and their applications.

Short answer questions

1. Whole cell immobilization.
2. Cocoa butter substitute.
3. Sterols.

Very short questions

1. Bio catalytic process.
2. Steroids.

Unit – IV

Essay questions

1. Write an essay on degradation of xenobiotics.
2. Explain about the production of bioethanol and biodiesel.
3. Write about mineral recovery process.
4. Explain about the production of biogas.

Short answer question

1. Bioremediation.
2. Algal biomass production
3. Aqueous effluents.

Very short answer questions

1. Xenobiotics.
2. Lingo cellulosic waste.
3. Methane.

Unit – V

Essay questions

1. Write an essay on trade marks.
2. Explain about the IPR.

Short answer questions

1. Copy rights.
2. Short notes on IPR.

Very short answer question

1. Patent.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., Program VI-Semester End Practical Syllabus
MBP- 7209 MICROBIAL BIOTECHNOLOGY

TOTAL HOURS: 48

CREDITS: 2

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 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, 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), 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.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III B.Sc., Microbiology - Practical Examinations
Elective Paper Model at the end of VI-Semester (w.e.f. 2020-2021)
MICROBIAL BIOTECHNOLOGY (MB7209P)

Time: 2 Hrs.

Max. Marks: 35

1. Major Experiment- 'A' 10 M

Scheme for valuation:

Conduct of experiment (05M) + procedure (3M) +Result (2M)

2. Major Experiment- 'B' 05 M

Scheme for valuation:

Principle (2M) + Description (3M)

3. Identify and write notes on the following 5 X 2 = 10 M

C-

D-

E-

F-

G-

Scheme for valuation:

Identification (1M) + Reasons (2M)

4. Record + Viva voce 6 +4 = 10 M

TOTAL = 35 M

15 MARKS FOR CCA

MODEL BLUE PRINT FOR THE QUESTION PAPER SETTER

COURSE MB-7209: MICROBIAL BIOTECHNOLOGY

Module No. / Title	Very Short Answer Questions	Short Answer Questions	Essay Questions	Marks allotted to the Module
UNIT-I	1	2	1	22
UNIT-II	1	2	1	22
UNIT-III	1	1	1	17
UNIT-IV	1	2	1	22
UNIT-V	1	1	1	17
Total marks allotted to all questions including choice =				100

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

THIRD YEAR – SEMESTER- VI

CLUSTER PAPERS UNDER ELECTIVE 8209 (8209A, 8209B & 8209C) MBT- 8209

A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS

TOTAL HOURS: 60hrs@3hrs per week

CREDITS: 3

UNIT – I **8H**

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

UNIT – II **8H**

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

UNIT – III **8H**

- ❖ 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 **6H**

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

UNIT – V **6H**

- ❖ 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

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., Program VI-Semester End
Microbiology: MBT- 8209 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS
Time: 2½ hours **Max. Marks:60**

SECTION – A

Answer all the following questions **5 X 2 = 10 M**

1. Typhoid antigen
2. CSF
3. Blood agar
4. Agglutination
5. MIC

SECTION – B

Answer any FOUR questions **4 X 5 = 20 M**

1. Candidiasis
2. Throat samples
3. HIV
4. Skin samples
5. Mac conkey agar
6. Swine flu
7. Disc diffusion method
8. Dengue

SECTION – C

Answer ANY THREE of the following Questions. Draw labeled diagrams wherever necessary **3 X 10 = 30 M**

1. Give a brief note on tuberculosis
2. Write an account on methods of transport of clinical samples
3. Explain about Principle and procedure of Gram staining technique
4. Give an account on Nucleic acid probes
5. Write an essay on sensitivity on bacteria

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., Program VI-Semester End
Microbiology: MBT- 8209 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS
MODEL QUESTION BANK

Unit – I

Essay questions

1. Give a brief note on tuberculosis.
2. Explain about malaria life cycle
3. Write short notes on HIV and Influenza viruses.

Short answer questions.

1. Candidiasis.
2. Throat samples.
3. Amebiasis.

Very short questions.

1. Typhoid antigen.
2. Aspergillosis.

Unit – II

Essay questions.

1. Write an account on methods of transport of clinical samples.
2. Explain the procedure for collection of blood and throat samples.

Short answer questions.

1. Skin samples.
2. Oral cavity
3. Precautions required for collection of samples.

Very short questions.

1. CSF
2. Aseptic conditions.

Unit – III

Essay questions

1. Explain the principle and procedure for gram staining technique.
2. Write about the preparation and uses of different culture media.
3. Explain about procedure of Ziehl-Neelson staining for tuberculosis.

Short answer questions

1. MacConkey agar.
2. Giemsa staining
3. Distinct colony properties of bacterial pathogens

Very short answer questions

1. Blood agar
2. Tuberculosis.

Unit –IV

Essay questions

1. Give an account on nucleic acid probes.
2. Explain about ELISA.
3. Write about Dengue and HIV.

Short answer questions

1. Swine-Flu
2. Agglutination
3. PCR
4. Immunofluorescence.

Very short questions

1. HIV
2. Probe

Unit – V

Essay question

1. Write an essay on sensitivity on bacteria.
2. Explain about the procedure of minimal inhibitory concentration.

Short answer questions

1. Disc-diffusion method.
2. Resistance of bacteria

Very short answer questions

1. MIC
2. Serial double dilution method.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., Program VI-Semester End Practical Syllabus
Microbiology: 8209 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS
TOTAL HOURS: 36 **CREDITS: 2**

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 sps) by studying their morphology, cultural character, Biochemical reactions, and other tests.
4. Maintenance and preservation of stock culture.

SUGGESTED READINGS

- ❖ 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. 26th edition. McGraw Hill Publication
- ❖ Collee JG, Fraser, AG, Marmion, BP, Simmons A (2007) Mackie and McCartney Practical Medical Microbiology, 14th 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, 13th edition, Mosby

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III B.Sc Microbiology - Practical Examinations Paper

Cluster Model at the end of VI-Semester (W.E.F. 2020-2021)

Microbiology: MBT-8209 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS

Time: 2 Hrs.

Max. Marks: 35

1. Major Experiment- 'A' 10 M

Scheme for valuation:

Conduct of experiment (05M) + procedure (3M) +Result (2M)

2. Major Experiment- 'B' 05 M

Scheme for valuation:

Principle (2M) + Description (3M)

3. Identify and write notes on the following 5 X 2 = 10 M

C-

D-

E-

F-

G-

Scheme for valuation:

Identification (1M) + Reasons (2M)

4. Record + Viva voce 6 +4 = 10 M

TOTAL = 35 M

15 MARKS FOR CCA

MODEL BLUE PRINT FOR THE QUESTION PAPER SETTER

MBT-8209 A1: MICROBIAL DIAGNOSIS IN HEALTH CLINICS

Module No. / Title	Very Short Answer Questions	Short Answer Questions	Essay Questions	Marks allotted to the Module
UNIT-I	1	2	1	22
UNIT-II	1	2	1	22
UNIT-III	1	1	1	17
UNIT-IV	1	2	1	22
UNIT-V	1	1	1	17
Total marks allotted to all questions including choice =				100

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

P R GOVERNMENT COLLEGE (A), KAKINADA
CLUSTER PAPERS UNDER ELECTIVE 8209 (8209A, 8209B & 8209C)
MBT- 8209 A2: MICROBIAL QUALITY CONTROL IN FOOD AND
PHARMACEUTICAL INDUSTRIES

TOTAL HOURS: 36

CREDITS: 3

UNIT – I

8H

- ❖ 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

8H

- ❖ 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

8H

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

UNIT – IV

8H

- ❖ 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

4H

- ❖ 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.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., Program VI-Semester End
Microbiology: MBT- 8209-A2: MICROBIAL QUALITY CONTROL IN FOOD
AND PHARMACEUTICAL INDUSTRIES

Time: 2½ hours

Max. Marks: 60

SECTION – A

Answer all the following questions

5 X 2 = 10 M

1. Incineration
2. Endotoxin
3. Taq polymerase
4. EMB
5. BIS

SECTION – B

Answer any FOUR questions

4 X 5 = 20 M

1. Working of biosafety cabinets
2. Methods of disinfection
3. Culture methods
4. Gel diffusion
5. Biosensors
6. Salmonella Shigella agar
7. MBRT
8. HACCP

SECTION – C

Answer ANY THREE of the following Questions. Draw labeled diagrams wherever necessary

3 X 10 = 30 M

1. Write an account on good microbiological practices
2. Write an account on direct microscopic counts
3. Explain about PCR technique
4. Give an account on types of culture media
5. Write an essay on flow diagrams of microbial standards

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., Program VI-Semester End
Microbiology: MBT- 8209-A2: MICROBIAL QUALITY CONTROL IN FOOD
AND PHARMACEUTICAL INDUSTRIES
MODEL QUESTION BANK

Unit- I

Essay questions

1. Write an account on good microbiological practices.
2. Explain about the discarding bio-hazardous waste.
3. Write about bio safety cabinets.

Short answer questions

1. Methods of disinfection
2. Autoclaving
3. Specification for BSL 1 and BSL 2

Very short questions

1. Incineration
2. BSL 3

Unit – II

Essay questions

1. Write an account on direct microscopic count.
2. Explain about the biochemical and immunological methods.
3. Write a note on standard plate count and MPN

Short answer questions

1. Culture methods.
2. Gel diffusion.
3. Sterility testing for pharmaceutical products.

Very short questions

1. Limulus lysate.
2. Endotoxins.

Unit – III

Essay questions

1. Explain about PCR technique.
2. Write a note on nucleic acid probe.

Short answer question

1. Biosensors.
2. Probe.

Very short answer questions

1. Taq polymerase.
2. Annealing
3. dNTPs.

Unit – IV

Essay questions

1. Give an account on types of culture media.
2. Write a note on microbiological quality of milk.
3. Explain about enrichment culture technique.

Short answer question

1. MBRT
2. Salmonella Shigella agar.
3. EMB agar

Very short questions

1. McConkey agar.
2. Milk collection centers.

Unit – V

Essay questions

1. Write an essay on flow diagrams of microbial standards.
2. Explain about HACCP.

Short answer questions

1. BIS standards.
2. Flow diagrams of HACCP.
3. Microbial standards for drinking water.

Very short questions

1. Limitations of HACCP.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc., Program VI-Semester End Practical Syllabus
Microbiology: 8209 A2: MICROBIAL QUALITY CONTROL IN FOOD AND
PHARMACEUTICAL INDUSTRIES

TOTAL HOURS: 36

CREDITS: 2

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 READINGS

- ❖ 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 I K 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., Himalaya publishing house, Nagpur.
- ❖ Microbiology - A laboratory manual, Cappuccino & Sherman, 6th Ed, Pearson Education Pharmaceutical Microbiology – Purohit
- ❖ Pharmaceutical Microbiology – W.B. Hugo

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III B.Sc., Microbiology - Practical Examinations
Paper III Cluster at the end of VI Semester (w.e.f. 2020-2021)
MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL
INDUSTRIES (MB8209-A2P)

Time: 2 Hrs.

Max. Marks: 35

1. Major Experiment- 'A' 10 M

Scheme for valuation:

Conduct of experiment (05M) + procedure (3M) +Result (2M)

2. Major Experiment- 'B' 05 M

Scheme for valuation:

Principle (2M) + Description (3M)

3. Identify and write notes on the following 5 X 2 = 10 M

C-

D-

E-

F-

G-

Scheme for valuation:

Identification (1M) + Reasons (2M)

4. Record + Viva voce 6 +4 = 10 M

TOTAL = 35 M

15 MARKS FOR CCA

MODEL BLUE PRINT FOR THE QUESTION PAPER SETTER

MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES (MB8209-A2P)

Module No. / Title	Very Short Answer Questions	Short Answer Questions	Essay Questions	Marks allotted to the Module
UNIT-I	1	2	1	22
UNIT-II	1	2	1	22
UNIT-III	1	1	1	17
UNIT-IV	1	2	1	22
UNIT-V	1	1	1	17
Total marks allotted to all questions including choice =				100

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III YEAR – SEMESTER- VI

CLUSTER PAPERS UNDER ELECTIVE 8209 (8209A, 8209B & 8209C)

MBT- 8209 A3: BIOFERTILIZERS AND BIOPESTICIDES

TOTAL HOURS: 36

CREDITS: 3

UNIT – I 10H

- ❖ General account of the microbes used as Bio fertilizers for various crop plants and their advantages over chemical fertilizers.
- ❖ Symbiotic N₂ 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 6H

- ❖ Free living Azospirillum, Azotobacter – free isolation, characteristics, mass inoculums, production and field application.

UNIT – III 6H

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

UNIT – IV 7H

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

UNIT – V 7H

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

P R Government College (Autonomous), Kakinada

III Year B.Sc Program VI-Semester End

Microbiology: MBT- 8209-A3: BIOFERTILIZERS AND BIOPESTICIDES

Time: 2½ hours

Max. Marks:60

SECTION – A

Answer all the following questions

5 X 2 = 10 M

1. Rhizobium
2. Frankia
3. Azolla
4. Bio insecticides
5. Ectomycorrhizae

SECTION – B

Answer any FOUR questions

4 X 5 = 20 M

1. Cyanobacteria
2. Field applications
3. Azotobacter
4. Azospirillum
5. Isolation of phosphate solubilizing microorganisms
6. VAM
7. NPV
8. Production of bt

SECTION – C

Answer ANY THREE of the following Questions. Draw labeled diagrams wherever necessary

3 X 10 = 30 M

1. Write an account on symbiotic nitrogen fixers
2. Write an account on Isolation of Azotobacter
3. Explain about production process of PSM
4. Give an account on types of Mycorrhizae
5. Write an essay on Bio insecticides

P R Government College (Autonomous), Kakinada
III Year B.Sc Program VI-Semester End
Microbiology: MBT- 8209-A3: BIOFERTILIZERS AND BIOPESTICIDES

MODEL QUESTION BANK

Unit – I

Essay questions

1. Write an account on symbiotic nitrogen fixers.
2. Write an essay biofertilizers and compare biofertilizers with chemical fertilizers.
3. Explain about Azolla and Cyanobacteria.

Short answer questions

1. Field applications.
2. Crop response.
3. Role in rice cultivation

Very short answer questions

1. Azolla
2. Frankia.
3. Non-legumes

Unit - II

Essay questions

1. Write an account on isolation of Azatobacter.
2. Explain about Azospirillum bacterium.

Short answer questions

1. Azatobacter - characteristics
2. Azospirillum - isolation
3. Mass inoculums production.

Very short questions

1. Pure culture techniques.
2. Inoculums

Unit – III

Essay questions

1. Explain about production and process phosphate solubilizing microorganism.
2. Write a note isolation of phosphate solubilizing microorganisms.

Short answer questions

1. Applications of PSM
2. Bio insecticides.

Unit – IV

Essay questions

1. Give account on types of Mycorrhizae.
2. Explain about mass inoculum production VAM

Short answer question

1. Ectomicorrhizae
2. VAM.

Very short answer question

1. Mycorrhizae.

Unit – V

Essay questions

1. Write an essay on bioinsecticides.
2. Explain about NPV cultivation and field applications.
3. Write essay on production and applications of *Bacillus thuringiensis*

Short answer questions

1. NPV
2. Synthetic pesticides.

Very short answer questions

1. Bio insecticides.

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc Program VI-Semester End Practical Syllabus

Microbiology: 8209 A3: BIOFERTILIZERS AND BIOPESTICIDES

TOTAL HOURS: 36

CREDITS: 2

PRACTICAL SYLLABUS

1. Isolation of Rhizobium from root nodules.
2. Isolation of phosphate solubilizers from soil
3. Staining and observation of VAM
4. A visit to bio fertilizer production unit.

SUGGESTED READINGS

- ❖ Agarwal SK (2005) Advanced Environmental Biotechnology, APH publication.
Kannaiyan, S. (2003). Bioethnology 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. NewDelhi

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III B.Sc Microbiology - Practical Examinations Paper
Cluster Model at the end of VI-Semester (W.E.F. 2020-2021)
BIOFERTILIZERS AND BIOPESTICIDES (MB8209-A3P)

Time: 2 Hrs.

Max. Marks: 35

- 1. Major Experiment- 'A' 10 M**
Scheme for valuation:
Conduct of experiment (05M) + procedure (3M) +Result (2M)
- 2. Major Experiment- 'B' 05 M**
Scheme for valuation:
Principle (2M) + Description (3M)
- 3. Identify and write notes on the following 5 X 2 = 10 M**
C-
D-
E-
F-
G-
Scheme for valuation:
Identification (1M) + Reasons (2M)
- 4. Record + Viva voce 6 +4 = 10 M**

TOTAL = 35 M

15 MARKS FOR CCE

MODEL BLUE PRINT FOR THE QUESTION PAPER SETTER

8209- A3: BIOFERTILIZERS AND BIOPESTICIDES

Module No. / Title	Very Short Answer Questions	Short Answer Questions	Essay Questions	Marks allotted to the Module
UNIT-I	1	2	1	22
UNIT-II	1	2	1	22
UNIT-III	1	1	1	17
UNIT-IV	1	2	1	22
UNIT-V	1	1	1	17
Total marks allotted to all questions including choice =				100

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper

P R GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
DEPARTMENT OF MICROBIOLOGY

MICROBIOLOGY Board of Studies Meeting for the academic year 2021-22

The Board of Studies in Microbiology for the Academic Year 2021-22 is conducted on 22-11-2021 at 2.00 PM by Dept. of Microbiology, P.R.G.C. (A), Kakinada.

Agenda

1. Revamping of Syllabus for I,III & V Semesters.
2. Model Question Papers and Blue Print.
3. Panel of Question Paper setters and Examiners.
4. Pass minimum in Internal Assessment.
5. Choice Based Credit System for I, II, & III year students.
6. Introducing of New Courses of Study and the possibilities.
7. Admission criteria for programmes offered by the Departments.
8. Proposals for Community Service/Extension Activities/ Projects for the benefit of the society.
9. Any other proposal / item with the permission of the Chair.

RESOLUTIONS:

1. Resolved to Continue CBCS System as instructed by Commissioner of Collegiate Education(CCE), Amaravati.
2. Resolved to implement 50% external and 50% internal marks for both theory and practical's for first year form the academic year 2021-22.
3. Resolved to split 50 marks of theory internal as 25 marks for mid exams and 25 marks for co-curricular activities (project / seminar / assignment / quiz / group discussion).
4. Resolved to continue 60% external and 40% internal marks for both theory and practical's for second year and final year for the academic year 2021-22.
5. Resolved to split 40 marks of theory internal as 20 marks for mid exams and 20 marks for co-curricular activities (seminar/assignment/quiz/group discussion).
6. Resolve to introduce project work for final students in the VI semester.
7. Resolve to continue same question bank for first, second & third year students.
8. Resolved to continue the same paper setters and examiners for all the semesters.
9. Resolved to introduce certificate course by biotechnology department.

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Dr. A.Sreenivasulu
Director
V.S. Laxmi Research Center
Kakinada, E.G.Dt., A.P

Faculty members:

1. G. Sathish
Guest Faculty in Microbiology