

## M.Sc., Applied Microbiology

### Program Outcomes:

<b>S.No</b>	<b><u>OUTCOMES</u></b>
<b>PO1</b>	The course will help them to impart the knowledge of the basic principles of microbiology ,bacteriology, mycology, immunology, virology and algal technology including the nature of pathogenic microorganisms, pathogenesis, laboratory diagnosis, transmission, prevention and control of diseases common in the country.
<b>PO2</b>	Students will 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. Students will demonstrate engagement in the Microbiology discipline through involvement in research or internship activities.
<b>PO3</b>	so it understand the relationship between the science and society by recognizing and discussing logical, scientific and ethical issues in Microbiology.
<b>PO4</b>	is program outcomes will help the students to learn the theoretical and practical view of the syllabus. It will help them to understand the courses fundamentally and its outcomes to develop their subject skills
<b>PO5</b>	Communicate and collaborate with other disciplines by effectively communicating the fundamental concepts of Microbiology in written and oral format. Identify credible scientific sources to interpret and evaluate the evidences.
<b>PO6</b>	Critically and analytically evaluate and interpret research based data to provide valid conclusions and solutions.
<b>PO7</b>	Apply ethical principles, commit to professional ethics and responsibilities and norms of the scientific practice.
<b>PO8</b>	Engage in life-long learning in the broadest context of scientific advancement.
<b>PO9</b>	Foster learning through accumulation of knowledge in Science.
<b>PO10</b>	Demonstrate leadership qualities by working collaboratively in a team, to set goals, communicate scientific information to stakeholders, comprehend and write reports, develop documentation, make presentation and to give and receive clear instructions.

**Program specific Outcomes:**

<b><u>S.No</u></b>	<b><u>OUTCOMES</u></b>
<b>PSO1</b>	general course emphasizing distribution, morphology and physiology of microorganisms in addition to skills in aseptic procedures, isolation and identification of microorganism from plant, animal, food, water, soil and human.
<b>PSO2</b>	successful completion of graduation for UG and PG students will gain insight of Microbiology starting from history, basic laboratory techniques and fundamental knowledge about the microorganisms.
<b>PSO3</b>	skill enhancement elective course such as algal technology, mushroom cultivation and herbal technology to develop their knowledge.
<b>PSO4</b>	They will be well-informative about the integral role of microorganisms associated with specific disease, vital role of microorganisms in biotechnology, fermentation, medicine, and other industries important to human well being.
<b>PSO5</b>	It will acquire the skill in the use and care of basic microbiological equipment; performance of basic laboratory procedures in microbiology; proper collection and forwarding of microbiological.
<b>PSO6</b>	Apply basic concepts/ theories of Life Sciences for solving current scientific and social issues in key fields such as agriculture, environment, human health, transgenic animals, GMOs and plant disease management
<b>PSO7</b>	Plan and design systematic research activities in the field of Microbiology and allied sciences including necessary skills for collecting, processing and interpreting data and drawing logical inferences
<b>PSO8</b>	Communicate and analyze the core concepts and theories in Microbiology and allied sciences
<b>PSO9</b>	Understand the applications of Microbiological sciences in Agriculture, Medicine, Environment etc.
<b>PSO10</b>	Analyse the relationships among microbes and plants/ animals/ humans

**SEMESTER-I  
PAPER- 1  
GENERAL MICROBIOLOGY AND MICROBIAL PHYSIOLOGY**

**SUBJECT CODE: MAM11  
NO.OF.HOURS/ WEEK:06**

**CREDITS:05  
TOTAL HOURS:77**

**Course Outcomes**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
<b>I (Regulation 2017- 2018) Semester-I</b>	<b>General Microbiology and Microbial Physiology</b>	<b>5</b>	CO1-Students will learn the modern trends in microbial taxonomy.
			CO2- Students will be able to understand the working of various microscope and their applications..
			CO3- Students will learn the techniques of studying bacterial growth curve and factors affecting growth curve.
			CO4- Students will be able to demonstrate and understanding of bacterial , fungal , cyanobacterial, viral classifications, culturing, reproduction and significance
			CO5- Students will learn basic concepts of metabolism CO6- The Students will be able to demonstrate the structure and function of viruses.

<b>COS</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>M</b>	<b>M</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>M</b>

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

# FOOD, AGRICULTURE AND ENVIRONMENTAL MICROBIOLOGY

## PAPER - 2

**SUBJECT CODE: MAM12**

**CREDITS: 05**

**NO.OF.HOURS/ WEEK: 06**

**TOTAL HOURS: 77**

Semester	Course Name	Course Credit	Course Outcomes
I Regulation (2017-18)	Food, Agriculture and Environmental Microbiology	05	CO1- Students will be able to Importance of studying food and dairy microbiology know the factors affecting the growth and survival of microorganisms in foods..
			CO2- Students will be able to understand Food control agencies and its regulations, HACCP Methods.
			CO3- Students will learn the manufacture of fermented foods
			CO4-Students will be able to know the Role of microorganisms in soil fertility.
			CO5-Students will learn the assessment of microbiological quality of water.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	S	S	L	S	M
CO2	S	M	S	S	M	S	M	S	M	S
CO3	S	S	M	S	M	S	M	M	M	S
CO4	S	S	S	S	M	L	S	S	S	M
CO5	S	M	S	S	M	S	S	S	L	S

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

# IMMUNOTECHNOLOGY

## PAPER - 3

SUBJECT CODE: MAM13

CREDITS: 05

NO.OF.HOURS/ WEEK:05

TOTAL HOURS: 65

Semester	Course Name	Course Credit	Course Outcomes
I Regulation (2017-18)	Immunotechnology	05	CO1- Students will able to acquire skills and competence in specialized immunological techniques in the diagnosis.
			CO2- Students will able to Impart knowledge about the underlying concepts of molecular and cellular mechanisms involved in the development and regulation of the immune response.
			CO3- Students will able to outline the Immunology and Immunotechnology.
			CO4- Students will learn the milestones in immunology - evolution of immunology..
			CO5- Students will able to Monoclonal antibody production and hybridoma technology.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	S	L
CO2	S	M	S	S	M	S	M	S	S	S
CO3	S	M	S	S	M	S	S	M	S	S
CO4	S	S	S	M	S	M	M	S	S	L
CO5	S	S	S	S	S	M	S	S	S	M

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

## HUMAN ANATOMY AND PHYSIOLOGY

### PAPER - 4

**SUBJECT CODE: MAM14**

**CREDITS: 04**

**NO.OF.HOURS/ WEEK: 05**

**TOTAL HOURS: 65**

Semester	Course Name	Course Credit	Course Outcomes
I Regulation (2017-18)	Human anatomy and physiology	04	CO1- The Students will able to understand the introduction to applied human anatomy and physiology.
			CO2- The Students will able to understand the Different organs associated with the Gastro Intestinal system: Salivary glands, Pancreas, Liver and Gall bladder and others.
			CO3- The Students will able to demonstrate the Different organs and Functions of Urinary System.
			CO4- The Students will able to understand Musculoskeletal System
			CO5- The Students will able to understand the Different organs and Functions of endocrine system.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	S	L
CO2	S	M	S	S	S	S	M	S	S	M
CO3	S	M	S	S	M	S	S	M	S	S
CO4	S	S	S	M	S	M	M	S	S	S
CO5	S	S	S	S	S	M	S	S	S	M

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

## Microbial Biotechnology

### ELECTIVE PAPER – 1 C

SUBJECT CODE:MAM15C

CREDITS: 03

NO.OF.HOURS/ WEEK:03

TOTAL HOURS: 39

Semester	Course Name	Course Credit	Course Outcomes
I Regulation (2017-18)	Microbial Biotechnology	04	CO1- Students will be able to understand the biotechnological potentials of microalgae..
			CO2- Students able to illustrate the production of microbial biofertilizers .
			CO3- Students will be able to learn the microbial herbicides.
			CO4- Students will be able to perform the different production microbial products.
			CO5- Students will learn the knowledge of biodegradation of oil and petroleum products

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	S	L
CO2	S	M	S	S	S	S	M	S	S	M
CO3	S	M	S	S	M	S	S	M	S	S
CO4	S	S	S	M	S	M	M	S	S	S
CO5	S	S	S	S	S	M	S	S	S	M

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

**SEMESTER-II****PAPER - 5****SUBJECT NAME: MEDICAL MICROBIOLOGY****SUBJECT CODE: MAM21****CREDITS: 05****NO.OF.HOURS/ WEEK: 05****TOTAL HOURS: 65**

Semester	Course Name	Course Credit	Course Outcomes
II Regulation (2017-18)	Medical Microbiology	05	CO1- Students to create awareness of microbial diseases of human beings and causes and cures.
			CO2- The Students will able to learn the modern methods of microbial diagnosis.
			CO3- The Students will able to outline the bacteria and its causes.
			CO4- The Students will learn the milestones in virology and its vaccine production.
			CO5- Students would have understood the difference between mycology and parasitology

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	M
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	M	L
CO4	S	S	S	S	S	S	M	M	L	S
CO5	S	S	S	S	S	S	S	S	S	M

**PO- Programme outcome, CO- Course outcome****S- Strong, M- Medium, L- Low ( may be avoided)**



**PAPER - 6**

**SUBJECT NAME: MICROBIAL PHARMACOLOGY**

**SUBJECT CODE: MAM22**

**CREDITS: 04**

**NO.OF.HOURS/ WEEK: 05**

**TOTAL HOURS: 65**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
II Regulation (2017-18)	Microbial Pharmacology	05	CO1- Students would have understood how the general principles of Microbial Pharmacology.
			CO2- By the end, of the course, students would have gained knowledge about the recent advances of drug affecting.
			CO3- Students would have learnt some aspects of drugs used for immunomodulation, immunostimulants and Immunosuppressants.
			CO4- Students would have gained an understanding of Hormones and Hormone Antagonists
			CO5- Students would have understood the Essential drug concepts.

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	S	S	S	S	S	M	M
<b>CO2</b>	S	S	S	S	M	S	S	SM	M	L
<b>CO3</b>	S	S	S	S	M	SL	S	S	S	S
<b>CO4</b>	S	S	S	S	S	M	M	L	S	S
<b>CO5</b>	S	S	S	M	L	S	S	S	S	M

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

**PAPER - 7**

**SUBJECT NAME: BIOINFORMATICS AND BIOSTATISTICS**

**SUBJECT CODE: MAM23**

**CREDITS: 04**

**NO.OF.HOURS/ WEEK: 05**

**TOTAL HOURS:65**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
II Regulation (2017-18)	Bioinformatics and biostatistics	05	CO1- Students Relate the Computational Approaches to Biological questions
			CO2- Students will able to Correlate Sequence analysis and phylogenetic analysis
			CO3- Students an understanding of the main social issues covered by the module; The Social History of England, 1500-1700.
			CO4- Students will able to learn t an opportunity to develop genomics and proteomics
			CO5- The Students will able to outline the further development of the Predicting Protein structure and function from sequence.

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	M	M	M	M	S	S	S	L	L
<b>CO2</b>	S	M	M	M	M	S	S	S	S	L
<b>CO3</b>	S	S	S	S	S	M	M	L	S	S
<b>CO4</b>	S	S	S	S	S	S	M	M	M	M
<b>CO5</b>	S	S	S	S	S	S	M	S	S	L

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

**ELECTIVE PAPER – 2 B****SUBJECT NAME: GENETIC ENGINEERING****SUBJECT CODE: MAM24B****CREDITS: 03****NO.OF.HOURS/ WEEK: 03****TOTAL HOURS: 39**

Semester	Course Name	Course Credit	Course Outcomes
II Regulation (2017-18)	Genetic Engineering	03	CO1- The Students will able to understand the introduction to applied human anatomy and physiology.
			CO2- The Students will able to understand the Enzymes in Genetic Engineering and DNA Polymerase
			CO3- The Students will able to demonstrate Strategy of recombinant DNA technology
			CO4- The Students will able to understand Gene transfer technologies.
			CO5- Students will able to learn tDNA chips and microarray gene screen technology.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	M
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	M	L
CO4	S	S	S	S	S	S	M	M	L	S
CO5	S	S	S	S	S	S	S	S	S	M

**PO- Programme outcome, CO- Course outcome****S- Strong, M- Medium, L- Low ( may be avoided)**

**PAPER - 1**

**SUBJECT NAME: PRACTICAL I**

**SUBJECT CODE: MAM25**

**CREDITS: 05**

**NO.OF.HOURS/ WEEK: 05**

**TOTAL HOURS: 65**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
II Regulation (2017-18)	Genetic Engineering	03	CO1- The Students will able to understand the introduction to applied human anatomy and physiology.
			CO2- The Students will able to understand the Enzymes in Genetic Engineering and DNA Polymerase
			CO3- The Students will able to demonstrate Strategy of recombinant DNA technology
			CO4- The Students will able to understand Gene transfer technologies.
			CO5- Students will able to learn tDNA chips and microarray gene screen technology.

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	M	S	S	S	S	S	M
<b>CO2</b>	M	S	S	S	S	S	M	S	S	S
<b>CO3</b>	S	S	S	S	S	S	S	M	M	L
<b>CO4</b>	S	S	S	S	S	S	M	M	L	S
<b>CO5</b>	S	S	S	S	S	S	S	S	S	M

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

**PAPER - 2**

**SUBJECT NAME: PRACTICAL II**

**SUBJECT CODE: MAM26**

**CREDITS: 05**

**NO.OF.HOURS/ WEEK: 05**

**TOTAL HOURS: 65**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
II Regulation (2017-18)	Genetic Engineering	03	CO1- The Students will able to understand the introduction to applied human anatomy and physiology.
			CO2- The Students will able to understand the Enzymes in Genetic Engineering and DNA Polymerase
			CO3- The Students will able to demonstrate Strategy of recombinant DNA technology
			CO4- The Students will able to understand Gene transfer technologies.
			CO5- Students will able to learn tDNA chips and microarray gene screen technology.

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	M	S	S	S	S	S	M
<b>CO2</b>	M	S	S	S	S	S	M	S	S	S
<b>CO3</b>	S	S	S	S	S	S	S	M	M	L
<b>CO4</b>	S	S	S	S	S	S	M	M	L	S
<b>CO5</b>	S	S	S	S	S	S	S	S	S	M

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

## SEMESTER-3

### PAPER-8

**SUBJECT NAME: MICROBIAL GENETICS AND MOLECULAR BIOLOGY**

**SUBJECT CODE: MAM31**

**CREDITS: 05**

**NO.OF.HOURS/ WEEK: 6**

**TOTAL HOURS: 77**

#### Course Outcomes

Semester	Course Name	Course Credit	Course Outcomes
II Regulation (2017-18)	MICROBIAL GENETICS AND MOLECULAR BIOLOGY	05	CO1- The Students will able to understand the Genetic Material, Recombination and Mutation.
			CO2- Students will able to learn Gene Transfer mechanism, Transduction and Transformations.
			CO3- The Students will able to understand the Biology of Plasmid, Structure of Plasmid and Extra-chromosomal heredity
			CO4- Students will able to learn Transposable Genetic Elements and Gene Mapping
			CO5- To understand the Concept of gene and Gene regulation

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	M	S	S	L
CO2	S	M	S	S	M	S	S	S	S	M
CO3	S	S	S	S	S	S	M	M	L	S
CO4	S	S	M	S	S	S	S	M	S	M
CO5	M	S	S	S	M	S	L	S	S	S

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

**PAPER - 9**

**SUBJECT NAME: RECOMBINANT DNA TECHNOLOGY**

**SUBJECT CODE: MAM32**

**CREDITS: 05**

**NO.OF.HOURS/ WEEK: 06**

**TOTAL HOURS: 77**

**Course Outcomes**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
II Regulation (2017-18)	RECOMBINANT DNA TECHNOLOGY	05	CO1- Students will able to understand the Basics of DNA cloning
			CO2- Students will able to learn Methods of DNA and protein analysis.
			CO3- The Students will able to understand Construction of cDNA and genomic DNA libraries
			CO4- Students will able to learn DNA sequencing by Enzymatic and chemical method
			CO5- To understand the Protein engineering and proteome analysis and good laboratory procedure (GLP) and HACCP.

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>L</b>
<b>CO2</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>
<b>CO5</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>S</b>	<b>S</b>	<b>S</b>

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

**PAPER - 10**

**SUBJECT NAME: INDUSTRIAL BIOTECHNOLOGY**

**SUBJECT CODE: MAM33**

**CREDITS: 05**

**NO.OF.HOURS/ WEEK: 05**

**TOTAL HOURS: 65**

**Course Outcomes**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
II Regulation (2017-18)	INDUSTRIAL BIOTECHNOLOGY	05	CO1- Students to understand the microbial processes applicable in industries and scale-up processes..
			CO2- Students will able to learn Industrial fermentation and Downstream Processing.
			CO3- Students will able to understand the industrial Production of SCP
			CO4- Students will able to learn Algal biotechnology: Biotechnological potential of microalgae
			CO5- Students to understand the Concept of Nanobiotechnology

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>L</b>
<b>CO2</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>
<b>CO5</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>S</b>	<b>S</b>	<b>S</b>

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**



**ELECTIVE PAPER – 3 A****SUBJECT NAME: BIOLOGICAL TECHNIQUES****SUBJECT CODE: MAM34A****CREDITS: 03****NO.OF.HOURS/ WEEK: 03****TOTAL HOURS: 39****Course Outcomes**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
II Regulation (2017-18)	MICROBIAL GENETICS AND MOLECULAR BIOLOGY	05	CO1 To enable the students to understand the basic biological techniques.
			CO2- Students will able to Analytical Techniques - Spectroscopic methods .
			CO3- The Students will able to understand Principles & Applications of Chromatographic Techniques
			CO4- Students will able to learn Electrophoresis Techniques
			CO5- To understand the Molecular Biological Techniques

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>L</b>
<b>CO2</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>M</b>
<b>CO5</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>S</b>	<b>S</b>	<b>S</b>

**PO- Programme outcome, CO- Course outcome****S- Strong, M- Medium, L- Low ( may be avoided)**

## SEMESTER-4

### PAPER-11

**SUBJECT NAME: RESEARCH METHODOLOGY**

**SUBJECT CODE: MAM41**

**NO.OF.HOURS/ WEEK: 06**

**CREDITS: 04**

**TOTAL HOURS: 77**

#### Course Outcomes

Semester	Course Name	Course Credit	Course Outcomes
II Regulation (2017-18)	<b>RESEARCH METHODOLOGY</b>	05	CO1- The student to understand the principles and applications of classical and modern techniques in Biology.
			CO2- Students will be able to learn Electromagnetic radiation
			CO3- The Students will be able to understand the Autoradiography, application of radioisotopes in biological research
			CO4- Students will be able to learn Gel documentation and molecular weight analysis.
			CO5- Students to understand the Amplification of 16S rRNA or specific genes using PCR techniques, RAPD, STRR and LTRR analysis using PCR.

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	M	S	S	L
CO2	S	M	S	S	M	S	S	S	S	M
CO3	S	S	S	S	S	S	M	M	L	S
CO4	S	S	M	S	S	S	S	M	S	M
CO5	M	S	S	S	M	S	L	S	S	S

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

**ELECTIVE PAPER – 4 C****SUBJECT NAME: CLINICAL MICROBIOLOGY****SUBJECT CODE: MAM42C****CREDITS: 03****NO.OF.HOURS/ WEEK: 03****TOTAL HOURS: 39****Course Outcomes**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
II Regulation (2017-18)	CLINICAL MICROBIOLOGY	05	CO1- The Students will able to understand the Genetic Material, Recombination and Mutation.
			CO2- Students will able to learn Gene Transfer mechanism, Transduction and Transformations.
			CO3- The Students will able to understand the Biology of Plasmid, Structure of Plasmid and Extra-chromosomal heredity
			CO4- Students will able to learn Transposable Genetic Elements and Gene Mapping
			CO5- To understand the Concept of gene and Gene regulation

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>L</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>M</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>S</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>
<b>CO5</b>	<b>M</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>S</b>	<b>L</b>	<b>S</b>	<b>S</b>	<b>S</b>

**PO- Programme outcome, CO- Course outcome****S- Strong, M- Medium, L- Low ( may be avoided)**

**PAPER-03**

**SUBJECT NAME: PRACTICAL III**

**SUBJECT CODE: MAM43**

**CREDITS: 05**

**NO.OF.HOURS/ WEEK: 05**

**TOTAL HOURS: 65**

Semester	Course Name	Course Credit	Course Outcomes
II Regulation (2017-18)	PRACTICAL III	03	CO1- The Students will able to understand the Isolation of plasmid DNA from bacteria (mini preparation).
			CO2- The Students will able to Isolation of antibiotic resistant crobes.
			CO3- The Students will able to demonstrate Purification of plasmids - large scale
			CO4- The Students will able to PCR amplification - 16S rRNA and RAPD ,Southern blotting
			CO5- Students will able to learn the Separation of proteins by coloum chromatography, ion exchange - gel exclusion –adsorption.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	S	S	S	S	M
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	M	L
CO4	S	S	S	S	S	S	M	M	L	S
CO5	S	S	S	S	S	S	S	S	S	M

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

**PAPER-04**

**SUBJECT NAME: PRACTICAL IV**

**SUBJECT CODE: MAM44**

**CREDITS: 05**

**NO.OF.HOURS/ WEEK: 05**

**TOTAL HOURS: 65**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
II Regulation (2017-18)	PRACTICAL IV	03	CO1- The Students will able to understand the introduction to applied human anatomy and physiology.
			CO2- The Students will able to understand the Enzymes in Genetic Engineering and DNA Polymerase
			CO3- The Students will able to demonstrate Strategy of recombinant DNA technology
			CO4- The Students will able to understand Gene transfer technologies.
			CO5- Students will able to learn tDNA chips and microarray gene screen technology.

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	M	S	S	S	S	S	M
<b>CO2</b>	M	S	S	S	S	S	M	S	S	S
<b>CO3</b>	S	S	S	S	S	S	S	M	M	L
<b>CO4</b>	S	S	S	S	S	S	M	M	L	S
<b>CO5</b>	S	S	S	S	S	S	S	S	S	M

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**

**PAPER - 12**

**SUBJECT NAME: PROJECT/ DISSERTATION WITH VIVA VOCE**

**SUBJECT CODE: MAM45**

**CREDITS: 05**

**NO.OF.HOURS/ WEEK: 05**

**TOTAL HOURS: 65**

<b>Semester</b>	<b>Course Name</b>	<b>Course Credit</b>	<b>Course Outcomes</b>
II Regulation (2017-18)	PROJECT /DISSERTATION WITH VIVA VOCE	03	CO1- The student to learn the knowledge and practice of public health research activity.
			CO2- Students will be enable them to carry out researches and solve research related problems and to help them in writing thesis and defend their work.
			CO3- Students will able to demonstrate Strategy of recombinant DNA technology
			CO4- Students will able to understand Gene transfer technologies.
			CO5- Students will able to learn tDNA chips and microarray gene screen technology.

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	M	S	S	S	S	S	M
<b>CO2</b>	M	S	S	S	S	S	M	S	S	S
<b>CO3</b>	S	M	S	S	S	S	S	M	M	L
<b>CO4</b>	S	M	S	S	S	S	M	M	L	S
<b>CO5</b>	S	S	S	S	S	S	S	S	S	M

**PO- Programme outcome, CO- Course outcome**

**S- Strong, M- Medium, L- Low ( may be avoided)**