

Session: 2022-2023

Name of College:	School of Applied and Life Sciences
Program Name:	M.Sc. Biotechnology
Program Code:	34

Program Educational Objectives- PEO, Program Specific Outcomes- PSO, Program Outcomes-PO, Course Outcomes-CO

Program Educational Objectives (PEO)

PEO-1	To demonstrate ability to identify the potential of biotechnology (basic and applied) to recognize and propose/ design/derive a solution to complex problem.
PEO-2	To attain eligibility and competency to appear in competitive examination and pursue career in R&D, industries, laboratories, government & private organizations.
PEO-3	Identify entrepreneurship potential of biotechnological advancements considering associated socio- ethical issues.
PEO-4	To recognize development of biotechnological process or product as career aspect and their respective implementation to address complex problems.
PEO-5	To inculcate life-long learning and professional ethics to work in team and as a team leader in interdisciplinary environment.

Program Outcomes-(PO)

PO-1	Acquire knowledge and enhance their fundamentals pertaining to basic and applied fields of biotechnology and allied sciences including microbiology, computer application, biostatistics.
PO-2	Exhibit technical skills to apply modern tools, techniques (bio-analytical, IT, biostatistics) and identify the utility and application in scientific studies.
PO-3	Exhibit ability to design and conduct laboratory-based experiments and inculcate research aptitude and critical thinking ability to analyze and interpret data.
PO-4	To identify entrepreneurship potential of biotechnological process and products, impact on environment and society, along with associated ethical issues.
PO-5	Enhance their presentation, communication and writing skills through trainings, seminars, research writing, report writing.
PO-6	Demonstrate an ability to identify the potential of biotechnology (basic and applied) to recognize and propose/ design/derive a solution to complex problem.
PO-7	Attain eligibility and competency pursue career in research, various industries, entrepreneurship and inculcate lifelong learning ability.

Program Specific Outcomes (PSO)

PSO-1	Demonstrate proficiency in theoretical as well as practical knowledge in the field of biotechnology and allied sciences (molecular & cell biology, biochemistry, bioinformatics, RDT, plant & animal science environmental biotechnology, immunology, IPR, Genomics, microbiology, Computer application, biostatistics & others).
PSO-2	Exhibit potential to design and conduct experiments, analyze and interpret data in different field of biotechnology along with inculcation of research-oriented learning.
PSO-3	Identify the potential and application of biotechnology and scientific knowledge to design / derive a solution of problem pertaining to environment conservation, health, agriculture, society and industry considering associated ethical issues
PSO-4	Ability to analyze prevailing career opportunities to pursue a career in research, industries, other organizations, setup start-ups.

Semester- Ist

Course Name: Cell Biology

Course Code: TMBT-101

TMBT-101-CO-1	Acquire knowledge about structural organization of cellular components and methods of transport across cell membrane
TMBT-101-CO-2	Identify different molecules involved in cell adhesion, intracellular communication and their significance
TMBT-101-CO-3	Comprehend techniques, processes and mechanism involved in cellular signalling, cell division and analyze their applications
TMBT-101-CO-4	Understand and analyze molecular mechanism of cancer biology and their significance in studies related to health and medicine.

Course Name: Cell Biology and Biochemistry Lab

Course Code: PMBT-101

PMBT-101-CO-1	Depict ability to utilize microscopes for study of biological samples and identify applicability of same in biological research.
PMBT-101-CO-2	Exhibit conceptual understanding of cellular components and practical skill to isolate cell organelles.
PMBT-101-CO-3	Identify mechanism involved in transport of molecules across cell membrane and practical significance of the same.
PMBT-101-CO-4	Demonstrate skills to prepare temporary mounts to study cell biology, interpret data from observations made and identify applicability of slide preparation in biological research.

Course Name: Biological tools & radiotracer techniques

Course Code: TMBT-102

TMBT-102-CO-1	Development of scientific, computational and analytical knowledge regarding various tools and techniques in the field of applied science
TMBT-102-CO-2	Apply modern techniques and their statistical knowledge for solving various scientific problems in industry and research institution
TMBT-102-CO-3	Demonstrate the scientific knowledge regarding safety regulations for handling of radioisotopes and other hazardous chemicals in the laboratory
TMBT-102-CO-4	Demonstrate the principles and working of bio-analytical and radiotracer techniques associated with various techniques related to upstream and downstream process like chromatography, electrophoresis, centrifugation, etc

Course Name: Lab II : Molecular Biology and Analytical Tools

Course Code: PMBT-102

PMBT-102-CO-1	Development of experimental and operating knowledge regarding various tools and techniques in the field of applied science
PMBT-102-CO-2	Apply modern techniques and their statistical knowledge for solving various scientific problems in laboratories.
PMBT-102-CO-3	Depict an understanding of principle, mechanism of basic and advanced molecular biology concepts and techniques.
PMBT-102-CO-4	Acquire domain-specific knowledge and develop globally relevant skills related to concepts of genetics

Course Name: Molecular Biology & Genetics

Course Code: TMBT-103

TMBT-103-CO-1	Depict an understanding of principle, mechanism of basic and advanced molecular biology concepts and techniques.
TMBT-103-CO-2	Acquire domain-specific knowledge and develop globally relevant skills related to concepts of genetics.
TMBT-103-CO-3	Identify underlying principle of various methods and techniques utilized in studies related to molecular biology and genetics
TMBT-103-CO-4	Demonstrate an understanding of molecular pathways that are altered in cancers including oncogenes, tumor suppressors, apoptosis, angiogenesis, and DNA repair.

Course Name: Biochemistry

Course Code: TMBT-104

TMBT-104-CO-1	Appraise and compare classifications of the biomolecules such as proteins, carbohydrates, amino acids etc in the living system.
TMBT-104-CO-2	Instill students to learn the fundamental biochemical principles, such as metabolic pathways, and the regulation of biological/biochemical processes, with applications in the scientific experiments & hypothesis testing.
TMBT-104-CO-3	Identify concepts and methods isolation & characterization of biomolecules and apply various techniques of allied sciences and come up with ideas resolving issues related to health.
TMBT-104-CO-4	Comprehend an effective scientific skill and data analysis with qualitative as well as quantitative analysis to understand the base of scientific research and diagnostics.

Course Name: Computational Biology

Course Code: TMBT-105

TMBT-105-CO-1	Demonstrate and understand the fundamental of computer hardware and software, and apply application software in an office environment.
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Course Name: Immunology Lab

Course Code: PMBT-201

PMBT-201-CO-1	Identify principle, procedure laboratory working of various techniques and instruments utilized in immunological studies.
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PMBT-201-CO-2	Availing skill-based learning while performing practical's and acknowledging the applications of immunology in the field of allied sciences to design solution to complex problems.
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PMBT-201-CO-3	Practical knowledge of microbiology techniques for microbial sample collection and data analysis.
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PMBT-201-CO-4	Expertise in isolation, identification and preservation of microbial samples.
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Course Name: Computational Biology Lab

Course Code: PMBT-103

PMBT-103-CO-1	Illustrate the fundamental of windows and DOS operating system and the basic operations of operating system.
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PMBT-103-CO-2	Evaluate the basic concepts of spreadsheets, formulas and shortcut keys.
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PMBT-103-CO-3	Create word documents and presentations for academic and business purposes.
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TMBT-201-CO-1	Acquire knowledge about structure, function and organization of immune system.
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TMBT-201-CO-2	Identify principle, concept and mechanism of various immunological process and techniques and inculcate critical thinking ability to analyze their applicability.
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TMBT-201-CO-3	Identify components of immune response (antibodies, complement system, cytokines, others) their synthesis / activation along with understanding of concept of vaccine and vaccination.
TMBT-201-CO-4	Avail lifelong learning about conceptual and technical aspects of immunological studies as diagnostic tools and utilization in fields of molecular diagnostics, medicine and solving global health issues

Course Name: Microbiology

Course Code: TMBT-202

TMBT-202-CO-1	Prior knowledge and acquaintance of microbial diversity, classification systems, and distinguishing features associated with them based on morphological, chemical, structural and metabolic characteristics and their applications
TMBT-202-CO-2	Edification of the safety guidelines, agencies and skills to explain the key concepts in population, evolutionary and quantitative genetics of microbes as well as the awareness about the impact of GMO's.
TMBT-202-CO-3	Proficiency to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests, diagnostic tools to design, implement and analyze data, thereby the technology to overcome the environmental problems and health issues.
TMBT-202-CO-4	The implication of scientific principles and methods for the screening of desired microbe (s) from the biosphere, to design new models or GMO's for the better management of microbiology techniques, their application and produce cost-effective products.

Course Name: Basics of Forensics Science

Course Code: TMBT-203 (I)

TMBT-203 (I)-CO-1	Critically comprehend the need, importance and history of development of forensic science in India.
TMBT-203 (I)-CO-2	Demonstrate and conceptual understanding of the scientific methods and the use of problem-solving within the field of forensic science
TMBT-203 (I)-CO-3	Inculcate proficiency in the collection, processing, analyses, and evaluation of evidence under forensic science.
TMBT-203 (I)-C4-3	Discern the role of the biotechnology and bioanalytical tools for forensic science within the criminal justice system.

Course Name: Basics of Forensics Science Lab

Course Code: PMBT-203 (I)

PMBT-203 (I)CO-1	Investigate historical case studies where forensic fingerprint identification was used to for successfully simulation of a crime scene.
PMBT-203 (I)-CO-2	Inculcate competency in the collection, processing, analyses, evaluation of evidence, and documentation of crime scene by photography, sketching and field notes, etc.
PMBT-203 (I)-CO-3	Evince and conceptualization of the principles, working and applications of bio analytical tools used for forensic science
PMBT-203 (I)-CO-4	Proliferate scientific knowledge and investigation methods for crime scenes.

Course Name: Biofertilizer and Biopesticides

Course Code: TMBT-203 (II)

TMBT-203 (II) -CO-1	Inculcate deep knowledge and understanding of biofertilizer and biopesticides and its application in environment and society.
TMBT-203 (II) -CO-2	Appraising the role of microbes in biofertilizer and bioinsecticides generation.
TMBT-203 (II) -CO-3	Demonstrate the scientific knowledge about various types of biofertilizers
TMBT-203 (II) -CO-4	Understand the concept of production, field application of <i>Bacillus thuringiensis</i> as an important biopesticides

Course Name: Biofertilizer and Biopesticides Lab

Course Code: PMBT-203 (II)

PMBT-203 (II) -CO-1	Demonstrate and develops skills for using microbes as a biofertilizer and biopesticides.
PMBT-203 (II) -CO-2	Learn various scientific methods for isolation of <i>Rhizobium</i> bacteria from roots and VAM from soil samples.
PMBT-203 (II) -CO-3	Understand the role of different type of bio-fertilizing agent to environment and society.
PMBT-203 (II) -CO-4	Avail knowledge of using microbe as a biopesticide

TMBT-203 (III) -CO-2	Interpret the application of Michaelis - Menten equation and enzyme kinetics.
TMBT-203 (III) -CO-3	Understand and illustrate mechanism of enzyme action.
TMBT-203 (III) -CO-4	Compare different methods of enzyme immobilization and analyze their respective industrial application, functional relationship of enzyme

Course Name: Enzymology Lab

Course Code: PMBT-203 (III)

PMBT-203 (III) -CO-1	Acquire skill to estimate kinetic parameters from raw data and interpret the result to define a conclusion
PMBT-203 (III) -CO-2	Ability to conduct quantitative estimation of proteins and identify the application of same in biological research
PMBT-203 (III) -CO-3	Interpret effect of factors influencing enzymatic activity and derive a solution for optimum enzyme activity
PMBT-203 (III) -CO-4	Exhibit ability to analyze the impact of substrate concentration on enzyme activity and its significance in research.

Course Name: Biomedical Technology

Course Code: TMBT-203(IV)

TMBT-203(IV)-CO-1	Discern and comprehend various types of cancers, tumour invasion, markers in cancer research and diagnosis.
TMBT-203(IV)-CO-2	Acquire conceptual knowledge related to genetic disease, gene diagnosis, gene tracking & other diagnostic application of biomedical technology.
TMBT-203(IV)-CO-3	Perceive the concept and types of mutations in Molecular biology
TMBT-203(IV)-CO-4	Obtain information and understanding of the cellular and molecular mechanisms in biomedical technology.

Course Name: Biomedical Technology Lab

Course Code: PMBT-203(IV)	
PMBT-203(IV)-CO-1	Basic understanding of various types of tools and techniques in cancer research and diagnosis
PMBT-203(IV)-CO-2	Attain knowledge related to genetic disease, gene diagnosis, gene tracking & other diagnostic tools in biomedical technology.
PMBT-203(IV)-CO-3	Understand the concept and types of mutations and mutagenesis
PMBT-203(IV)-CO-4	Acquire knowledge related to cellular and molecular mechanisms in biomedical technology

Course Name: Essential Mathematics & Biostatistics

Course Code: TMBT-204

TMBT-204-CO-1	Learnt the basic knowledge of probability axioms, distributions such as binomial, poisson and normal and its applications in multidisciplinary environment.
TMBT-204-CO-2	Acquired the knowledge of rank correlation, Correlation coefficient, skewness and kurtosis.
TMBT-204-CO-3	Enhanced critical thinking ability by learning Testing of goodness of fit by applying Sampling test such as chi square and t- test, testing of single Mean and two Means.
TMBT-204-CO-4	Assessed information statistically and explanation of the results to the real-world situations

Course Name: Cell & Tissue Culture

Course Code: TMBT-205

TMBT-205-CO-1	Acquire knowledge pertaining to tools and techniques employed in cell and tissue culture studies along with assessment of associated risk factors and safety measures.
TMBT-205-CO-2	Identify different types and aspects of plant and animal cell culture process, including design of culture medium, maintenance of culture, cell separation, etc
TMBT-205-CO-3	To identify and appraise widespread applications of cell and tissue culture (plant and animal) process pertaining to health, environment, industry and research.
TMBT-205-CO-4	Compare and analyze different vectors and techniques utilized in transgenic technology and to assess applicability of transgenics.

Course Name: Cell & Tissue Culture Lab

Course Code: PMBT-205

PMBT-205-CO-1	Identify designing and organization of cell and tissue culture laboratory working and application of various instruments, techniques utilized in culture process.
PMBT-205-CO-2	Exhibit technical skill required for explants selection, optimize media preparation, sterilization process and inoculation technique.
PMBT-205-CO-3	Expertise technique of micropropagation for conservation and mass propagation of plant species and ability to interpret observations and data.
PMBT-205-CO-4	Demonstrate skills to carry out successful transplantation of micropropagated plants from laboratory to natural conditions and application of same in environment conservation

Course Name: Seminar presentation	
Course Code: PMBT-206	
PMBT -206-CO-1	Acquaintance about the current trends, recent developments in Biotechnology and life sciences
PMBT -206-CO-2	Enhance communication and presentation skills by substantive participation in seminar, workshop, oral and poster presentations.
PMBT -206-CO-3	Development skills to utilize modern tool and technique for data compilation, analysis and presentation

Semester III	
Course Name: Bioinformatics	
Course Code: TMBT-301	
TMBT-301-CO-1	Identify the objectives, concept, applications and prospects of bioinformatics and simultaneously exhibit ability to access internet resources as information tools.
TMBT-301-CO-2	Demonstrate ability to utilize biological databases and inculcate technical skills to apply various programmes, softwares for sequence alignment, phylogenetic analysis and data interpretation
TMBT-301-CO-3	Exhibit an understanding of concept and types of intellectual property rights and implementation of IPR in protecting biological inventions
TMBT-301-CO-4	Comprehend various aspects of drafting of patent application, types and specification of patent application, various treaties and amendments made with an exposure to concept of international patenting.

Course Name: Bioinformatics Lab
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Course Code: PMBT-301	
PMBT-301-CO-1	Exhibit ability to characterize and select biological databases to obtain required data and identify applicability of same in biological research.
PMBT-301-CO-2	Acquisition of technical skills to operate search engines through internet interface for data retrieval and recognize significance in biological studies.
PMBT-301-CO-3	Demonstrate technical skill to select and operate appropriate scoring matrices, interpret data and utilize the same to derive solution / analyze biological data (DNA, RNA, protein).
PMBT-301-CO-4	Identify criteria for any invention, process, product to qualify eligibility to be patented and exhibit proficiency in drafting patent application.

Course Name: Recombinant DNA Technology	
Course Code: TMBT-302	
TMBT-302-CO-1	Apply the basic and advanced recombinant DNA techniques for higher studies, employment and advanced research in industrial and academic scale.
TMBT-302-CO-2	Develop understanding of various modern tools, instruments and RDT techniques and their utilization to solve the society and industry-related problems.
TMBT-302-CO-3	Acquire domain-specific knowledge and develop globally-relevant skills for academic and professional enhancement.
TMBT-302-CO-4	Demonstrate an understanding of transgenic technology and applications in health, agriculture and environment, alongwith associated social and environmental issues.

Course Name: Recombinant DNA Technology Lab	
Course Code: PMBT-302	
PMBT-302-CO-1	Interpret the test hypotheses; analyze the data of RDT by using modern molecular methods.
PMBT-302-CO-2	Develop laboratory skills for academic and professional enhancement
PMBT-302-CO-3	Apply the basic and advanced recombinant DNA techniques experiments applicable in scientific research and different industries.
PMBT-302-CO-4	Demonstrate the experimental techniques related to recombinant DNA molecule and expression of recombinant DNA.

Course Name: Genomics and proteomics	
Course Code: TMBT-303 (I)	
TMBT-303 (I)-CO-1	Punitive knowledge of the biological systems information and the explanation of the key concepts Omics technologies-genomics,

	transcriptomics and proteomics.
TMBT-303 (I)-CO-2	Comprehend the range of molecular biology techniques for DNA or genome profiling, DNA sequencing/synthesis.
TMBT-303 (I)-CO-3	Knowledge of bioinformatics tools for the genomic data storage and analysis of the outgoing research in the area of genomic and proteomic studies
TMBT-303 (I)-CO-4	Erudition skills and computer software for data analysis of genetic data relevant to forensic, conservation, quantitative and evolutionary genetics, genome sequencing, assembly and annotation and summarise and interpretation of the outcomes.

Course Name: Genomics and proteomics Lab

Course Code: PMBT-303 (I)

PMBT-303 (I)-CO-1	Practical Knowledge of molecular techniques for genome collection and data analysis.
PMBT-303 (I)-CO-2	Expertise in biological samples collection, bio-informatics software for the analysis of biological samples.
PMBT-303 (I)-CO-3	Expertise in instrument and sample handling for the preparation and analysis of samples.
PMBT-303(I)-CO-4	Proficiency in data analysis and perception of samples.

Course Name: Nanotechnology

Course Code: TMBT-303 (II)

TMBT-303 (II)-CO-1	Understanding the concept of Metals & Ceramics with properties for application
TMBT-303 (II)-CO-2	Synthesis knowledge of Nanomaterials useful for different field useful for life long.
TMBT-303 (II)-CO-3	Ability to assess and prepare polymeric materials for industrial as well as for social benefits
TMBT-303(II)-CO-4	Learning about development of Nano-composites for research and projects which is useful for substitute of traditional material.

Course Name: Nanotechnology

Course Code: PMBT-303 (II)

PMBT-303 (II)-CO-1	Construction of different polymeric species using suitable chemical methods.
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PMBT-303 (II)-CO-2	Evaluation of some specific properties of polymers such as softening and melting points and glass transition temperature.
PMBT-303 (II)-CO-3	Construction of Nano-based materials in laboratory using suitable techniques.
PMBT-303(II)-CO-4	Performances of synthesized nanomaterial for different applications such photo-catalytic behavior, antibacterial and antifungal activities.

Course Name: Bio – Entrepreneurship and Bio-business management	
Course Code: TMBT-303 (III)	
TMBT-303 (III)-CO-1	Identify and understand the basic of Entrepreneurship, Bio business management along with imparting ability to work in team.
TMBT-303 (III)-CO-2	Appraise and develop management skills as life learning process, designing and management of project and develop laboratory skills along with case study.
TMBT-303 (III)-CO-3	Explore bio-business prospective in India and world and analysis of Indian Bio business as life learning process.
TMBT-303 (III)-CO-4	Acquire sound knowledge pertaining to application of bio business strategies and impact of same to society, environment along with ethical issues.

Course Name: Bio – Entrepreneurship and Bio-business management Lab	
Course Code: PMBT-303 (III)	
PMBT-303 (III)-CO-1	Identify and interpret the nature of entrepreneurship.
PMBT-303 (III)-CO-2	Analyze the business environment which in turn will help in exploring business opportunities.
PMBT-303 (III)-CO-3	Understand the importance of marketing and management in small businesses venture.
PMBT-303 (III)-CO-4	Exhibit understanding and know-how of independent startups.

Course Name: Food and Dairy Microbiology	
Course Code: TMBT-303 (IV)	
TMBT-303 (IV)-CO-1	Acknowledging the significance and activities of microorganisms in food and role of intrinsic and extrinsic factors on growth and survival of

	microorganisms in food.
TMBT-303 (IV)-CO-2	Introduction to the spoilage mechanisms in foods and identification methods to control deterioration and spoilage.
TMBT-303 (IV)-CO-3	Recognition of characteristics of important pathogens and microorganisms utilized in foods.
TMBT-303 (IV)-CO-4	Ability to identify ways to control microorganisms in foods and learn the principles involving various methods of food preservation

Course Name: Food and Dairy Microbiology

Course Code: PMBT-303 (IV)

PMBT-303 (IV)-CO-1	Inculcate the basic concept of tests & techniques used in standard plate count of milk and efficiency of pasteurization of milk in concern with the future prospective of dairy industries.
PMBT-303 (IV)-CO-2	Effective knowledge of Isolation of the food borne bacteria and spoilage microorganisms from various sources keeping the lab safety measures in mind.
PMBT-303 (IV)-CO-3	Acquire, discover, and apply the theories and principles of food microbiology in practical, real-world situations and problems as well for career purpose.
PMBT-303 (IV)-CO-4	Acquaint the various methods for the isolation, detection and identification of microorganisms in food, enhancing the analytical skills and employ it to relevant industries.

Course Name: Intellectual property rights Lab

Course Code: TMBT-304

TMBT-304- CO-1	Identify the objectives and evaluation, applications and prospects of intellectual property protection.
TMBT-304- CO-2	Exhibit an understanding of concept and types of intellectual property rights and implementation of IPR in protecting inventions.
TMBT-304- CO-3	Analyse various treaties and amendments pertaining to intellectual property rights along with their respective with an exposure to concept of international patenting
TMBT-304- CO-4	Comprehend various aspects of drafting of patent application, types and specification of patent application.

Course Name: Research Methodology and Ethics	
Course Code: TMBT-305	
TMBT-305-CO-1	Recognize the basics of philosophy of science with research ethics.
TMBT-305-CO-2	Familiarize with important issues in research ethics, integrity & scientific misconduct.
TMBT-305-CO-3	Analyze the best practices for publications, publication ethics and identify the predatory publishers & journals
TMBT-305-CO-4	Demonstrate & use of plagiarism software tools, citation databases, research

Course Name: Industrial Training and Report Submission	
Course Code: PMBT- 306	
PMBT- 306-CO-1	Acquire exposure of students pertaining to industrial procedures and protocols.
PMBT- 306-CO-2	Development of skills, safety measures through Goods Laboratory Practices and guidelines in industry.
PMBT- 306-CO-3	Development of good presentation and communication skills.

Semester IV	
Course Name: Environmental biotechnology & bioprocess engineering	
Course Code: TMBT-401	
TMBT-401-CO-1	Acquire skills to undertake the environmental problems and implication of scientific principles to design new models with respect to modern trends through biotechnology.
TMBT-401-CO-2	Interpret and propose solutions for effective management of different types of pollution and its remediation.
TMBT-401-CO-3	Demonstrate the experimental techniques associated with aseptic process, media preparation and related upstream and downstream process.
TMBT-401-CO-4	Elaborate the needs of various parts of fermenter and their design operations in laboratory as well as in industrial level.

Course Name: Environmental biotechnology & bioprocess engineering Lab	
Course Code: PMBT-401	
PMBT-401-	Exhibit laboratory skills to undertake the environmental problems and

CO-1	implication of scientific principles to design new models with respect to modern trends through biotechnology.
PMBT-401- CO-2	Design, develop and analyze the solutions for effective management of different types of pollution and its remediation and propose solutions for effective management of different types of pollution and its remediation.
PMBT-401- CO-3	Demonstrate the experimental techniques for media preparations, associated with aseptic process and related upstream, downstream process.
PMBT-401- CO-4	Development of operating and designing skills of fermenter and various parts of fermenter in laboratory level.

Course Name: Agriculture Biotechnology

Course Code: TMBT-402 (I)

TMBT-402 (I)-CO-1	Ability to implement various tools and techniques including plant breeding, micropropagation in agriculture along with development of hybrid varieties and conservation of endangered species
TMBT-402 (I)-CO-2	Identify potential and implementation of plant growth promoting rhizobacteria (PGPR), biopesticides, biofertilizers, IPM to improve agricultural productivity
TMBT-402 (I)-CO-3	Comprehend and analyze genetic engineering techniques and their utilization to develop transgenic plants for crop improvement and enhanced productivity.
TMBT-402 (I)-CO-4	Exhibit ability to analyze and assess ethical issues associated with release of GMO and their respective environmental impact

Course Name: Agriculture Biotechnology Lab

Course Code: PMBT-402 (I)

PMBT-402 (I)- CO-1	Exhibit technical skill to isolate plant growth promoting bacteria and ability to record and analyze observations.
PMBT-402 (I)- CO-2	Investigate plant growth promoting activities of microorganism (bacteria) and analyze data to interpret ability of and to function as potent biopesticides in agriculture.
PMBT-402 (I)- CO-3	Expertise technique of plant tissue culture, record observations and interpret data alongwith analyzing impact of vermicomposting, IPM on agriculture and environment.
PMBT-402 (I)- CO-4	Illustrate potential to conduct biochemical analysis of water, soil sample and analyze data to derive solution for agriculture related problems.

Course Name: Medical Microbiology

Course Code: TMBT-402 (II)

PMBT-402 (II)-CO-1	Acquire knowledge pertaining to microflora of human body their mode of transmission and importance.
PMBT-402 (II)-CO-2	Attain conceptual and technical understanding of process and safety measures involved in collection and transport of sample along with the principle and application of diagnostic test in medicine and research.
PMBT-402 (II)-CO-3	Exhibit ability to characterize and identify pathogen and diseases based upon symptoms and mode of transmission and significance of same in biological research.
PMBT-402 (II)-CO-4	Recognize viral pathogens, their symptoms mode of transmission with recent viral outbreak including swine flu, chikungunya and their impact on human and environment.

Course Name: Medical Microbiology

Course Code: PMBT-402 (II)

PMBT-402 (II)-CO-1	Demonstrate practical skills to conduct laboratory experiments to identify pathogenic microbes based upon cultural, morphological, and biochemical characteristics and to identify significance in disease diagnosis.
PMBT-402 (II)-CO-2	Exhibit proficiency in plotting bacterial growth curve from obtained data, interpret the growth rate, and identify its significance in microbial research.
PMBT-402 (II)-CO-3	Acquire ability to conduct staining and antibacterial testing of microbial specimens and interpret the observation.
PMBT-402 (II)-CO-4	Expertise the techniques of preparation of temporary mounts, conduct microscopic observation and record and interpret observation

Course Name: Pharmaceutical Biotechnology

Course Code: TMBT-402 (III)

TMBT-402 (III)-CO-1	Understand the Need, Importance and applications of biotech products in pharmaceuticals.
TMBT-402 (III)-CO-2	Demonstrate and understanding the scientific method and the use of Drug targeting and drug delivery systems.
TMBT-402 (III)-CO-3	Development of skills and scientific knowledge regarding vaccines and role of biotechnology in development of pharmaceutical drugs. .
TMBT-402 (III)-CO-4	Identify the role of the Pharmaceutical product and their control.

Course Name: Pharmaceutical Biotechnology	
Course Code: PMBT-402 (III)	
PMBT-402 (III)-CO-1	Development of knowledge related to development of SOPs for handling of instruments.
PMBT-402 (III)-CO-2	Develop skills related to documentation like STPs, SOPs, etc in both Quality Control Department and Quality Assurance Department of Pharmaceutical Industry.
PMBT-402 (III)-CO-3	Attain knowledge regarding safety measures for handling of instruments in QC and QA Department.
PMBT-402 (III)-CO-4	Demonstrate the principles, needs and importance of QA and QC Department and their relevant in other department of Pharmaceutical Industry.

Course Name: Dissertation	
Course Code: PMBT-403	
PMBT -403-CO-1	Acquire ability to analyze scientific advancements to identify a research area, design objectives and utilize modern tools, e-resources for literature survey.
PMBT -403-CO-2	Demonstrate technical skills to conduct experiments operate various analytical techniques and instruments, and ability to interpret data to derive a solution / conclusion to complex problem.
PMBT -403-CO-3	Exhibit competent scientific writing (with critical analysis) and enhance presentation skills