B.Tech. (Computer Science & Engineering)

A. Programme Objectives:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problem.
2. **Problem Analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess Societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Program Specific Outcomes (PSOs):

1. To impart knowledge in cutting edge Computer Science and Engineering technologies in par with industrial standards.
2. To collaborate with renowned academic institutions to uplift innovative research and development in Computer Science and Engineering and its allied fields to serve the needs of society
3. To demonstrate strong communication skills and possess the ability to design computing systems individually as well as part of multidisciplinary teams.
4. To produce successful Computer Science and Engineering graduates with personal and professional responsibilities and commitment to lifelong learning

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BSC 101	**Physics**	CO1	Understand the concepts of quantum physics for materials.
		CO2	Use of equipment for low and high energy applications.
		CO3	Solve engineering problems by applying the concepts of wave and particle nature of radiant energy.
		CO4	Apply the concept of energy band for semiconductors.
		CO5	Construct a quantum mechanical model to explain the behavior of a system at microscopic level.
BSC 103	**Mathematics-I**	CO1	The essential tools of matrices and linear algebra, eigen values and diagonalization in a comprehensive manner are required.
		CO2	Understand the concept of limit, continuity and differentiability and apply in the study of Rolle's, Lagrange's and Cauchy mean value theorem and Leibnitz theorems
		CO3	Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians
		CO4	Illustrate the working methods of multiple integral and apply for finding area, volume, center of mass and center of gravity
		CO5	Recall the concept of vector and apply for directional derivatives, tangent and normal planes. Also evaluate line, surface and volume integrals
ESC 101	**Basic Electrical Engineering**	CO1	Memorize the concepts of KVL/KCL and network theorems in solving DC circuits
		CO2	Define the steady state behavior of single phase and three phase AC electrical circuits.
		CO3	Recall the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three-phase transformer
		CO4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications.
		CO5	To apply the components of low voltage electrical installations and perform elementary calculations for energy consumption
BSC 151	**Physics Lab**	CO1	Develop skills to impart practical knowledge in real time solutions.
		CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
		CO3	Design new experiments/instruments with practical knowledge.

		CO4	Gain knowledge of new concept in the solution of practical oriented problems.
ESC 151	**Electrical Engineering Lab**	CO1	Get an exposure to common electrical components and their ratings.
		CO2	Make electrical connections by wires of appropriate ratings.
		CO3	Understand the usage of common electrical measuring instruments.
		CO4	Understand the basic characteristics of transformers and electrical machines.
ESC 152	**Engineering Graphics & Design**	CO1	Draw orthographic projections of lines, planes and solids.
		CO2	Construct isometric scale, isometric projections and views.
		CO3	Draw sections of solids including cylinders, cones, prisms and pyramids.
		CO4	Draw projections of lines, planes, solids, isometric projections and sections of solids including cylinders, cones, prisms and pyramids using AutoCAD
AOC 101	**Basics of Communication**	CO1	Trained in English language including listening, speaking, reading and writing skills
		CO2	Developed the presentation skills for professional life
		CO3	Able to manage the work stress in professional life
		CO4	Able to control inter-personal conflicts.
Semester II			
BSC 202	**Chemistry**	CO1	Recall the instruments for atomic and molecular structure
		CO2	Determine Structure of Compound by spectroscopic methods.
		CO3	analyze the importance of Chemical Industry
		CO4	Understand the basic concept of hardness of water and its removal techniques.
		CO5	Study the manufacture of different products like fuel, cement, polymer, glass, soap and detergents by modern methods
BSC 204	**Mathematics-II**	CO1	Recall the differentiation and apply for solving differential equations
		CO2	Learn definite integral and apply for evaluating surface areas and volumes
		CO3	Discuss the concept of convergence of sequence and series. Also evaluate Fourier series
		CO4	Operate of Laplace transforms and apply to solve ODE and PDE
		CO5	Solution of engineering problems with Fourier and Z-transform
ESC 203		CO1	Understand the basics of Computer System and Hardware Organization

	Programming for Problem Solving	CO2	Learn the different tests of Memory Units, Input and Output Devices and Input Output Ports.
		CO3	Understand Basics of Programming Languages and Operating Systems and Graphical User Interface and Windows
		CO4	Solve Programming Methodology, Arrays and Structures
		CO5	Apply techniques of Operations and Expressions.
HSMC 201	**Professional Communication and Soft Skills**	CO1	Trained in English language including listening, speaking, reading and writing skills.
		CO2	Developed the presentation skills Reading Techniques
		CO3	Able to manage the Essential Grammar.
		CO4	Able to Basic Technical Writing Skills and Nature and Style of sensible Writing
BSC 252	**Chemistry Lab**	CO1	Use of different analytical instruments.
		CO2	Measure molecular/system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water
		CO3	Measure hardness of water.
		CO4	Estimate the rate constant of reaction.
		CO5	Determine Structure of Compound by spectroscopic methods.
ESC 253	**Programming for Problem Solving Lab**	CO1	Explain the basic syntax, structure and execution of programs written in C language.
		CO2	Develop the C code for a given algorithm.
		CO3	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
		CO4	Write programs that perform operations using derived data types.
ESC-254	**Work Shop**	CO1	Study and practice on machine tools and their operations
		C02	Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding
		C03	Identify suitable tools for machining processes including turning, facing, thread cutting and tapping
		CO4	Apply suitable tools for machining processes including turning, facing, thread cutting and tapping
HSMC-251	**Communication Lab**	CO1	Trained in English language including listening, speaking, reading and writing skills.
		CO2	Developed the presentation skills Reading Techniques
		CO3	Able to manage the Essential Grammar.
		CO4	Able to Basic Technical Writing Skills and Nature and Style of sensible Writing

Semester-III			
ECC-305	**Analog Electronic Circuits**	C01	Understand the characteristics and Applications of diode.
		CO2	Discuss the characteristics and Applications of transistor.
		CO3	Describe the characteristics and Applications of MOSFET.
		CO4	Design and analyse various rectifier and amplifier circuits.
		CO5	Understand the functioning of OP-AMP and design OP-AMP based circuits.
ECC-307	**Digital Electronics**	C01	Understand working of logic families and logic gates
		CO2	Design and implement Combinational and Sequential logic circuits.
		CO3	Understand the process of Analog to Digital conversion and Digital to Analog conversion
		CO4	Use PLDs to implement the given logical problem.
BAS-310	**Discrete Mathematics**	C01	For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives
		CO2	For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference
		CO3	For a given a mathematical problem, classify its algebraic structure
		CO4	Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
		CO5	Develop the given problem as graph networks and solve with techniques of graph theory.
BSA 301	**Economics**	C01	Understand the roles of managers in firms
		CO2	Understand the internal and external decisions to be made by managers
		CO3	Analyze the demand and supply conditions and assess the position of a company
		CO4	Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets
		CO5	Analyze real-world business problems with a systematic theoretical framework.
CSC-302	**Data Structures using 'C'**	C01	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
		CO2	For a given Search problem (Linear Search and Binary Search) student will able to implement it.
		CO3	For a given problem of Stacks, Queues, linked list and Tree, student will able to implement it and analyze the same to determine the time and computation complexity.

		CO4	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
		CO5	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.
CSC-351	**Data Structure using 'C' Lab**	C01	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
		CO2	For a given Search problem (Linear Search and Binary Search) student will able to implement it.
		CO3	For a given problem of Stacks, Queues, linked list and Tree, student will able to implement it and analyze the same to determine the time and computation complexity.
		CO4	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
		CO5	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.
CSC-352	**IT Workshop (MATLAB)**	C01	Use MATLAB for programming purposes
		CO2	Learn and explore MATLAB further on their own
		CO3	Use this learning experience to learn other programming languages.
Semester-IV			
BSB-401	**Organizational Behavior**	C01	To identify the concept of organizational behavior to understand the behavior of people in the organization.
		CO2	To demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
		CO3	To explain the complexities associated with management of the group behavior in the organization.
		CO4	To examine how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.
EEC-409	**Fundamentals of Digital Signal Processing**	C01	Ability to apply current knowledge and applications of mathematics, science, engineering and technology
		CO2	Ability to creatively design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
		CO3	Ability to identify, formulate, analyze and solve technical and engineering problems

		CO4	Ability to use the techniques, skills and modern technical tools necessary for technical or engineering practice
CSC-401	**Internet and Web Technology**	C01	Explain the server and client side programming technologies and development frameworks
		CO2	Illustrate the basic web forms based on HTML, CSS and JavaScript
		CO3	Compare the architecture details of JavaScript, Servelets and JSP.
CSC-402	**Computer Organization and Architecture**	C01	Recall basic structure of computer and microoperations like register transfer language; register transfer, bus and memory transfer.
		CO2	Explain computer organization and its design.
		CO3	Describe memory organization.
		CO4	Explain input-output organization.
		CO5	Define parallel processing.
		CO6	Discuss multiprocessor organization and CISC & RISC architecture.
CSC-403	**Operating Systems**	C01	Understand the basics of operating systems like kernel, shell, types and views of operating systems
		CO2	Describe the various CPU scheduling algorithms and remove deadlocks.
		CO3	Explain various memory management techniques and concept of thrashing
		CO4	Use disk management and disk scheduling algorithms for better utilization of external memory.
		CO5	Recognize file system interface, protection and security mechanisms.
		CO6	Explain the various features of distributed OS like Unix, Linux, windows etc.
CSC-404	**Design and Analyses of Algorithmes**	C01	Explain the time and space complexity of the algorithm.
		CO2	Describe elementary data structure like binary search tree, Red Black tree, binomial, B tree and Fibonacci heap.
		CO3	Compare between design techniques of algorithm like Divide and Conquer, Dynamic algorithm, Greedy algorithm, backtracking and Amortized algorithm.
		CO4	Demonstrate different graph traversal algorithm like BFS, DFS, Prim's, Kruskal's, single source shortest path and all pair shortest path
		CO5	Examine different string matching algorithm like naïve string matching, robin-karp algorithm, kurth-morrispratt algorithm.
		CO6	Distinguish between NP-hard and NP-completeness problem.
MCC-401	**Environmental Science**	C01	An Environmental Science major will be able to recognize the physical, chemical, and biological components of the earth's systems and show how they function

		CO2	An Environmental Science major will be able to apply lessons from various courses through field experiences.
CSC 451	**Design and Analysis of Algorithms Lab**	C01	Explain the time and space complexity of the algorithm.
		CO2	Describe elementary data structure like binary search tree, Red Black tree, binomial, B tree and Fibonacci heap.
		CO3	Compare between design techniques of algorithm like Divide and Conquer, Dynamic algorithm, Greedy algorithm, backtracking and Amortized algorithm.
		CO4	Demonstrate different graph traversal algorithm like BFS, DFS, Prim's, Kruskal's, single source shortest path and all pair shortest path
		CO5	Examine different string matching algorithm like naïve string matching, robin-karp algorithm, kurth-morrispratt algorithm.
		CO6	Distinguish between NP-hard and NP-completeness problem.
CSC-452	**Internet and Web Technology Lab**	C01	Explain the server and client side programming technologies and development frameworks
		CO2	Illustrate the basic web forms based on HTML, CSS and JavaScript
		CO3	Compare the architecture details of JavaScript, Servelets and JSP.
Semester V			
CSC-501	**Automata Theory**	C01	Discuss key notions of computation, such as algorithm, computability, decidability, reducibility, and complexity, through problem solving.
		CO2	Explain the models of computation, including formal languages, grammars and automata, and their connections.
		CO3	State and explain the Church-Turing thesis and its significance.
		CO4	Analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
		CO5	Solve computational problems regarding their computability and complexity and prove the basic results of the theory of computation.
CSC-502	**Software Engineering**	C01	How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
		CO2	An ability to work in one or more significant application domains
		CO3	Work as an individual and as part of a multidisciplinary team to develop and deliver quality software
		CO4	Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
		CO5	Demonstrate an ability to use the techniques and tools necessary for engineering practice

CSC-503	**Data Base Management Systems**	C01	Describe the fundamental elements of relational database management systems
		CO2	Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
		CO3	Design ER-models to represent simple database application scenarios
		CO4	Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
		CO5	Improve the database design by normalization.
		CO6	Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.
CSC-504	**Object Oriented programming**	CO1	To understand the basic concepts of the programming
		CO2	To identify the principles of object-oriented problem solving and programming
		CO3	Outline the essential features and elements of the C++ programming language.
		CO4	The students will gain knowledge about Object Oriented Programming through C++.
		CO5	Analyze, write, debug, and test basic C++ codes using the approaches introduced in the course.
		CO6	They can make their own Applications /Projects using C++.
DCS-504	**Cryptography & Network Security**	C01	The concepts of classical encryption techniques and concepts of finite fields and number theory.
		CO2	And explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
		CO3	And explore the design issues and working principles of various authentication protocols, PKI standards.
		CO4	Explore various secure communication standards including Kerberos, IPsec, and SSL/TLS and email.
		CO5	The ability to use existing cryptographic utilities to build programs for secure
OME-501	**Industrial Safety**	C01	Analyze the effect of release of toxic substances
		CO2	Understand the industrial laws, regulations and source models
		CO3	Identify hazard and potential hazard areas.
		CO4	Develop safety programs to prevent or mitigate damage or losses
		CO5	Assess safety practices and programs
	Cyber Security	CO1	Analyze and evaluate the cyber security needs of an organization.

MCC 501		CO2	Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
		CO3	Measure the performance and troubleshoot cyber security systems.
		CO4	Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.
		CO5	Comprehend and execute risk management processes, risk treatment methods, and key risk and performance indicators
		CO6	Design and develop a security architecture for an organization
CSC-551	**DBMS Lab**	C01	Students get practical knowledge on designing and creating relational database systems
		CO2	Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.
		CO3	Design ER-models to represent simple database application scenarios
		CO4	Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
		CO5	Improve the database design by normalization.
		CO6	Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.
CSC-552	**OOP Lab**	C01	To understand the basic concepts of the programming
		CO2	To identify the principles of object-oriented problem solving and programming
		CO3	Outline the essential features and elements of the C++ programming language.
		CO4	The students will gain knowledge about Object Oriented Programming through C++.
		CO5	Analyze, write, debug, and test basic C++ codes using the approaches introduced in the course.
Semester-VI			
CSC-601	**Java Programming**	C01	Identify classes, objects, members of a class and relationships among them needed for a specific problem
		CO2	Write Java application programs using OOP principles and proper program structuring
		CO3	Demonstrate the concepts of polymorphism and inheritance
		CO4	Able to Write Java programs to implement error handling techniques using exception handling
CSC-602	**Artificial Intelligence**	C01	Define the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.

		CO2	Classify AI techniques in applications, which involve perception, reasoning and learning.
		CO3	Demonstrate about AI techniques for knowledge representation, planning, uncertainty management and exploration methods.
		CO4	Distinguish the knowledge of real world Knowledge representation, the modern view of AI as the study of agents that receive precepts from the environment and perform actions
		CO5	Defend a real world problem for implementation and understand the dynamic behavior of a system.
		CO6	Formulate the machine learning techniques to design AI machine and enveloping applications for real world problems.
CSC-603	**Computer Graphics**	C01	To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
		CO2	To learn the basic principles of 3- dimensional computer graphics.
		CO3	Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
		CO4	Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.
		CO5	To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
		CO6	To comprehend and analyze the fundamentals of animation, virtual reality, underlying technologies, principles, and applications.
CSC-604	**Compiler Construction and Design**	C01	Describe the lexical structure of grammars
		CO2	Design the compilers of High Level Languages
		CO3	Implement LEX and YACC for designing Syntax Analyzers and Lexical Analyzers
		CO4	Construct Parsing Tables from Grammars like CFG
		CO5	Evaluate the code blocks and optimize them
DCS-603	**Cloud Computing**	C01	Describe various service and deployment models used in cloud computing
		CO2	Explain the Web Services available and its architectural modules and structure
		CO3	Illustrate the VM-Ware and Virtualization concepts
		CO4	Demonstrate Case Studies based on PaaS and SaaS Platforms
		CO5	Examine the Private and Public Cloud Environment Models
		CO6	Evaluate the Working and Methodology of SaaS, PaaS and IaaS Cloud Computing Models.

OEC-606	**Signal & Network Synthesis**	C01	Obtain circuit matrices of linear graphs and analyze networks using graph theory
		CO2	Obtain network functions and poles and zeros of network functions
		CO3	Learn conditions for stability and reliability of network functions
		CO4	Synthesize driving point functions of RL, RC and RLC networks
		CO5	Synthesize two port network functions
		CO6	Acquire knowledge about the application of Fourier series, Fourier transform and Laplace transform in signal representation and analysis of linear time invariant systems.
MCC-606	**Technical Seminar**	C01	To study research papers for understanding of a new field, in the absence of a textbook, to summarize and review them.
		CO2	To impart skills in preparing detailed report describing the project and results
		CO3	To effectively communicate by making an oral presentation before an evaluation committee
CSC 651	**Java Lab**	C01	Use an integrated development environment to write, compile, run, and test simple object-oriented **Java** programs
		CO2	Read and make elementary modifications to **Java** programs that solve real-world problems.
		CO3	Demonstrate the concepts of polymorphism and inheritance
		CO4	Able to Write Java programs to implement error handling techniques using exception handling
CSC-652	**Computer Graphics Lab**	C01	Draw Geometric primitives using OpenGL
		CO2	Execute scan line polygon filling using OpenGL
		CO3	Implement basic transformations on objects using OpenGL
		CO4	Implement clipping algorithm on lines using OpenGL
		CO5	To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
CSC-653	**Artificial Intelligence Lab**	C01	To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems
		CO2	To impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques.
		CO3	To make students understand various AI methods like searching and game playing and how to apply them to solve real applications
		CO4	To explain to students the basic issues of knowledge representation and Logic so as to build inference engines
		CO5	To impart a basic understanding of some of the more advanced topics of AI such as planning.

		CO6	To understand Bayes networks, natural language processing and introduce concept of cognitive computing.
Semester VII			
CSC-701	**Advanced Computer Architecture**	C01	Demonstrate concepts of parallelism in hardware/software.
		CO2	Discuss memory organization and mapping techniques.
		CO3	Describe architectural features of advanced processors.
		CO4	Interpret performance of different pipelined processors.
		CO5	Explain data flow in arithmetic algorithms
CSC-702	**Mobile Computing**	C01	Understand fundamentals of wireless communications.
		CO2	Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.
		CO3	Demonstrate basic skills for cellular networks design.
		CO4	Apply knowledge of TCP/IP extensions for mobile and wireless networking.
CSC-703	**.Net Framework**	C01	Learn about MS.NET framework developed by Microsoft.
		CO2	You will be able to using XML in C#.NET specifically ADO.NET and SQL server
		CO3	Be able to understand use of C# basics, Objects and Types, Inheritance
		CO4	To develop, implement and creating Applications with C#.
		CO5	To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web
CSC-704	**Distributed Systems**	C01	Understand the principles and desired properties of distributed systems on which the Internet and other distributed systems are based
		CO2	Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving
		CO3	Recognize the inherent difficulties that arise due to distributed-ness of computing resources
		CO4	Identify the challenges in developing distributed applications
		CO5	Design a distributed system that fulfills requirements with regards to key distributed systems properties
		CO2	An Environmental Science major will be able to apply lessons from various courses through field experiences.
CSC 751	**.Net Framework Lab**	C01	Create user interactive web pages using ASP.Net.
		CO2	Create simple data binding applications using ADO.Net connectivity.
		CO3	Performing Database operations for Windows Form and web applications.

Semester-VIII			
EEC-881	**Internship**	CO1	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job functions
		CO2	Solve real life challenges in the workplace by analyzing work environment and conditions, and selecting appropriate skill sets acquired from the course
		CO3	Articulate career options by considering opportunities in company, sector, industry, professional and educational advancement
		CO4	Communicate and collaborate effectively and appropriately with different professionals in the work environment through written and oral means

M. Tech. (Computer Engineering)

A. Programme Objectives:

1. **Engineering Knowledge:** To apply knowledge of mathematical, scientific, and computer science to evaluate, analyze, synthesize, model and integrate technologies to develop new computer system for applied engineering systems.
2. **Problem Analysis:** To generate optimized solutions by formulating and implementing analytical tools for upcoming issues in the field of computer science and engineering.
3. **Design/development of solutions:** To demonstrates integrity, ethical behavior and commitment to code of conduct of professional practices and standards.
4. **Conduct Investigations of Complex Problems:** To understand contemporary issues in providing technology solutions for sustainable development considering impact on economic, social, political, and global issues and thereby contribute to the welfare of the society.
5. **Modern Tool Usage:** To use the techniques, skills, and modern engineering tools, including simulation and modeling for engineering needs.
6. **The Engineer and Society:** To work upon unfamiliar problems through investigative studies and research and contribute to the development of technological knowledge and intellectual property.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** To design and develop a system to meet desired needs within social areas such as economics, environmental, and ethics.
9. **Individual and Team Work:** To possess knowledge for functioning effectively, as a member or team leader, in software projects considering multidisciplinary environments.
10. **Communication:** To transfer technology effectively on broadly defined engineering needs with engineering community and with society at large, by being able to comprehend and write effective technical reports, presentations and software tools.
11. **Project Management:** To demonstrate independent learning and scholarship by adopting research pursuits.
12. **Life-long Learning:** To learn reflectively from mistakes, engage in lifelong learning, adapt new developments and participate in continuing education opportunities to foster personal and organizational growth.

B. Program Specific Outcomes (PSOs):

1. To produce post graduate (PG) engineers who are ready to contribute research & development (R&D) effectively to the advancement of Computer Science applications.
2. To engage in professional practices to promote the development of innovative systems and optimized solutions.
3. To work collaboratively on multidisciplinary projects and exhibit high levels of professional and ethical values within organization and society globally.
4. To enhance skills and adapt new computing technologies for attaining professional excellence and carrying research.
5. To apply software engineering principles and practices to provide software solutions.
6. To design efficient algorithms and develop effective code.
7. To design and develop Network, Mobile and Web-based Computational systems under realistic constraints.

C. Course outcome (COs)

Course Code	Course name	Course outcomes	
Semester I			
CSMT-501	**Computer System Software**	CO1	Demonstrate a basic understanding of computer hardware and software
		CO2	Demonstrate problem-solving skills
		CO3	Apply logical skills to programming in a variety of languages
CSMT-503	**Data Structure and Algorithm**	CO1	Explain the time and space complexity of the algorithms
		CO2	Describe elementary data structure like binary search tree, Red Black tree, binomial, B tree and Fibonacci heap
		CO3	Compare between design techniques of algorithm like Divide and Conquer, Dynamic algorithm, Greedy algorithm, backtracking and Amortized algorithm
		CO4	Demonstrate different graph traversal algorithm like BFS, DFS, Prim's, Kruskal's, single source shortest path and all pair shortest path
		CO5	Examine different string matching algorithm like naïve string matching, robin-karp algorithm, kurth-morrispratt algorithm.

CSMT-505	**Advanced Database Management Systems**	CO1	Describe the fundamental elements of relational database management systems
		CO2	Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL
		CO3	Design ER-models to represent simple database application scenarios
		CO4	Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data
		CO5	Improve the database design by normalization
CSMT-507	**Computer Communication and Networks**	CO1	Understand the basics of data communication, networking, internet and their importance
		CO2	Analyze the services and features of various protocol layers in data networks
		CO3	Differentiate wired and wireless computer networks
		CO4	Analyze TCP/IP and their protocols
		CO5	Recognize the different internet devices and their functions.
		C06	Identify the basic security threats of a network.
Semester II			
CSMT-502	**Resource Management in Computer Systems**	CO1	To describe process, threads, scheduling and synchronization
		CO2	To understand the management of computer memory
		CO3	To understand device and file management
CSMT-504	**Soft Computing**	CO1	To familiarize with soft computing concepts.
		CO2	To introduce the fuzzy logic concepts, fuzzy principles and relations
		CO3	To Basics of ANN and Learning Algorithms
		CO4	Ann as function approximation
		CO5	Genetic Algorithm and its applications to soft computing
		CO6	Hybrid system usage, application and optimization
CSMT-506	**High Performance**	CO1	Comprehend various High Performance Computing (HPC) system architectures

	Computer Architecture	CO2	Identify design issues related to the architectural characteristics and performance of HPC systems
		CO3	Design and implement compute intensive applications on HPC platform
CSMT-522	**Mobile & Wireless communication**	CO1	Understand fundamentals of wireless communications.
		CO2	Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks
		CO3	Demonstrate basic skills for cellular networks design.
		CO4	Apply knowledge of TCP/IP extensions for mobile and wireless networking.
CSMT-522	**Network Security**	CO1	The concepts of classical encryption techniques and concepts of finite fields and number
		CO2	Explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
		CO3	Explore the design issues and working principles of various authentication protocols, PKI standards
		CO4	Explore various secure communication standards including Kerberos, IPsec, and SSL/TLS and email
		CO5	The ability to use existing cryptographic utilities to build programs for secure
CSMT-522	**Security Of Information Systems**	CO1	To describe encryption, decryption and cryptosystem
		CO2	To understand Key Management Protocols
		CO3	To understand Operating System, Database and Program Security
Semester-III			
CSMT-601	**Knowledge based System Design**	CO1	Identify and analyze the applications of knowledge management (KM)
		CO2	Apply KM models and technologies to real life applications
		CO3	Create a KM system for an organization
CSMT-603	**Internet and Web technology**	CO1	Analyze a web page and identify its elements and attributes.
		CO2	Create web pages using XHTML and Cascading Style Sheets.

		CO3	Build dynamic web pages using JavaScript (Client side programming).
		CO4	Create XML documents and Schemas.
CSMT-605	**System and Network Administration**	CO1	Design and configure peer-to-peer networks to share resources
		CO2	Analyze requirements and design network architecture for a given scenario
		CO3	Design and configure IP addressing schemes for a given scenario
		CO4	Design and configure a client-server network and required network services for a given scenario
		CO5	Evaluate and critique a design for a systems and network solution.
CSMT-621	**Embedded Systems**	CO1	Understand hardware and software design requirements of embedded systems.
		CO2	Analyze the embedded systems' specification and develop software programs.
		CO3	Evaluate the requirements of programming Embedded Systems, related software architectures and tool chain for Embedded Systems
CSMT-621	**Software Verification, Validation And Testing**	CO1	Have an ability to apply software testing knowledge and engineering methods
		CO2	Have an ability to design and conduct a software test process for a software testing project.
		CO3	Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.
		CO4	Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
		CO5	Have an ability to use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
CSMT-621	**Advanced Microprocessors**	CO1	Describe Intel 8086/8088 architecture with explanation of internal organization of some popular microprocessors

		CO2	To Understand the use of various concepts of assembly language programming
		CO3	To describe various input output interfaces
CSMT-621	**Software Project Management**	CO1	To understand software project management tools and techniques
		CO2	To understand and do project planning and scheduling
		CO3	To project monitoring and control
		CO4	To identify risks and controlling the risks

Master of Computer Applications (M.C.A.)

A. Programme Objectives:

1. Will demonstrate basic knowledge in computing discipline.
2. Will demonstrate the ability to design and conduct experiments, interpret and analyze data, and report results.
3. Will demonstrate the ability to design and develop software that meets the Software industry demands.
4. Capacity to analyze a problem, and identify and formulate the computing requirements appropriate to its solution.
5. Capacity to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
6. Will demonstrate an understanding of their professional and ethical responsibilities.
7. Will be able to communicate effectively in both verbal and written forms.
8. Will have the confidence to apply engineering solutions in global and societal contexts.
9. Should be capable of self-education and clearly understand the value of lifelong learning.
10. Awareness of the need for and an ability to engage in continuing professional development.
11. A skill of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

B. Program Specific Outcomes (PSOs):

1. To prepare students for successful careers in Industry that meets the needs of Indian and multinational Companies.
2. To develop the ability among students to synthesize data and technical concept for application to project design.
3. To provide opportunity for students to work as part of teams on multidisciplinary projects.
4. To provide students with a sound foundation in the mathematical, scientific and technical foundations necessary to formulate, solve and analyze real life problems.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
CA 401	**Fundamentals of Computers & Programming in C**	CO1	Understand the basics of Computer System and Hardware Organization
		CO2	Learn the different tests of Memory Units, Input and Output Devices and Input Output Ports.
		CO3	Understand Basics of Programming Languages and Operating Systems and Graphical User Interface and Windows
		CO4	Solve Programming Methodology, Arrays and Structutre
		CO5	Apply techniques of Operations and Expressions.
CA 403	**Digital Electronics**	CO1	Discuss the basic arithmetic calculation in binary, decimal, hexadecimal & Logic gates
		CO2	To describe the combinational logic circuit..
		CO3	Illustrate different semiconductor memories.
		CO4	Value the needs to implement sequential logic circuit.
		CO5	Discuss the various types of Flip-flop and their conversion.
CA 405	**System Analysis and Design**	CO1	Understand various kinds of system designs
		CO2	Understand elements and characteristics of information systems
		CO3	Understand various models
CA 407	**Discrete Mathematics**	CO1	Be able to construct simple mathematical proofs and possess the ability to verify them.
		CO2	Have substantial experience to comprehend formal logical arguments.
		CO3	Be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate
		CO4	Be able to specify and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess
		CO5	Acquire ability to describe computer programs (e.g. recursive functions) in a formal mathematical manner.

CA 409	**Rapid Application Development using Visual Basic**	CO1	Learn about MS.NET framework developed by Microsoft.
		CO2	You will be able to using XML in.NET specifically ADO.NET and SQL server .
		CO3	Be able to understand use of VB, Objects and Types, Inheritance .
		CO4	To develop, implement and creating Applications with VB.
CA 451	**C Programming Lab**	CO1	Understand Basics of Programming Languages and Operating Systems and Graphical User Interface and Windows
		CO3	Solve Programming Methodology, Arrays and Structutre
		CO4	Apply techniques of Operations and Expressions.
		CO5	Apply programming skills for problem solving.
CA 453	**Visual Basic Lab**	CO1	Learn about MS.NET framework developed by Microsoft.
		CO2	You will be able to using XML in.NET specifically ADO.NET and SQL server .
		CO3	Be able to understand use of VB, Objects and Types, Inheritance .
		CO4	To develop, implement and creating Applications with VB.
Semester II			
CA 402	**Data Structures**	CO1	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
		CO2	For a given Search problem (Linear Search and Binary Search) student will able to implement it.
		CO3	For a given problem of Stacks, Queues, linked list and Tree, student will able to implement it and analyze the same to determine the time and computation complexity.
		CO4	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
		CO5	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

CA 404	**Theory of Computation**	CO1	discuss key notions of computation, such as algorithm, computability, decidability, reducibility, and complexity, through problem solving.
		CO2	explain the models of computation, including formal languages, grammars and automata, and their connections.
		CO3	state and explain the Church-Turing thesis and its significance.
		CO4	analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
		CO5	solve computational problems regarding their computability and complexity and prove the basic results of the theory of computation.
CA 406	**Computer System Architecture**	CO1	Recall basic structure of computer and microoperations like register transfer language, register transfer, bus and memory transfer.
		CO2	Explain computer organization and its design.
		CO3	Describe memory organization.
		CO4	Explain input-output organization.
		CO5	Define parallel processing.
CA 408	**Computer Graphics**	CO1	To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
		CO2	To learn the basic principles of 3- dimensional computer graphics.
		CO3	Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
		CO4	Provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.
CA 410	**Object Oriented Programming**	CO1	To understand the basic concepts of the programming.
		CO2	To identify the principles of object-oriented problem solving and programming
		CO3	Outline the essential features and elements of the C++ programming language.

		CO4	The students will gain knowledge about Object Oriented Programming through C++.
		CO5	Analyze, write, debug, and test basic C++ codes using the approaches introduced in the course.
CA 452	**Data Structure & C++ Lab.**	CO1	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
		CO2	For a given Search problem (Linear Search and Binary Search) student will able to implement it.
		CO3	For a given problem of Stacks, Queues, linked list and Tree, student will able to implement it and analyze the same to determine the time and computation complexity.
		CO4	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
		CO5	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.
CA 454	**Computer Graphic Lab**	CO1	Recall basic structure of computer and microoperations like register transfer language, register transfer, bus and memory transfer.
		CO2	Explain computer organization and its design.
		CO3	Describe memory organization.
		CO4	Explain input-output organization.
		CO5	Define parallel processing.
Semester-III			
CA 501	**Operating System**	CO1	Understand the basics of operating systems like kernel, shell, types and views of operating systems
		CO2	Describe the various CPU scheduling algorithms and remove deadlocks.
		CO3	Explain various memory management techniques and concept of thrashing
		CO4	Use disk management and disk scheduling algorithms for better utilization of external memory
CA 503	**Data Base Management System**	CO1	Describe the fundamental elements of relational database management systems
		CO2	Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.

		CO3	Design ER-models to represent simple database application scenarios
		CO4	Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
		CO5	Improve the database design by normalization.
		CO6	Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.
CA 505	**Analysis and Design of Algorithms**	CO1	Explain the time and space complexity of the algorithm.
		CO2	Describe elementary data structure like binary search tree, Red Black tree, binomial, B tree and Fibonacci heap.
		CO3	Compare between design techniques of algorithmlike Divide and Conquer, Dynamic algorithm, Greedy algorithm, backtracking and Amortizedalgorithm.
		CO4	Demonstrate different graph traversal algorithm like BFS, DFS, Prim's, Kruskal's, single source shortest path and all pair shortest path .
		CO5	Examine different string matching algorithm like naïve string matching, robin-karp algorithm, kurth-morrispratt algorithm.
		CO6	Distinguish between NP-hard and NP-completeness problem.
CA 507	**Intelligent System**	CO1	Define the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
		CO2	Classify AI techniques in applications which involve perception, reasoning and learning.
		CO3	Demonstrate about AI techniques for knowledge representation, planning, uncertainty management and exploration methods.
		CO4	Distinguish the knowledge of real world Knowledge representation, the modern view of AI as the study of agents that receive precepts from the environment and perform actions
		CO5	Defend a real world problem for implementation and understand the dynamic behavior of a system.

		CO6	Formulate the machine learning techniques to design AI machine and enveloping applications for real world problems.
CA 509	**Software Engineering**	CO1	apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.
		CO2	An ability to work in one or more significant application domains.
		CO3	Work as an individual and as part of a multidisciplinary team to develop and deliver quality software .
		CO4	Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software life cycle
		CO5	Demonstrate an ability to use the techniques and tools necessary for engineering practice.
CA 551	**Database Management Lab**	CO1	Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
		CO2	Design ER-models to represent simple database application scenarios
		CO3	Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
		CO4	Improve the database design by normalization.
		CO5	Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.
		CO6	Apply queries to database application to perform different operation related to data.
CA 553	**Operating System Lab**	CO1	Understand the basics of operating systems like kernel, shell, types and views of operating systems
		CO2	Describe the various CPU scheduling algorithms and remove deadlocks.
		CO3	Explain various memory management techniques and concept of thrashing
		CO4	Use disk management and disk scheduling algorithms for better utilization of external memory
Semester-IV			
CA 502	**Data Warehousing and Data Mining.**	CO1	Describe the basic concepts and techniques of Data Warehouse and Data Mining.

		CO2	Demonstrate the gathering and analysis of large sets of data to gain useful business understanding.
		CO3	Differentiate the data generalization and frequent pattern mining that can be discovered by association rule mining.
		CO4	Explain the classification, clustering and prediction in Data mining.
		CO5	Identify business applications and trends of data mining.
CA 504	**Linux and X-Windows Programming**	CO1	Students will be able to understand the basic commands of linux operating system and can write shell scripts.
		CO2	Students will be able to create file systems and directories and operate them.
		CO3	Students will be able to create processes background and fore ground etc. by fork() system calls.
		CO4	Students will be able to create shared memory segments, pipes, message queues and can exercise interprocess communication.
CA 506	**Java Programming and Web Site Design**	CO1	Identify classes, objects, members of a class and relationships among them needed for a specific problem
		CO2	Write Java application programs using OOP principles and proper program structuring
		CO3	Demonstrate the concepts of polymorphism and inheritance
		CO4	Write Java programs to implement error handling techniques using exception handling
CA 508	**Computer Networks**	CO1	Recognize the technological trends of Computer Networking.
		CO2	Discuss the key technological components of the Network.
		CO3	Evaluate the challenges in building networks and solutions to those.
CA 510-A	**Multimedia Technologies**	CO1	Identify the essential features of graphics/image data types, file formats, and colour models in images and video.
		CO2	Explain the technical details of multimedia data representations.
		CO3	Perform a comparative analysis of the major methods and algorithms for multimedia data compression.

		CO4	Explain the technical details of popular multimedia compression standards.
		CO5	configure and manage multimedia content delivery platforms.
CA 510-B	**Microprocessors**	CO1	Understand and realize the Interfacing of memory & various I/O devices with 8085 microprocessor
		CO2	Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.
		CO3	Understand the architecture and operation of Programmable Interface Devices and realize the programming & interfacing of it with 8085 microprocessor.
CA 510-C	**Advanced Computer Architecture**	CO1	Demonstrate concepts of parallelism in hardware/software.
		CO2	Discuss memory organization and mapping techniques.
		CO3	Describe architectural features of advanced processors.
		CO4	Interpret performance of different pipelined processors.
		CO5	Explain data flow in arithmetic algorithms
CA 552	**Java Programming Lab**	CO1	Identify classes, objects, members of a class and relationships among them needed for a specific problem
		CO2	Write Java application programs using OOP principles and proper program structuring
		CO3	Demonstrate the concepts of polymorphism and inheritance
		CO4	Write Java programs to implement error handling techniques using exception handling
CA 554	**Linux and Network Admin Lab**	CO1	Students will be able to understand the basic commands of linux operating system and can write shell scripts.
		CO2	Students will be able to create file systems and directories and operate them.
		CO3	Students will be able to create processes background and fore ground etc. by fork() system calls.
		CO4	Students will be able to create shared memory segments, pipes, message queues and can exercise interprocess communication.

Semester-V			
CA 601	**Object Oriented Software Engineering**	CO1	To learn and understand various O-O concepts along with their applicability contexts.
		CO2	Given a problem, identify domain objects, their properties, and relationships among them.
		CO3	How to identify and model/represent domain constraints on the objects and (or) on their relationships
		CO4	Develop design solutions for problems on various O-O concepts
		CO5	To learn various modeling techniques to model different perspectives of object-oriented software design (UML)
		CO6	To learn software development life cycle for Object-Oriented solutions for Real-World Problems.
CA 603	**Distributed Operating System**	CO1	Understand the principles and desired properties of distributed systems on which the Internet and other distributed systems are based
		CO2	Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving
		CO3	Recognize the inherent difficulties that arise due to distributed-ness of computing resources
		CO4	Identify the challenges in developing distributed applications
		CO5	Design a distributed system that fulfills requirements with regards to key distributed systems properties
CA 605	**Advanced DBMS**	CO1	Describe the fundamental elements of relational database management systems
		CO2	Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
		CO3	Design ER-models to represent simple database application scenarios
CA 607-A	**Compiler Design**	CO1	Describe the lexical structure of grammars
		CO2	Design the compilers of High Level Languages
		CO3	Implement LEX and YACC for designing Syntax Analyzers and Lexical Analyzers
		CO4	Construct Parsing Tables from Grammars like CFG
		CO5	Evaluate the code blocks and optimize them

CA 607-B	**Introduction to E-Commerce & ERP**	CO1	Analyze different types of portal technologies and deployment methodologies commonly used in the industry.
		CO2	Analyze the effectiveness of network computing and cloud computing policies in a multi- location organization.
		CO3	Analyze real business cases regarding their e-business strategies and transformation processes and choices.
		CO4	Integrate theoretical frameworks with business strategies.
CA 607-C	**Secuirty of Information System**	CO1	To describe encryption, decryption and cryptosystem
		CO2	To understand Key Management Protocols
		CO3	To understand Operating System, Database and Program Security
CA 607-D	**Web Engineering**	CO1	Grasping the basic concepts of Web Engineering.
		CO2	Acquaintance with the basic phases needed for implementing Web applications.
		CO3	Grasping the basic Web development tools.
CA 609-A	**Management Information System**	CO1	Student understand the roles of Information Systems in contemporary organizations.
		CO2	Students learn various types of information systems at various levels of the organizations.
		CO3	Student learn how to analyze and design an information system based on user requirements.
		CO4	Students understand the strategic role of information systems and information technology in organizations.
CA 609-B	**Neural Network**	CO1	To familiarize with soft computing concepts.
		CO2	To introduce the fuzzy logic concepts, fuzzy principles and relations
		CO3	To Basics of ANN and Learning Algorithms
		CO4	ANN as function approximation
		CO5	Genetic Algorithm and its applications to soft computing
		CO6	Hybrid system usage, application and optimization
CA 609-C	**Logic and Functional Programming**	CO1	Understand different approaches to solving problems: functional decomposition and declarative programming.

		CO2	Get practical experience using most widely used functional and logic programming languages: F# and Prolog.
		CO3	Understand different programming paradigms andthe relationship between programming paradigm and underlying mathematical computational model
CA 609-D	**Operational Research**	CO1	Identify and develop operational research models from the verbal description of the real system.
		CO2	Understand the mathematical tools that are needed to solve optimisation problems.
		CO3	Use mathematical software to solve the proposed models.
		CO4	Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.
CA 609-E	**.Net Framework**	CO1	Learn about MS.NET framework developed by Microsoft.
		CO2	You will be able to using XML in C#.NET specifically ADO.NET and SQL server
		CO3	Be able to understand use of C# basics, Objects and Types, Inheritance
		CO4	To develop, implement and creating Applications with C#.
		CO5	To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web
		CO6	To understand and be able to explain Security in the .NET framework and Deployment in the .NET.
		CO7	To develop Assemblies and Deployment in .NET, Mobile Application Development.
CA 651	**Object Oriented System Design Lab**	CO1	To learn and understand various O-O concepts along with their applicability contexts.
		CO2	Given a problem, identify domain objects, their properties, and relationships among them.
		CO3	How to identify and model/represent domain constraints on the objects and (or) on their relationships
		CO4	Develop design solutions for problems on various O-O concepts

		CO5	To learn various modeling techniques to model different perspectives of object-oriented software design (UML)
		CO6	To learn software development life cycle for Object-Oriented solutions for Real-World Problems
Semester-VI			

B.Tech. (Electronics and Communication Engineering)

A. Programme Objectives:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex Electronics and Communication engineering problems.
2. **Problem Analysis:** Identify, formulate, research literature, and analyze complex Electronics and Communication engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of Solutions:** Design solutions for complex Electronics and Communication engineering problems and design system componentsor processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool usage:** Create, select, and apply appropriate techniques, resources, and modern Electronics and Communication engineering and IT tools including prediction and modeling to complex Electronics and Communication engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional Electronics and Communication engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional Electronics and Communication engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the Electronics and Communication engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex Electronics and Communication engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the Electronics and Communication engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Program Specific Outcomes (PSOs):

1. Ability to design and develop Integrated Circuits.
2. Ability to design and develop Electronic Products.
3. Ability to design and develop Communication Systems.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BAS 101	**Physics**	CO1	Understand the concepts of quantum physics for materials.
		CO2	Use of equipment for low and high energy applications.
		CO3	Solve engineering problems by applying the concepts of wave and particle nature of radiant energy.
		CO4	Apply the concept of energy band for semiconductors.
		CO5	Construct a quantum mechanical model to explain the behavior of a system at microscopic level.
BAS 103	**Mathematics-I**	CO1	The essential tools of matrices and linear algebra, eigen values and diagonalization in a comprehensive manner are required.
		CO2	Understand the concept of limit, continuity and differentiability and apply in the study of Rolle's, Lagrange's and Cauchy mean value theorem and Leibnitz theorems
		CO3	Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians
		CO4	Illustrate the working methods of multiple integral and apply for finding area, volume, center of mass and center of gravity
		CO5	Recall the concept of vector and apply for directional derivatives, tangent and normal planes. Also evaluate line, surface and volume integrals
ECC 101	**Basic Electrical Engineering**	CO1	Memorize the concepts of KVL/KCL and network theorems in solving DC circuits
		CO2	Define the steady state behavior of single phase and three phase AC electrical circuits.
		CO3	Recall the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three-phase transformer
		CO4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications.
		CO5	To apply the components of low voltage electrical installations and perform elementary calculations for energy consumption

BAS 151	**Physics Lab**	CO1	Develop skills to impart practical knowledge in real time solutions.
		CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
		CO3	Design new experiments/instruments with practical knowledge.
		CO4	Gain knowledge of new concept in the solution of practical oriented problems.
ECC 151	**Electrical Engineering Lab**	CO1	Get an exposure to common electrical components and their ratings.
		CO2	Make electrical connections by wires of appropriate ratings.
		CO3	Understand the usage of common electrical measuring instruments.
		CO4	Understand the basic characteristics of transformers and electrical machines.
MEC 151	**Engineering Graphics & Design**	CO1	Draw orthographic projections of lines, planes and solids.
		CO2	Construct isometric scale, isometric projections and views.
		CO3	Draw sections of solids including cylinders, cones, prisms and pyramids.
		CO4	Draw projections of lines, planes, solids, isometric projections and sections of solids including cylinders, cones, prisms and pyramids using AutoCAD
AOC 101	**Basics of Communication**	CO1	Trained in English language including listening, speaking, reading and writing skills
		CO2	Developed the presentation skills for professional life
		CO3	Able to manage the work stress in professional life
		CO4	Able to control inter-personal conflicts.
Semester II			
BAS 202	**Chemistry**	CO1	Recall the instruments for atomic and molecular structure.
		CO2	Determine Structure of Compound by spectroscopic methods.
		CO3	analyze the importance of Chemical Industry
		CO4	understand the basic concept of hardness of water and its removal techniques.
		CO5	Study the manufacture of different products like fuel, cement, polymer, glass, soap and detergents by modern methods
BAS 204	**Mathematics-II**	CO1	Recall the differentiation and apply for solving differential equations

		CO2	Learn definite integral and apply for evaluating surface areas and volumes
		CO3	Discuss the concept of convergence of sequence and series. Also evaluate Fourier series
		CO4	Operate of Laplace transforms and apply to solve ODE and PDE
		CO5	Solution of engineering problems with Fourier and Z-transform
CSC 201	**Programming for Problem Solving**	CO1	Understand the basics of Computer System and Hardware Organization
		CO2	Learn the different tests of Memory Units, Input and Output Devices and Input Output Ports.
		CO3	Understand Basics of Programming Languages and Operating Systems and Graphical User Interface and Windows
		CO4	Solve Programming Methodology, Arrays and Structures
		CO5	Apply techniques of Operations and Expressions.
HSM 201	**Professional Communication and Soft Skills**	CO1	Trained in English language including listening, speaking, reading and writing skills.
		CO2	Developed the presentation skills Reading Techniques
		CO3	Able to manage the Essential Grammar.
		CO4	Able to Basic Technical Writing Skills and Nature and Style of sensible Writing
BAS 251	**Chemistry Lab**	CO1	Use of different analytical instruments.
		CO2	Measure molecular/system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water
		CO3	Measure hardness of water.
		CO4	Estimate the rate constant of reaction.
		CO5	Determine Structure of Compound by spectroscopic methods.
CSC 251	**Programming for Problem Solving Lab**	CO1	Explain the basic syntax, structure and execution of programs written in C language.
		CO2	Develop the C code for a given algorithm.
		CO3	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
		CO4	Write programs that perform operations using derived data types.
Semester-III			
ECC-301	**Electronic Devices andCircuits**	CO1	Understand the working and current voltage characteristics of semiconductor devices,
		CO2	Perform dc and ac analysis of amplifier circuits.
		CO3	Design amplifiers and oscillator circuits,

		CO4	Understand and work around with different performance metrics of amplifier circuits.
ECC-302	**Digital Electronics**		Analyze and design digital circuits.
		CO1	Understand working and usage of logic families.
		CO2	Implement digital circuits using gates, ICs, and programmable logics.
		CO3	Understand and use different types of digital memories.
CSC-307	**Computer Architecture**	CO1	Understand, analyze and design internal components of a digital computer.
		CO2	Understand, analyze and implement different algorithms for binary arithmetic.
		CO3	Specify a computer in Register Transfer Language.
		CO4	Analyze performance of computer and its dependence on various components.
		CO5	Design and implement different digital circuits and computer using VHDL.
ECC-303	**Signals and Systems**	CO1	Understand and specify different types of signals and systems.
		CO2	Understand, analyze and transform different signals-systems in time and frequency domains.
		CO3	Apply properties of Fourier /Laplace/ Z Transforms to electronic systems.
		CO4	Understand different steps in Analog-to-Digital signal conversion.
ECC-304	**Electronic Measurements and Instruments**	CO1	Understand working and correct usage of different electronic measurement instruments.
		CO2	Understand and estimate errors in measurement.
		CO3	Set up experiments for electronic measurements.
		CO4	Interface different transducers for Data acquisition.
HSS-30	**Indian Constitution**	CO1	To understand history and sources of Indian Constitution.
		CO2	To understand features of Indian Constitution.
		CO3	To understand structure of polity and administration at union, state and local levels.
		CO4	To understand role and functioning of Election Commission and different bodies or institutions for welfare of SC, ST, OBC and Women.
Semester-IV			
ECC-401	**Analog Communication**	CO1	Understand different modulation schemes used in analog communication. .
		CO2	Understand issue of noise in communication systems.
		CO3	Understand signal generation/ detection techniques used in different modulation schemes.

		CO4	Understand working different transmitter and receiver circuits.
ECC-402	**Analog Integrated Circuits**	CO1	Understand and analyse different circuit blocks used in an OP AMP.
		CO2	Understand different specifications and data sheets of an OP AMP.
		CO3	Design application circuits using OP AMP.
		CO4	Use 555 IC for different timing applications.
ECC-403	**Microprocessors and Microcontrollers**	CO1	Understand and program 8085 microprocessor.
		CO2	Understand and program 8051 microcontroller.
		CO3	Interface different type of peripheral devices.
		CO4	Understand and program for communication with peripherals.
		CO5	Understand and program 8085 microprocessor.
ECC-404	**VLSI Devices and Technology**	CO1	Understand physics of semiconductor devices.
		CO2	Understand working and models of different semiconductor devices.
		CO3	Understand techniques used in fabrication of semiconductor devices. .
		CO4	Understand different issues faced by modern semiconductor devices.
ECC-405	**Electromagnetic Field Theory**	CO1	Understand and analyze behaviour of static electric or magnetic field.
		CO2	Understand and solve Maxwell's equations.
		CO3	Understand electromagnetic field and related material properties in electronic systems.
		CO4	Understand electromagnetic wave propagation and power flow in a medium
ECC-406	**Circuit Theory**	CO1	Apply network theorems for solving complex circuit networks.
		CO2	Apply concepts of Graphs to solve electric circuits.
		CO3	Model and Analyze circuits in time/ frequency domain.
		CO4	Use concept of two port networks and conversion of different parameters.
		CO5	Synthesize different networks and analyse for stability.
HSS-40	**Essence of Indian Traditional Knowledge**	CO1	Understand traditional practices related to medicinal plants in Indian Society
		CO2	Understand phenomenon of urbanisation and its impact on society.
		CO3	Understand issue of Gender Inequality.
		CO4	Understand India's heritage and cultural aspects.

SEMESTER-V			
ECC-501	**Digital Communication**	CO1	Understand the basics of information theory, source coding techniques and calculate Entropy Of source.
		CO2	Describe and determine the performance of line codes and methods to mitigate inter symbol Interference.
		CO3	Learn the generation and detection of base band system.
		CO4	Understand the generation, detection signal space diagram, spectrum, bandwidth efficiency, and probability of error analysis of different band pass modulation techniques.
		CO5	Describe and determine the performance of different error control coding schemes for the Reliable transmission of digital representation of signals and information over the channel.
ECC-502	**Control Systems**	CO1	Understand feedback mechanisms and their impact on system performance.
		CO2	Determine time domain and frequency domain performance metrics.
		CO3	Design and analyze a system from frequency domain perspective.
		CO4	Determine and enhance stability property of a control system.
ECC-503	**CMOS Digital VLSIDesign**	CO1	Understand working of static and dynamic CMOS logic circuits.
		CO2	Design a CMOS circuit of given functionality and requirements.
		CO3	Understand timing and power dissipation issues in digital circuits.
		CO4	Understand and design Data-path subsystems.
			Understand and design different type of digital memory.
ECC-504	**Microwave Theory andTechniques**	CO1	Understand the working of basic microwave components
		CO2	Understand the theory of microwave amplifiers and oscillators
		CO3	Design waveguides and resonators
		CO4	Understand the basic working principle of ferrites in microwave devices
		CO5	Proficient in analysis and characterization of microwave networks
		CO6	Understand the use of microwave devices in real time scenarios.
HSS-50	**Foundations of Yoga**	CO1	To understand psychological and physiological aspects Yoga and its role in health.

		CO2	To understand historical and other multidisciplinary aspects of Yoga.
		CO3	To understand relevance of related ancient texts in modern time.
ECC-506	**Power Electronics**	CO1	Understand operation of different types of power electronic devices.
		CO2	Understand different triggering methods.
		CO3	Understand working of different type of converters used in power electronic circuits.
		CO4	Understand working of different type of inverters used in power electronic circuits.
ECC-507	**Speech and Audio Processing**	CO1	To understand mathematical model for speech and audio signal processing.
		CO2	To apply different mathematical transform methods to speech and audio signals.
		CO3	To analyse and modify signals is frequency domain.
		CO4	To understand engineering problems related to speech signals.
		CO1	Understand various aspects of nano-technology and the processes involved in making nano Components and material.
		CO2	Leverage advantages of the nano
		CO3	Understand various aspects of nano
		CO4	Leverage advantages of the nano and appropriate use in solving practical problems.
ECC-508	**Digital Signal Processing**	CO1	Interpret, represent and process discrete/digital signals and systems.
		CO2	Understand frequency domain analysis of discrete time signals.
		CO3	Ability to design & analyze DSP systems like FIR and IIR Filter etc.
		CO4	Grasp practical implementation issues such as computational complexity, hardware resource limitations as well as cost of DSP systems.
ECC-509	**Data Communication and Networking**	CO1	Explain the functions of the different layer of the OSI Protocol.
		CO2	Draw the functional block diagram of wide-area networks (WANs), local area Networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
		CO3	For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
		CO4	For a given problem related TCP/IP protocol developed the network programming.

		CO5	Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.
ECC-510	**Antenna and Wave Propagation**	CO1	Develop an understanding of the design features of various Antenna Types and their families.
		CO2	Understand the fundamentals and modes of wave propagation.
		CO3	Differentiate and deploy Broadband and Narrowband Antennas with characteristic radiation patterns.
		CO4	Use mathematical analysis and tools to simulate Antenna signals for transmission and reception.
		CO5	Quantify the fields radiated by various types of antenna.
		CO6	Plot the characteristics of wire and aperture antennas.
		CO7	Understand the significance of Micro-Strip antennas, methods of analysis and configurations.
ECC-511	**Telecommunication Switching**	CO1	Understand the concepts of networking thoroughly.
		CO2	Design a network for a particular application.
		CO3	Analyze the performance of the network.
ECC-512	**CMOS Analog IC Design**	CO1	To understand working of MOSFETs and different related effects such as parasitic etc.
		CO2	To analyse and design different amplifiers, current mirror and band gap reference circuits Using MOSFETs.
		CO3	To design an OPAMP building blocks for given specification.
		CO4	To analyze and modify frequency response of analog circuits.
ECC-513	**Information Theoryand Coding**	CO1	Understand the concept of information and entropy.
		CO2	Understand Shannon's theorem for coding.
		CO3	Calculation of channel capacity.
		CO4	Apply coding techniques.
BM-50	**Bio-Medical Electronics**	CO1	Understand the application of the electronic systems in biological and medical applications.
		CO2	Understand the practical limitations on the electronic components while handling bio Substances.
		CO3	Understand and analyze the biological processes like other electronic processes.
		CO4	Understand working and design of different sensing and imaging techniques used in medical Electronic systems.
BTC-50	**Biology**	CO1	Describe how biological observations of 18th Century that lead to major discoveries.

		CO2	Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological
		CO3	Highlight the concepts of recessive-ness and dominance during the passage of genetic material from parent to offspring
		CO4	Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine
		CO5	Classify enzymes and distinguish between different mechanisms of enzyme action.
SEMESTER-VII			
ECC-701	**Optical Fiber Communication**	CO1	Distinguish Step Index, Graded index fibers and compute mode volume.
		CO2	Explain the Transmission Characteristics of fiber and Manufacturing techniques of fiber/cable.
		CO3	Classify the construction and characteristics of optical sources and detectors.
		CO4	Discuss splicing techniques, passive optical components and explain noise in optical system.
		CO5	Design short haul and long haul Analog/ Digital optical communication systems.
ECC-702	**Embedded Systems**	CO1	Suggest design approach using advanced controllers to real-life situations.
		CO2	Design interfacing of the systems with other data handling / processing systems.
		CO3	Appreciate engineering constraints like energy dissipation, data exchange speeds etc.
		CO4	Develop a working product from given technical specifications.
ECC-703	**High Speed Electronics**	CO1	Understand significance and the areas of application of high-speed electronics circuits.
		CO2	Understand the properties of various components used in high speed electronics
		CO3	Design High-speed electronic system using appropriate components.
		CO4	Use PCB techniques for high speed PCBs and circuits.
ECC-704	**Radar Guidance AndNavigation**	CO1	Explain radar and radar range equation.
		CO2	Explain the principles, concepts and operation of radar system.
		CO3	Understand CW, FMCW, MTI and tracking radar systems.

		CO4	Understand different types of radar based guidance technique.
ECC-705	**Satellite Communication**	CO1	Explain the principles, concepts and operation of satellite communication.
		CO2	Explain the concepts and operation of telemetry and command control for satellite communication.
		CO3	Describe the concepts of signal propagation affects, link design, rain fading and link availability and perform interference calculations.
		CO4	Understand different multiple access techniques.
ECC-706	**Adaptive Signal Processing**	CO1	Understand the non-linear control and the need and significance of changing the control Parameters w. r. t. real-time situation.
		CO2	Mathematically represent the adaptability requirement.
		CO3	Understand the mathematical treatment for the modelling.
		CO4	Design of the signal processing systems.
Semester-VIII			
EEC-881	**Internship**	CO1	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job functions
		CO2	Solve real life challenges in the workplace by analyzing work environment and conditions, and selecting appropriate skill sets acquired from the course
		CO3	Articulate career options by considering opportunities in company, sector, industry, professional and educational advancement
		CO4	Communicate and collaborate effectively and appropriately with different professionals in the work environment through written and oral means

M. Tech. (VLSI)

Programme Objectives:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution ofcomplex VLSI problems.
2. **Problem Analysis:** Identify, formulate, research literature, and analyze complex VLSI problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of Solutions:** Design solutions for complex VLSI problems and design system componentsor processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool usage:** Create, select, and apply appropriate techniques, resources, and modern VLSI and IT tools including prediction and modeling to complex VLSI activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional VLSI practice.
7. **Environment and Sustainability:** Understand the impact of the professional VLSI solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the VLSI practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex VLSI activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the VLSI and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

1. Acquire competency in areas of VLSI, IC Fabrication, Design, Testing, Verification and prototype development focusing on applications.
2. Integrate multiple sub-systems to develop System on Chip, optimize its performance and excel in industry sectors related to VLSI domain.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
EV-501	VLSI Technology	CO1	Appreciate the various techniques involved in the VLSI fabrication process.
		CO2	Understand the different lithography methods and etching process.
		CO3	Appreciate the deposition and diffusion mechanisms.
		CO4	Analyze the fabrication of NMOS, CMOS memory and bipolar devices.
		CO5	Understand the nuances of assembly and packaging of VLSI devices.
EV-503	Digital VLSI Design	CO1	Classify ICs, static and dynamic VLSI design techniques.
		CO2	Design any CMOS digital VLSI combinatorial and sequential circuits.
		CO3	Design, analyze and verify digital logic circuits and MOS memories as well as Physical layout designing of circuits.
		CO4	Model the CMOS circuits with equivalent parameters.
		CO5	Build upon the theoretical & mathematical models using design principles, for proper understanding of VLSI circuits.
EV-505	Semiconductor Device Models for Circuit Simulation	CO1	Comprehend the insight of electronic devices so as to provide appropriate and economically viable solutions to electronics engineering community and society at large.
		CO2	Identify the new state of art electronic devices models to solve the real world research problems.
		CO3	Apply principles of usage of EDA tools & techniques for effective & efficient modeling of e-devices & circuits.
		CO4	Analyze the performance of electronic devices without actual fabrication so as to deal with e-designing for practical aspects
		CO5	Generate interest and competence in self-directed continuing professional development
EV-507	Programming and Data Structure	CO1	Design correct programs to solve problems.
		CO2	Choose efficient data structures and apply them to solve problems.
		CO3	Analyze the efficiency of programs based on time complexity.
		CO4	Prove the correctness of a program using loop invariants, pre-conditions and post-conditions in programs.
EV 551	VLSI Lab I	CO1	Write HDL code for basic as well as advanced digital integrated circuits.

		CO2	Import the logic modules into FPGA Boards.
		CO3	Synthesize Place and Route the digital IPs.
		CO4	Design, Simulate and Extract the layouts of Analog IC Blocks using EDA tools.
Semester II			
EV-502	Analog VLSI Design	CO1	Learn the basics of CMOS and BICMOS circuit techniques.
		CO2	Gain a well founded knowledge on filters and converters.
		CO3	Obtain knowledge on testability and VLSI interconnects.
		CO4	Grasp the concept of statistical modeling and simulation.
EV 504	Digital Systems Design	CO1	Develop a digital logic and apply it to solve real life problems.
		CO2	Analyze, design and implement combinational logic circuits.
		CO3	Analyze, design and implement sequential logic circuits.
		CO4	Classify different semiconductor memories.
		CO5	Simulate and implement combinational and sequential circuits using VHDL systems.
EV 506	CAD for VLSI	CO1	Specify layout techniques in IC
		CO2	Identify algorithms required for circuit simulators
		CO3	Incorporate timing analysis & floor planning
		CO4	Apply scripting language PERL to improve EDA tool flow
EV 552	Lab II	CO1	Write Verilog Code for the all logic gate circuits and their Test Bench for verification observe the waveform and synthesize the code with the technological library, with the given Constraints
		CO2	Design an Inverter with given specifications, completing the design flow
		CO3	Write Verilog Code for the SR, JK, D, T flip-flop circuits and their Test Bench for verification
		CO4	Write Verilog Code for the counters adder circuits and their Test Bench for verification, observe the waveform and synthesize the code with the technological library, with the given Constraints
Semester-III			
EV 601	VLSI Testability & Testing	CO1	Identify the significance of testable design
		CO2	Understand the concept of yield and identify the parameters influencing the same.
		CO3	Specify fabrication defects, errors and faults.
		CO4	Implement combinational and sequential circuit test generation algorithms
		CO5	Identify techniques to improve fault coverage.

EV 603	VLSI Physical Design	CO1	Understand the relationship between design automation algorithms and various constraints posed by VLSI fabrication and design technology.
		CO2	Adapt the design algorithms to meet the critical design parameters
		CO3	Identify layout optimization techniques and map them to the algorithms
		CO4	Develop proto-type EDA tool and test its efficacy.
EV 623	Embedded Systems Design	CO1	Acquire a basic knowledge about fundamentals of microcontrollers
		CO2	Acquire a basic knowledge about programming and system control to perform a specific task.
		CO3	Acquire knowledge about devices and buses used in embedded networking
		CO4	Develop programming skills in embedded systems for various applications.
		CO5	Acquire knowledge about basic concepts of circuit emulators.

M. Tech. (Communication Engineering)

A. Programme Objectives:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex communication problems.
2. **Problem Analysis:** Identify, formulate, research literature, and analyze complex communication problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of Solutions:** Design solutions for complex communication problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool usage:** Create, select, and apply appropriate techniques, resources, and modern communication and IT tools including prediction and modeling to complex Communication activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional communication practice.
7. **Environment and Sustainability:** Understand the impact of the professional communication solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the communication practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multi disciplinary settings.
10. **Communication:** Communicate effectively on complex communication activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the communication and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Program Specific Outcomes (PSOs):

1. An Ability to design and analyze different electronic circuits and systems.
2. An exposure to variety of programming languages and software's.
3. An ability to understand and design different modules of communication systems.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
EC 501	**Signal Theory**	CO1	Demonstrate mathematical modeling and problem solving using such models.
		CO2	Understand random process and noise effect on communication receivers.
		CO3	Understand the optimum filtering concepts for communication.
EC 503	**Digital Communication**	CO1	Understand the basics of sampling process.
		CO2	Describe and determine the performance of line codes and methods to mitigate inter symbol Interference.
		CO3	Understand the generation, detection signal space diagram, spectrum, bandwidth efficiency, and probability of error analysis of different band pass modulation techniques.
		CO4	Understand the spread spectrum modulation techniques.
EC 505	**Computer Communication and Networks**	CO1	Understand the basics of data communication techniques.
		CO2	Explain the functions of the different layer of the OSI Protocol.
		CO3	Compare the different protocols and network topologies.
		CO4	Solve the implementation and performance design issues for local area networks (LANs).
EC 507	**Digital Signal Processing**	CO1	Understand frequency domain analysis of discrete time signals.
		CO2	Design FIR and IIR type digital filters.
		CO3	Find DFT of a given signal through Fast Fourier Transform Techniques.
		CO4	Understand the concepts of Multi-rate digital filtering.
Semester II			
EC 502	**Information Theory & Coding**	CO1	Understand the concept of information and entropy.
		CO2	Understand Shannon's theorem for coding.
		CO3	Calculation of channel capacity.
		CO4	Apply coding techniques.
EC 504	**Microwave Theory & Circuits**	CO1	Understand the basic concepts of Electromagnetic theory.
		CO2	Understand design parameters of transmission lines.
		CO3	Design different types of waveguides.
		CO4	Understand the impedance matching and tuning.
		CO5	Analysis and design of passive components.

EC 506	**Communication Hardware**	CO1	Understand the basic line circuits in telephony and telegraphy.
		CO2	Understand the different switching and signaling schemes.
		CO3	Compare the properties of connecting networks.
		CO4	Calculate blocking probability for different tele-traffic theory.
HSM 201	**CAD of RF and Microwave Circuits**	CO1	Understand the behavior of RF passive components and model active components.
		CO2	Compare the performance of different small signal amplifiers.
		CO3	Simulation using harmonic balance and different oscillators.
		CO4	Justify the choice/selection of components from the design aspects.
		CO5	Analyze the subsystems/ modules using CAD tool.
		CO6	Synthesis of frequency using DDS and PLL.
Semester-III			
EC 601	**Optical Communication System**	CO1	Understand the optical signaling schemes.
		CO2	Classify the construction and characteristics of optical sources and detectors.
		CO3	Calculate the SNR and optimum gain in APD.
		CO4	Discuss the optical line coding schemes.
		CO5	Understand the different optical fiber cables.
EC 603	**Detection & Estimation Theory**	CO1	Understand the Hypothesis testing bayes and types of estimates and error bounds.
		CO2	Characterize and apply probabilistic techniques in modern decision systems, such as information systems, receivers, filtering and statistical operations.
		CO3	Demonstrate mathematical modeling and problem solving using such models.
		CO4	Understand the application to communication, radar and sonar systems.
		CO5	Compare the estimation and detection of coloured noise, elements sequential and non-parametric.
EC 605	**Antenna Theory & Techniques**	CO1	Develop an understanding of the design features of various Antenna Types and their families.
		CO2	Differentiate and deploy Broadband and Narrowband Antennas with characteristic radiation patterns.
		CO3	Use mathematical analysis and tools to simulate Antenna signals for transmission and reception.
		CO4	Analysis of different antenna using assumed current distribution, field equivalence and Fourier transform methods.
		CO5	Plot the characteristics of wire and aperture antennas.

EC 609	**Network Security**	CO1	Identify and utilize different forms of cryptography techniques.
		CO2	Incorporate authentication and security in the network applications.
		CO3	Distinguish among different types of threats to the system and handle the same.

B.Tech. (Mechanical Engineering)

A. Programme Objectives (POs):

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Program Specific Outcomes (PSOs):

1. Plan, design, construct, maintain and improve mechanical engineering systems that are technically sound, economically feasible and socially acceptable to enhance quality of life.
2. Apply modern computational, analytical, simulation tools and techniques to address the challenges faced in mechanical and allied engineering streams.

3. Communicate effectively using innovative tools and demonstrate leadership & entrepreneurial skills.
4. Exhibit professionalism, ethical attitude, and team spirit and pursue lifelong learning to achieve career and organizational goals.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BAS 101	**Physics**	CO1	Understand the concepts of quantum physics for materials.
		CO2	Use of equipment for low and high energy applications.
		CO3	Solve engineering problems by applying the concepts of wave and particle nature of radiant energy.
		CO4	Apply the concept of energy band for semiconductors.
		CO5	Construct a quantum mechanical model to explain the behavior of a system at microscopic level.
BAS 103	**Mathematics-I**	CO1	The essential tools of matrices and linear algebra, eigen values and diagonalization in a comprehensive manner are required.
		CO2	Understand the concept of limit, continuity and differentiability and apply in the study of Rolle's, Lagrange's and Cauchy mean value theorem and Leibnitz theorems
		CO3	Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians
		CO4	Illustrate the working methods of multiple integral and apply for finding area, volume, center of mass and center of gravity
		CO5	Recall the concept of vector and apply for directional derivatives, tangent and normal planes. Also evaluate line, surface and volume integrals
ECC 101	**Basic Electrical Engineering**	CO1	Memorize the the concepts of KVL/KCL and network theorems in solving DC circuits
		CO2	Define the steady state behavior of single phase and three phase AC electrical circuits.
		CO3	Recall the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three-phase transformer

		CO4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications.
		CO5	To apply the components of low voltage electrical installations and perform elementary calculations for energy consumption
BAS 151	**Physics Lab**	CO1	Develop skills to impart practical knowledge in real time solutions.
		CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
		CO3	Design new experiments/instruments with practical knowledge.
		CO4	Gain knowledge of new concept in the solution of practical oriented problems.
ECC 151	**Electrical Engineering Lab**	CO1	Get an exposure to common electrical components and their ratings.
		CO2	Make electrical connections by wires of appropriate ratings.
		CO3	Understand the usage of common electrical measuring instruments.
		CO4	Understand the basic characteristics of transformers and electrical machines.
MEC 151	**Engineering Graphics & Design**	CO1	Draw orthographic projections of lines, planes and solids.
		CO2	Construct isometric scale, isometric projections and views.
		CO3	Draw sections of solids including cylinders, cones, prisms and pyramids.
		CO4	Draw projections of lines, planes, solids, isometric projections and sections of solids including cylinders, cones, prisms and pyramids using AutoCAD
AOC 101	**Basics of Communication**	CO1	Trained in English language including listening, speaking, reading and writing skills
		CO2	Developed the presentation skills for professional life
		CO3	Able to manage the work stress in professional life
		CO4	Able to control inter-personal conflicts.
Semester II			
BAS 202	**Chemistry**	CO1	Recall the instruments for atomic and molecular structure
		CO2	Determine Structure of Compound by spectroscopic methods.
		CO3	analyze the importance of Chemical Industry

		CO4	understand the basic concept of hardness of water and its removal techniques.
		CO5	Study the manufacture of different products like fuel, cement, polymer, glass, soap and detergents by modern methods
BAS 204	**Mathematics-II**	CO1	Recall the differentiation and apply for solving differential equations
		CO2	Learn definite integral and apply for evaluating surface areas and volumes
		CO3	Discuss the concept of convergence of sequence and series. Also evaluate Fourier series
		CO4	Operate of Laplace transforms and apply to solve ODE and PDE
		CO5	Solution of engineering problems with Fourier and Z-transform
CSC 201	**Programming for Problem Solving**	CO1	Understand the basics of Computer System and Hardware Organization
		CO2	Learn the different tests of Memory Units, Input and Output Devices and Input Output Ports.
		CO3	Understand Basics of Programming Languages and Operating Systems and Graphical User Interface and Windows
		CO4	Solve Programming Methodology, Arrays and Structures
		CO5	Apply techniques of Operations and Expressions.
HSM 201	**Professional Communication and Soft Skills**	CO1	Trained in English language including listening, speaking, reading and writing skills.
		CO2	Developed the presentation skills Reading Techniques
		CO3	Able to manage the Essential Grammar.
		CO4	Able to Basic Technical Writing Skills and Nature and Style of sensible Writing
BAS 251	**Chemistry Lab**	CO1	Use of different analytical instruments.
		CO2	Measure molecular/system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water
		CO3	Measure hardness of water.
		CO4	Estimate the rate constant of reaction.
		CO5	Determine Structure of Compound by spectroscopic methods.
CSC 251	**Programming for Problem Solving Lab**	CO1	Explain the basic syntax, structure and execution of programs written in C language.
		CO2	Develop the C code for a given algorithm.

		CO3	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
		CO4	Write programs that perform operations using derived data types.
Semester-III			
MEC 303	**Engineering Mechanics**	CO1	Determine the resultant force and moment for a given force system.
		CO2	Analyze planar and spatial systems to determine the forces in members of trusses, frames and problems related to friction.
		CO3	Calculate the motion parameters for a body subjected to a given force system.
		CO4	Determine the deformation of a shaft and understand the relationship between material constants.
		CO5	Determine the centroid and second moment of area.
MEC 304	**Thermodynamics**	CO1	Understand the concepts of continuum, system, control volume, thermodynamic properties, thermodynamic equilibrium, work and heat.
		CO2	Apply the laws of thermodynamics to analyze boilers, heat pumps, refrigerators, heat engines, compressors and nozzles.
		CO3	Evaluate the performance of steam power cycles.
		CO4	Evaluate the available energy and irreversibility.
		CO5	Evaluate properties of pure substances and gas mixtures.
		CO6	Analyze air standard cycles applied in prime movers.
MEC 305	**Material Engineering**	CO1	Understand the crystal structure and classification of materials.
		CO2	Understand methods of determining mechanical properties and their suitability for applications.
		CO3	Classify cast irons and study their applications.
		CO4	Interpret the phase diagrams of materials.
		CO5	Select suitable heat-treatment process to achieve desired properties of metals and alloys.
BAS 308	**Mathematics III**	CO1	Solve field problems in engineering involving PDEs
		CO2	Formulate and solve problems involving random variables
		CO3	Apply statistical methods for analyzing experimental data
HSM 302	**Managerial Economics**	CO1	Understand the roles of managers in firms and make optimal business decisions by integrating the concepts of economics, mathematics and statistics

			and analyze real world business problems with a systematic theoretical framework.
		CO2	Examine the internal and external decisions to be made by managers.
		CO3	Critical analyze the demand and supply conditions and assess the position of a company.
		CO4	Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets.
ECC 306	**Basic Electronics Engineering**	CO1	Acquire basic knowledge on the working of various semi-conductor devices
		CO2	Develop analysis capability in BJT and FET Amplifier Circuits
		CO3	Develop competence in frequency response analysis of discrete amplifiers
		CO4	Understand design competence in signal and power amplifiers using BJT and FET
		CO5	Acquire knowledge on basic digital electronic gates
		CO6	Develop knowledge on design trade-offs in various digital electronic families with a view towards reduced power consumption
Semester-IV			
HSM 403	**Industrial Psychology**	CO1	Understanding the various methods of Training
		CO2	Knowledge of the Training calendar
		CO3	Understand the training need assessment and analysis
		CO4	Understanding the concepts, the concepts of quality of work life
MEC 406	**Applied Thermodynamics**	CO1	Apply thermodynamic concepts to analyze turbo machines.
		CO2	Analyze power plant and propulsion cycles.
		CO3	Analyze impulse and reaction machines for energy transfer.
		CO4	Design gas turbine and steam turbine components.
		CO5	Evaluate the thermal performance of machines components.
MEC 407	**Fluid Mechanics and Fluid Machines**	CO1	Apply conservation laws to fluid flow problems in engineering applications.
		CO2	Design experimental procedure for physical model studies.
		CO3	Design the working proportions of hydraulic machines.
		CO4	Compute drag and lift coefficients using the theory of boundary layer flows.

		CO5	Analyze and design free surface and pipe flows
		CO6	Formulate and solve one dimensional compressible fluid flow problems
MEC 408	**Strength of Materials**	CO1	Recognize various types of loads applied on machine components of simple geometry and identify the nature of internal stresses that will develop within the components
		CO2	Solve real life problems based on stress generation in machine components.
		CO3	Examine the possibilities that arise due to different end conditions and load variations in machine components.
		CO4	Evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading
MEC 409	**Instrumentation and Control**	CO1	Understand the accuracy, range, resolution and error of measurements by using instruments.
		CO2	Understand the basics of signal processing and control systems.
		CO3	Apply the techniques for controlling devices automatically.
		CO4	Apply sensors for common engineering measurements.
MEC 410	**Internal Combustion Engines**	CO1	Understand working and performance of IC Engines through thermodynamic cycles.
		CO2	Understand combustion phenomena in SI and CI engines and factors influencing combustion chamber design.
		CO3	Outline emission formation mechanism of IC engines, its effects and the legislation standards.
		CO4	Understand working principles of instrumentation used for engine performance and emission parameters.
		CO5	Evaluate methods for improving the IC engine performance.
		CO6	Understand the latest developments in IC Engines and alternate fuels.
Semester-V			
MEC 512	**Heat Transfer**	CO1	Understand the basic modes of heat transfer.
		CO2	Compute temperature distribution in steady-state and unsteady-state heat conduction.
		CO3	Understand and analyze heat transfer through extended surfaces.
		CO4	Interpret and analyze forced and free convection heat transfer.
		CO5	Understand the principles of radiation heat transfer

		CO6	Design heat exchangers using LMTD and NTU methods.
MEC 513	**Solid Mechanics**	CO1	Understand the deformation behavior of solids under loading
		CO2	Solve problems for stresses induced in rotating components
		CO3	Analyze component's suitability for required task.
		CO4	Design new components suitable for required tasks.
MEC 514	**Manufacturing Processes**	CO1	Understand the principles and process parameters of both conventional and nonconventional manufacturing processes.
		CO2	Categorize and select the suitable conventional and nonconventional manufacturing processes as per requirements of the end products and with the aim of reducing cost, manpower, material wastage and machining time.
		CO3	Identify the process parameters affecting the quality of end product in different conventional and nonconventional manufacturing processes.
		CO4	Apply a suitable conventional/nonconventional manufacturing processes, process parameters and corresponding machine tool for a specific purpose in real time.
		CO5	Apply the fundamental knowledge and practical experience of manufacturing process in industrial applications where conventional/nonconventional machining is required.
MEC 515	**Kinematics & Theory of Machines**	CO1	Understand the principles of kinematic pairs, chains and their classification, DOF, inversions, equivalent chains and planar mechanisms.
		CO2	Analyze the planar mechanisms for position, velocity and acceleration.
		CO3	Synthesize planar four bar and slider crank mechanisms for specified kinematic conditions.
		CO4	Evaluate gear tooth geometry and select appropriate gears for the required applications.
		CO5	Design cams and followers for specified motion profiles.
MEC 516	**Automotive Chassis**	CO1	Understand the functioning of the machine components of Engine and vehicle body/Chases.
		CO2	Identify mechanisms in real applications.
		CO3	Ability to know the steering geometry.
		CO4	Recognize what should be the tyre pressure for different vehicle.

		CO5	Identify which type of brakes is best for vehicle and recognize which safety systems are best for vehicle and also for safety consideration.
MEC 553	**Thermal Engineering Lab.**	CO1	Develop skills to impart practical knowledge in real time solutions.
		CO2	Measure various properties of fluids and Thermal Systems.
		CO3	Characterize the performance of fluid and thermal machinery.
OME 501	**Industrial Safety**	CO1	Analyze the effects of release of toxic substances.
		CO2	Select the methods of prevention of fires and explosions.
		CO3	Understand the methods of hazard identification and preventive measures.
		CO4	Assess the risks using fault tree diagram.
Semester-VI			
MEC 619	**Manufacturing Technology**	CO1	Identify the tooling needed for manufacturing.
		CO2	Measure the dimensions with dimensional accuracy and tolerances of products.
		CO3	Assemble different components using advanced material handling techniques.
		CO4	Apply optimization methods in manufacturing.
		CO5	Apply forecasting and scheduling techniques to production systems.
MEC 620	**Design of Machine Elements**	CO1	Identify the failure criteria using component behavior subjected to loads.
		CO2	Understand the concepts of principal stresses, theories of failure, stress concentration and fatigue loading.
		CO3	Design shafts, couplings and gears.
		CO4	Analyze the pressure distribution and design journal bearings.
		CO5	Design belts, springs, brakes, clutches and engine parts.
MEC 621	**Non-Destructive Evaluation and Testing**	CO1	Understand non-destructive tests.
		CO2	Apply non-destructive tests on components.
		CO3	Evaluate suitable NDT method for requires components.
		CO4	Develop new non-destructive testing methods for components.
MEC 623	**Vehicle Dynamics**	CO1	Identify the various forces and loads
		CO2	Identify performance under acceleration, ride and braking.

		CO3	Understand acceleration and braking characteristics, effect on vehicle due to various forces
		CO4	Understand what is ride and handling in vehicle design.
		CO5	Balance machine at the time of design by considering all forces.
MEC 654	**Design Engineering Laboratory**	CO1	Understand the deformation behavior of materials.
		CO2	Understand the kinematic and dynamic characteristics of mechanical devices.
		CO3	Draw complex geometries of machine components in sketcher mode.
		CO4	Generate freeform shapes in part mode to visualize components.
		CO5	Create complex engineering assemblies using appropriate assembly constraints.
OME602	**Total Quality Management**	CO1	Develop an understanding on quality management philosophies and frameworks.
		CO2	Adopt TQM methodologies for continuous improvement of quality.
		CO3	Measure the cost of poor quality, process effectiveness and efficiency to identify areas for improvement.
		CO4	Apply benchmarking and business process reengineering to improve management processes.
		CO5	Determine the set of indicators to evaluate performance excellence of an organization
OME603	**Maintenance and Reliability**	CO1	Understand the concepts of reliability, availability and maintainability
		CO2	Develop hazard-rate models to know the behaviour of components
		CO3	Build system maintenance and reliability models for different configurations
		CO4	Asses reliability of components and systems using field and test data
		CO5	Implement strategies for improving reliability of repairable and non-repairable systems
Semester-VII			
MEC 724	**Operations Research**	CO1	Understand game, queuing and decision theories
		CO2	Solve linear programming problems
		CO3	Determine optimum solution to transportation problem
		CO4	Determine average queue length and waiting times of queuing models.

		CO5	Determine optimum inventory and cost in inventory models.
MEC 725	**Industrial Automation**	CO1	Enumerate principles, strategies and advantages of industrial automation.
		CO2	Select level of automation and calculate manpower requirement.
		CO3	Design material handling and material storage systems for an automated factory.
		CO4	Automate shop floor controls and part/device identification methods.
		CO5	Study the effect of automation by simulation and experimentation.
MEC 726	**Automobile Engineering**	CO1	Understand the basic lay-out of an automobile.
		CO2	Understand the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems.
		CO3	Understand the principles of transmission, suspension, steering and braking systems.
		CO4	Understand automotive electronics.
		CO5	Study latest developments in automobiles.
MEC 729	**Industrial Robotics**	CO1	Model forward and inverse kinematics of robot manipulators.
		CO2	Analyze forces in links and joints of a robot.
		CO3	Programme a robot to perform tasks in industrial applications.
		CO4	Design intelligent robots using sensors.
OME 704	**Engineering Acoustics**	CO1	Understand wave propagation, absorption, transmission, reflection and radiation.
		CO2	Formulate acoustic problems for reduction of sound levels.
		CO3	Analyze and design resonant systems including pipes, mufflers, Helmholtz resonators.
		CO4	Evaluate architectural acoustics reverberation time, direct echoes and acoustical amplification.
		CO5	Analyze the acoustic levels and analytical predictions.
OME 705	**Project Management**	CO1	Understand the importance of projects and its phases.
		CO2	Analyze projects from marketing, operational and financial perspectives.
		CO3	Evaluate projects based on discount and non-discount methods.
		CO4	Develop network diagrams for planning and execution of a given project.

		CO5	Apply crashing procedures for time and cost optimization.
MEC 755	**Automobile Engineering Laboratory**	CO1	Understand the Construction, working and other details about Internal Combustion Engines used in automobiles
		CO2	Identify Construction, working, preventive maintenance, troubleshooting and diagnosis of various Automobile Systems.
		CO3	Understand importance and features of different systems like axle, brakes, steering, suspension, and balancing etc.
		CO4	Identify Modern technology and safety measures used in Automotive Vehicles
MEC 771	**Project**	CO1	Identify methods and materials to carry out experiments/develop code.
		CO2	Reorganize the procedures with a concern for society, environment and ethics.
		CO3	Analyze and discuss the results to draw valid conclusions.
		CO4	Prepare a report as per recommended format and defend the work.
		CO5	Explore the possibility of publishing papers in peer reviewed journals/conference proceedings.
Semester-VIII			
MEC 881	**Internship**	CO1	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job functions
		CO2	Solve real life challenges in the workplace by analyzing work environment and conditions, and selecting appropriate skill sets acquired from the course
		CO3	Articulate career options by considering opportunities in company, sector, industry, professional and educational advancement
		CO4	Communicate and collaborate effectively and appropriately with different professionals in the work environment through written and oral means
		CO5	Recommend ideas to improve work effectiveness and efficiency by analyzing challenges and considering viable options
		CO6	Exhibit professional ethics by displaying positive disposition during internship

M.Sc. (Mathematics)

A. Programme Objectives:

PO1. **Engineering Knowledge:** Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of mathematical models from defined problems.

PO2. **Problem Analysis:** Ability to identify, critically analyze and formulate complex mathematical problems using fundamentals of mathematical application domains.

PO3. **Design / Development of Solutions:** Ability to transform complex research, academic problems and contemporary issues into research problems, investigate, understand and propose integrated solutions by using emerging technologies.

PO4. **Conduct Investigations of Complex mathematical problems:** Ability to conduct analysis and interpretation of data and provide well informed conclusions.

PO5. **Modern Tool Usage:** Ability to select modern software as tools and apply appropriate techniques for necessary solutions.

PO6. **Professional Ethics:** Ability to follow ethical principles and responsibilities in a global environment.

PO7. **Life-long Learning:** Recognize the need for and develop the ability to engage in independent and continuous learning as a mathematician.

PO8. **Project Management:** Ability to demonstrate knowledge of mathematical principles to apply these to own work and manage projects in multidisciplinary environments.

PO9. **Communication Efficacy:** Communicate effectively with the mathematical community as well as society and able to write reports and design comprehend documentations and presentations.

PO10. **Environmental Concern:** Ability to recognize economical, environmental, social, health, legal and ethical issues involved in mathematical problems and impact on other relevant professional engineering solutions.

PO11. **Individual & Team Work:** Ability to work as a member or leader in diverse teams in multidisciplinary environment.

PO12. **Innovation and Entrepreneurship:** Identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

B. Program Specific Outcomes (PSOs):

1. define the fundamental axioms in mathematics and try to improve capabilities.
2. acquire basic idea about the software and computer skills and algorithms.
3. provide an idea about the wide range of mathematical techniques and its application.
4. classify the advanced topics in pure and applied mathematics.
5. pursue career as a researcher in mathematics and inter-disciplinary fields.
6. support the students in preparing for competitive exam and higher education examination e.g. (NET GATE JRF).

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
MAMS-101	**Linear Algebra**	CO1	Recall matrix manipulations
		CO2	Classify the vector space, linear intendance and foundation of abstract algebraic thinking
		CO3	Explain the problems of linear equitation with mathematical software i.e. matlab, wolfram mathematica etc.
		CO4	Analyze system of linear equation
MAMS-102	**Ordinary Differential Equations & Applications**	CO1	Find general solutions to first-order, second-order, and higher-order homogeneous and non homogeneous differential equations by manual and technology-based methods.
		CO2	Ability to handle ordinary differential equations and solve them under appropriate assumptions.
		CO3	Ability to solve a linear system of Ordinary differential equations.
		CO4	Apply important properties of stability for linear and non linear systems
MAMS-103	**Real & Complex Analysis**	CO1	Understand the basics of Real analysis
		CO2	Apply the acquired knowledge in probability theory.
		CO3	Explain, how complex numbers provide a satisfying extension of the real numbers
		CO4	Solve real integrals by doing complex integration; Taylor series of a complex variable illuminating the relationship between real function that seem unrelated
		CO5	Learn techniques of complex analysis that make practical problems easy (e.g. graphical rotation and scaling as an example of complex multiplication
MAMS-104	**Number Theory & Cryptography**	CO1	Recall the sets and number system
		CO2	Classify Divisibility, the fundamental theorem of arithmetic and the Sieve of Eratosthenes
		CO3	Explain the problems of Congruence's, Quadratic residues, Euler's quotient function and Mobius inversion formula
		CO4	Analyze system of primarily and factoring
		CO5	Discuss to useful tools in cryptography and related applied subject
CSMS-110	**Computer Fundamentals and Programming using C**	CO1	Learn techniques of complex analysis that make practical problems easy (e.g. graphical rotation and scaling as an example of complex multiplication); Understand the basics of Computer System and Hardware Organization
		CO2	Apply the different tests of Memory Units, Input and Output Devices and Input Output Ports.
		CO3	Explain basics of programming languages and operating systems and graphical user interface and windows
		CO4	Solve programming methodology, arrays and structures
		CO5	Learn techniques of operations and expressions

CSMS-154	**'C' Language Lab.**	CO1	Understand the algorithms for arithmetic and logical problems.
		CO2	Classify algorithms of the programs & execution (in C language).
		CO3	Explain the conditional branching, iteration and recursion.
		CO4	Solve problem into functions and synthesize a complete program using divide and conquer approach.
		CO5	Develop algorithms and programs based on arrays, pointers and structures.
MAMS 181	**Seminar**	CO1	to take a piece of writing through the process of revision in order to advance their ideas and communicate more effectively with their readers.
		CO2	discern the assignment's intended audience and objectives and respond appropriately.
		CO3	identify the disciplinary context for different kinds of writing, including both informal writing (like scientific note taking) and formal writing (like a research paper in Government).
		CO4	construct a paper consistent with expectations of the discipline, including an appropriate organization, style, voice, and tone.
		CO5	perform critical readings of their own writing and the writing of others.
Semester II			
MAMS-201	**Abstract Algebra**	CO1	Memorize about group and its application
		CO2	Classify the normal Subgroups and its compositions
		CO3	Illustrate the Solvability of group and some important theorem
		CO4	Interpret the ring theory in detail
		CO5	Construct polynomial over arbitrary ring
MAMS-202	**Operations Research**	CO1	Recall the meaning of operations research and memorize the various techniques of operations research
		CO2	Use operations research to: solve transportation problems during the allocation of trucks to excavators
		CO3	Formulate operation research models to solve real life problem proficiently allocating scarce resources to optimize and maximize profit
		CO4	Eliminate customers / clients waiting period for service delivery
		CO5	Discuss real life problems into formulation of models and solve by linear programming etc
MAMS-203	**Partial Differential Equations and Applications**	CO1	Describe real-world systems using PDEs.
		CO2	Students can solve first order PDEs and second order PDE using different method
		CO3	Determine the existence, uniqueness, of solution of PDEs
		CO4	Find out the solution of One and two dimensional diffusion equation
		CO5	Formulate Laplace equation in Cartesian, polar, spherical and cylindrical coordinates

MAMS-204	**Advanced Numerical Analysis**	CO1	Memorize about Linear equations and its application
		CO2	Classify the Eigen values of Symmetric matrices and its compositions
		CO3	Illustrate the techniques to solve the Ordinary Differential Equations.
		CO4	Interpret the finite difference method to find the solution of Partial Differential Equations.
		CO5	Discuss the Finite Element Method over 1D & 2D
CSMS-210	**Data Structure Using 'C'**	CO1	Define basic data structure such as arrays, linked list, stacks and queues.
		CO2	Classify the types of linked list.
		CO3	Describe trees and its operations.
		CO4	Solve problem involving graphs, trees & heaps.
		CO5	Apply algorithm for solving problem like sorting & searching.
MAMS-251	**Numerical Analysis Lab.**	CO1	Understand the algorithms for linear system of equations.
		CO2	Classify algorithms of the programs & execution to find the Eigen values of Symmetric matrices.
		CO3	Solve problem of Ordinary Differential Equations
		CO4	Develop algorithms and programs for finite difference method.
HSMS-201	**Personality Development & Soft Skill**	CO1	Trained in English language including listening, speaking, reading and writing skills.
		CO2	Developed the presentation skills for professional life
		CO3	Able to manage the work stress in professional life.
		CO4	Able to control inter-personal conflicts.
Semester-III			
MAMS-301	**Topology**	CO1	Memorize the basics of Topology and its application
		CO2	Classify the Continuous functions and Homeomorphisms, components and locally connected spaces its compositions
		CO3	Illustrate the countability and seperability with some important theorem
		CO4	Interpret the Separation axioms in detail
		CO5	Construct Sequential compactness
MAMS-302	**Fluid Dynamics**	CO1	Memorize about fluid and its physical properties
		CO2	Classify the One and two dimensional inviscid incompressible
		CO3	Illustrate theorem of Blasius, Milne's circle, Stokes stream function and Buckingham's pie
		CO4	Interpret the principal axis and principle values of stress tensor in detail
		CO5	Construct flow of viscous incompressible fluids-Steady flow between two infinite parallel plates (non-porous and porous)
MAMS-351	**Matlab**	CO1	Understand the algorithms for plot of a curve, script file and function file
		CO2	Classify algorithms of the programs & execution to all matrix manipulations.
		CO3	Implementation of if-else, for and while loops

		CO4	Develop algorithms and programs for interpolation & curve fitting
		CO5	Solve the problems of ordinary differential equations
HSMS-301	**Ethics in Research and Plagiarism**	CO1	Learn the basic of philosophy of science, research integrity and publication ethics.
		CO2	Describe research misconduct of publications.
		CO3	Analyze the indexing and citation databases in open access publications
		CO4	Explain the research metrics and plagiarism.
Open Elective-I and II			
MAMS-321	**Lebesgue Measure & Integration**	CO1	Recall Algebra of sets and Measure of open and closed sets
		CO2	Classify the Approximation of measurable functions
		CO3	Explain the Lebesgue integral of simple functions, Integration of bounded & measurable functions and of non-negative functions and Monotone convergence theorem etc.
		CO4	Analyze system of L^p –Spaces and Holder's and Minkowski's inequalities.
MAMS-322	**Functional Analysis**	CO1	Understand the basics of Normed linear spaces and Banach spaces.
		CO2	Apply the Orthogonal and orthonormal systems in Hilbert space with examples, Bessel's and Parseval's inequality.
		CO3	Analyse Continuity of linear maps on normed linear spaces.
		CO4	Solve real Isometric isomorphism of H onto itself under Unitary operators and their importance and Projection operators on Banach spaces and Hilbert spaces.
		CO5	Explain the techniques of Contraction Mappings with examples.
MAMS-323	**Advanced Complex Analysis**	CO1	Recall the Analytic Functions and Entire Functions.
		CO2	Classify Harmonic functions in the disc, Mean Value Property and Maximum and Minimum Principle Quadratic reciprocity.
		CO3	Explain the Spaces of Analytic functions, Compactness and Convergence.
		CO4	Analyze of Gamma function, Riemann zeta function, Riemann hypothesis
		CO5	Discuss to useful tools in Analytic Continuation, Definition and uniqueness of analytic continuation, standard method of analytic continuation using power series
MAMS-324	**Tensors & Differential Geometry**	CO1	Find general solutions Theory of Space Curves.
		CO2	Understand the theory of Surfaces, Principal and Gaussian curvatures.
		CO3	Develop the relations between the space curves and curves on surfaces
		CO4	Apply Gauss-Bonnet theorem, Surfaces of constant curvature, Conformal mapping, Geodesic mapping and Tissot's theorem.
		CO5	Discuss the useful tools in Tensors: Summation convention and indicial notation, Coordinate

			transformation and Jacobian, Contra-variant and Covariant vectors, Tensors of different type, Algebra of tensors and contraction.
MAMS-325	**Special Functions**	CO1	Recall the Hyper geometric functions.
		CO2	Classify Barnes' contour integral representation, Confluent hyper geometric function and its elementary properties
		CO3	Explain the problems of elementary properties, term by term differentiation, integration, theorem of uniqueness and Watson's lemma
		CO4	Analyze system of some standard forms including Boas and Buck type.
		CO5	Create the useful tools Christofel-Darboux formula, Bessel's inequality. Hermite, Laguerre and Jacobi and Ultra spherical polynomials
MAMS-326	**Mathematical Methods**	CO1	Memorize standard methods for solving inner products of functions, Orthogonal set of functions and Fourier series and its properties
		CO2	Discuss the differentiation and integration of Fourier series and solution of ordinary boundary value problems in Fourier series
		CO3	Demonstrate the relation between of Fredholm and Voterra's integral equations
		CO4	Solve eigen values and eigen functions, iterated kernels and iterative scheme for solving Fredholm and Voterra's integral equation of second kind
		CO5	Apply Hilbert Schmidt theory, symmetric kernels and orthonormal systems of functions of integral equations
MAMS-327	**Probability and Statistics**	CO1	Understand the basics of probability and its distributions.
		CO2	Classify correlation, regression, multiple and partial correlation coefficient and Multiple regression analysis
		CO3	Describe the point and interval estimation, Statistical hypothesis, Null and alternative hypothesis, Two types of errors and Power of test.
		CO4	Discuss techniques of components of a time Series and measurement of trend by methods.
		CO5	Understand the basics of probability and its distributions.
MAMS-328	**Optimization Techniques**	CO1	Recall the Convex sets and their properties from the point of view of mathematical programming, Kuhn-Tucker conditions and concept of concavity and convexity
		CO2	Classify Theory of revised simplex algorithm, duality theory of linear programming and Sensitivity analysis
		CO3	To know Unconstrained optimization techniques
		CO4	Explain the Quadratic programming, Wolfe's algorithm, Beales algorithm, Theil and Vande and Panne algorithm.
		CO5	Analyze duality theory of quadratic and convex programming and sequential inconstrained minimization.

MAMS-329	**Discrete Mathematics and Graph Theory**	CO1	Recall the logic and connectives
		CO2	Interpret Boolean algebra, Lattices and Sublattices
		CO3	Discuss Hamiltonian paths and circuits of graphs and its existence theory and traveling salesman problem.
		CO4	Apply cut-sets on circuits, connectivity and separability, network flows and 1-isomorphism and 2-isomorphism.
		CO5	Create Euler's formula, Kuratowski's graphs, tools in fundamental cut set matrix, path matrix and adjacency matrix of a graph and digraph.
Open Elective-III			
CSMS 321	**Basic of Database Management System**	CO1	Recall the Database management system (DBMS) and Comparison of DBMS with file processing system.
		CO2	Classify Entity Relationship Model.
		CO3	Interpret the Relational Model.
		CO4	Explain the Query Languages: Structured Query Language (SQL).
		CO5	Analyze system of Transaction Processing
CSMS-322	**Basic of Object oriented Programming Using C^{++}**	CO1	Recall the Object oriented paradigm, Basic concepts, Tokens, Keywords and Identifiers and Constants.
		CO2	Classify the Classes, Objects, Constructors and Destructors..
		CO3	Explain the Basic concept, Types of inheritance, Single Inheritance, Multi level Inheritance, Hierarchical Inheritance, Multiple Inheritance, Virtual Base class, Abstract classes and Constructors in derived classes and Function overriding
		CO4	Discuss the Working with files of system
		CO5	Analyze Exception Handling and String handling of system
CSMS-323	**Mathematical Modeling & Simulation**	CO1	Recall the of System definition and components, Stochastic activities, Continuous and discrete Systems
		CO2	Classify the System simulation.
		CO3	Discuss about Discrete system Simulation and Fixed time step vs event to event model..
		CO4	Explain the Basic concept System dynamics, exponential growth models, Exponential decay models and Modified exponential growth models
		CO5	Analyze system of Simulation of PERT networks.
CSMS-324	**Software Engineering**	CO1	Recall the software engineering and Project Management.
		CO2	Classify the Software Requirement Analysis and Scheduling and Implementation.
		CO3	Discuss Software Design, Software Architecture Design and Coding
		CO4	Explain the testing in virus forms and model.
		CO5	Analyze system of Software Quality Management and Maintenance and Quality certifications.
CSMS-325	**Fuzzy Sets & Fuzzy Systems**	CO1	Recall concepts of fuzzy set, α-level sets, and comparison with classical (crisp) sets.

		CO2	Classify the Operations on fuzzy sets.
		CO3	Use of Fuzzy equivalence relations, Fuzzy compatibility relations, Fuzzy relation equations, Fuzzy graphs and similarity relation.
		CO4	Explain Fuzzy logic and multi valued logics.
		CO5	Analyze system of approximate reasoning
			Semester –IV
MAMS-481	**Seminar**	CO1	to take a piece of writing through the process of revision in order to advance their ideas and communicate more effectively with their readers.
		CO2	discern the assignment's intended audience and objectives and respond appropriately.
		CO3	identify the disciplinary context for different kinds of writing, including both informal writing (like scientific note taking) and formal writing (like a research paper in Government).
		CO4	construct a paper consistent with expectations of the discipline, including an appropriate organization, style, voice, and tone.
		CO5	perform critical readings of their own writing and the writing of others.
MAMS-491	**Dissertation**	CO1	Describe a relevant area of career development, career coaching, coaching or work-related learning studies
		CO2	Identify research methods
		CO3	State research questions
		CO4	Identify literature for review
		CO5	Critically analyse and evaluate the knowledge and understanding in relation to the agreed area of study

B.Tech. (Biomedical Engineering)

A. Programme Objectives:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Program Specific Outcomes (PSOs):

1. **Bio-Analysis:** Apply mathematical analysis for human paradigm, to problems, thereby to interface engineering and life science.
2. **Data Interpretation and Problem Solving:** Make measurements on and interpret data from physiological systems and decipher the problems associated with the interaction between living and non-living materials and systems.
3. **Collaborative and Multidisciplinary work:** Possess knowledge and understanding of group dynamics, recognize opportunities and contribute positively to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision-making based

on open-mindedness, objectivity and rational analysis in order to achieve common goals and further the learning of themselves as well as others.

C. B.Tech. Biomedical Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BAS 101	**Physics**	CO1	Understand the concepts of quantum physics for materials.
		CO2	Use of equipment for low and high energy applications.
		CO3	Solve engineering problems by applying the concepts of wave and particle nature of radiant energy.
		CO4	Apply the concept of energy band for semiconductors.
		CO5	Construct a quantum mechanical model to explain the behavior of a system at microscopic level.
BAS 105	**Remedial Mathematics-I**	CO1	Recall the set, relation, function mapping and Complex numbers
		CO2	Learn the Roots of the quadratic equations, concept of A.P., G.P. and H.P
		CO3	Discuss the vector and trigonometry
		CO4	Operate the limit, continuity, differentiability and integration
		CO5	Apply the concept of two dimensional geometry
ECC 101	**Basic Electrical Engineering**	CO1	Memorize the concepts of KVL/KCL and network theorems in solving DC circuits
		CO2	Define the steady state behavior of single phase and three phase AC electrical circuits.
		CO3	Recall the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three-phase transformer
		CO4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications.
		CO5	To apply the components of low voltage electrical installations and perform elementary calculations for energy consumption
BAS 151	**Physics Lab**	CO1	Develop skills to impart practical knowledge in real time solutions.
		CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.

		CO3	Design new experiments/instruments with practical knowledge.
		CO4	Gain knowledge of new concept in the solution of practical oriented problems.
ECC 151	**Electrical Engineering Lab**	CO1	Get an exposure to common electrical components and their ratings.
		CO2	Make electrical connections by wires of appropriate ratings.
		CO3	Understand the usage of common electrical measuring instruments.
		CO4	Understand the basic characteristics of transformers and electrical machines.
MEC 151	**Engineering Graphics & Design**	CO1	Draw orthographic projections of lines, planes and solids.
		CO2	Construct isometric scale, isometric projections and views.
		CO3	Draw sections of solids including cylinders, cones, prisms and pyramids.
		CO4	Draw projections of lines, planes, solids, isometric projections and sections of solids including cylinders, cones, prisms and pyramids using AutoCAD
AOC 101	**Basics of Communication**	CO1	Trained in English language including listening, speaking, reading and writing skills
		CO2	Developed the presentation skills for professional life
		CO3	Able to manage the work stress in professional life
		CO4	Able to control inter-personal conflicts.
Semester II			
BAS 202	**Chemistry**	CO1	Recall the instruments for atomic and molecular structure
		CO2	Determine Structure of Compound by spectroscopic methods.
		CO3	analyze the importance of Chemical Industry
		CO4	understand the basic concept of hardness of water and its removal techniques.
		CO5	Study the manufacture of different products like fuel, cement, polymer, glass, soap and detergents by modern methods
BAS 206	**Remedial Mathematics-II**	CO1	Recall the differentiation & its applications
		CO2	Learn the concept of three dimensional geometry.
		CO3	Discuss the determinants and Matrices
		CO4	Operate the Numerical techniques.
		CO5	Apply the interpolation formulae & numerical integration
CSC 201	**Programming for Problem Solving**	CO1	Understand the basics of Computer System and Hardware Organization

		CO2	Learn the different tests of Memory Units, Input and Output Devices and Input Output Ports.
		CO3	Understand Basics of Programming Languages and Operating Systems and Graphical User Interface and Windows
		CO4	Solve Programming Methodology, Arrays and Structures
		CO5	Apply techniques of Operations and Expressions.
HSM 201	**Professional Communication and Soft Skills**	CO1	Trained in English language including listening, speaking, reading and writing skills.
		CO2	Developed the presentation skills Reading Techniques
		CO3	Able to manage the Essential Grammar.
		CO4	Able to Basic Technical Writing Skills and Nature and Style of sensible Writing
BAS 251	**Chemistry Lab**	CO1	Use of different analytical instruments.
		CO2	Measure molecular/system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water
		CO3	Measure hardness of water.
		CO4	Estimate the rate constant of reaction.
		CO5	Determine Structure of Compound by spectroscopic methods.
CSC 251	**Programming for Problem Solving Lab**	CO1	Explain the basic syntax, structure and execution of programs written in C language.
		CO2	Develop the C code for a given algorithm.
		CO3	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
		CO4	Write programs that perform operations using derived data types.
Semester-III			
HSS-308	**Management Concept and Practices**	CO1	Describe the primary functions of management and the roles of managers.
		CO2	What are the general practices of manager
		CO3	Understand the managerial concepts
BAS-311	**Biology for Engineers**	CO1	Learn Common Features of Biology and Living Things
		CO2	Examines common features of living things
		CO3	Basic Compounds in the Structure of Living Things
BAS-309	**Remedial Mathematics III**	CO1	Become confident in using mathematics to analyse and solve problems both in school and in real-life situations
		CO2	Develop the knowledge, skills and attitudes necessary to pursue further studies in mathematics
		CO3	Develop abstract, logical and critical thinking and the ability to reflect critically upon their work and the work of others

BMC-301	**Human Anatomy and Physiology**	CO1	Describe internal environment of human body and explain the fundamental concept of homeostasis.
		CO2	Explain the structure and functioning of various types of tissues.
		CO3	Describe the structure and explain the functioning of various nervous system, cardio-vascular system, respiratory system, digestive system and musculoskeletal system.
		CO4	Demonstrate and analyze various physiological parameters in normal and abnormal conditions.
BMC-302	**Elements of Biochemistry**	CO1	Understanding of proteins,
		CO2	Understanding of enzymes,
		CO3	Understanding of saccharides
		CO4	Understanding of fatty acids.
BMC-303	**Basic Biomedical Engineering**	CO1	Memorize basic human anatomy and biomedical engineering.
		CO2	Knowledge of mechanics.
		CO3	Illustrate instrumentation system.
		CO4	Explain the Contrast different imaging instruments.
BMC-351	**Anatomy and Physiology Lab.**	CO1	Knowledge of the Human body
		CO2	Knowledge of the cell, blood,
		CO3	Knowledge of the Cardiovascular
		CO4	Knowledge of the Respiratory Systems
BMC-352	**Biochemistry Lab.**	CO1	Learn fundamental approaches for experimentally investigating biochemical problems,
		CO2	Learn the theoretical foundations for the methods used
		CO3	Understand the applicability of the biochemical methods to realistic situations.
BMC - 371	**Minor Project-I**	CO1	Development of devices
		CO2	Apply the principles in product development
MCC-301	**Essence of Indian Traditional Knowledge**	CO1	Understand philosophy of Indian culture.
		CO2	Distinguish the Indian languages and literature among difference traditions.
		CO3	Learn the philosophy of ancient, medieval and modern India.
		CO4	Acquire the information about the fine arts in India.
		CO5	Know the contribution of scientists of different eras.
		CO6	The essence of Yogic Science for Inclusiveness of society.
Semester-IV			
HSS-403	**Entrepreneurship**	CO1	Entrepreneurship and Innovation minors will develop and cultivate endurance.
		CO2	Awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency; foster self-efficacy and self-advocacy.

		CO3	Improve communication and problem-solving skills, manage strong impulses and feelings; and identify personal purpose.
ECC-408	**Network and Systems**	CO1	Apply their knowledge in analysing Circuits by using network theorems.
		CO2	Apply network topology for analyzing the circuit
		CO3	Synthesize the network using passive elements
		CO4	Find the various parameters of two port network.
		CO5	Apply the time and frequency method of analysis.
BMC-401	**Linear Integrated Circuits**	CO1	Understand the differences between theoretical, practical & simulated results in integrated circuits.
		CO2	Demonstrate the ability to design practical circuits that perform the desired operations.
		CO3	Understand the fundamentals and areas of applications for the integrated circuits.
		CO4	Analyze important types of integrated circuits.
		CO5	Select the appropriate integrated circuit modules to build a given application.
BMC-402	**Biomedical instrumentation-I**	CO1	Understand the generalized structure of biomedical instrumentation and its development process.
		CO2	Study the concepts behind the origin of electricity in human beings.
		CO3	Analyze the working principles of electrodes and their applications in biomedical engineering concepts.
		CO4	Apply different concepts to design of bio-potential amplifiers for various healthcare applications.
		CO5	Study the non-electrical & sensory measurements in human body and their importance in clinical diagnostics
BMC-403	**Biomedical Sensor and Transducers**	CO1	Memorize basic measurement system.
		CO2	Classification and construction details of Transducers.
		CO3	Illustrate piezo electric and photoelectric transducers.
		CO4	Contrast different biochemical and biological sensors
		CO5	Explain the technology in the measurement field.
BMC-451	**Linear Integrated Circuits Lab.**	CO1	Differentiate IC and Discrete components, understand manufacturing process of IC and analyze how monolithic components are being developed.
		CO2	Understand & demonstrate different applications based on operational-amplifier
		CO3	Demonstrate the applications of waveform generators, timers and voltage regulators.
		CO4	Identify different configurations of op-amp analyze the parameters of op-amp and observe the frequency response of operational-amplifier.

BMC-452	**Biomedical instrumentation Lab. - 1**	CO1	develop the Basic circuit of the ECG and, its analysis calibration and maintenance.
		CO2	develop the Basic circuit of the PMS and, its analysis calibration and maintenance.
BMC - 453	**Biomedical Sensor and Transducers Lab**	CO1	Understanding basic biomedical sensors and transducers.
		CO2	Analysis of the response curves of the sensors
		CO3	Evaluate the correlation between sensor data to the physiological signals.
		CO4	Explain the technology in the measurement field
		CO5	Classification and construction details of Transducers.
BMC - 471	**Minor Project-II**	CO1	Development of devices
		CO2	Apply the principles in product development
MCC-401	**Environmental Sciences**	CO1	Describe the various types of Eco-systems.
		CO2	Use the scientific method to design an ecological study in the lab and/or field.
		CO3	Demonstrate knowledge of the important ecological principles operating at different levels of organization.
		CO4	Define important scientific/ecological terms.
		CO5	Describe important ecological processes.
Semester-V			
BMC-501	**Biomedical Image Processing**	CO1	knowledge of biomedical image processing principles
		CO2	Applications of image processing tools
		CO3	Develop their own programs
BMC-502	**Genetics Engineering and its Applications**	CO1	The students will have knowledge of tools and strategies used in genetic engineering.
		CO2	Understanding of applications of recombinant DNA technology and genetic engineering. from academic and industrial perspective.
		CO3	Can use and apply the knowledge of genetic engineering in problem solving and in practice.
BMD-501	**Biomaterials (Elective-I)**	CO1	understand the mechanism of Biomaterial interaction
		CO2	Biocompatibility Testing
		CO3	Development of different application.
BMD-502	**Biomechanics (Elective-II)**	CO1	Describe applications of mechanics in human body analysis especially skeleton and Cardiovascular system.
		CO2	Explain biomechanics for other biomedical applications.
		CO3	Understand GAIT analysis for different organs of the human body.
		CO4	Explain various principles of mechanics.
		CO5	Explain fundamentals of human bones and structures.
ECC-507	**Fundamentals of Signals and Systems**	CO1	Understand about various types of signals and systems, classify them, analyze them, and perform various operations on them.

		CO2	Observe the effect of various properties and operations of signals and systems.
		CO3	Evaluate the time and frequency response of Continuous and Discrete time systems which are useful to understand the behaviour of electronic circuits and communication system.
		CO4	Understand use of transforms in analysis of signals and system in continuous and discrete time domain.
ECC-508	**Digital Electronics**	CO1	Develop a digital logic and apply it to solve real life problems.
		CO2	Analyze, design and implement sequential logic circuits.
		CO3	Analyze digital system design using PLD.
		CO4	Analyze, design and implement combinational logic circuits.
		CO5	Classify different semiconductor memories.
BMC-551	**Biomedical Image Processing Lab**	CO1	Students would be conferred with the profound knowledge of biomedical images
BMC-571	**Minor Project-III**	CO1	Development of devices
		CO2	Apply the principles in product development
MCC-501	**Cyber Security**	CO1	Highlight the need for security architecture and its relevance to systems, service continuity and reliability
		CO2	Discuss the application of techniques such as defence in depth to demonstrate how controls can be selected, deployed and tested to minimize risk and impact
		CO3	Understand the trade-offs for functionality, usability and security
		CO4	Understand the role of operations in monitoring, maintaining and evolving controls
		CO5	Differentiate between controls to protect systems availability and reliability; controls to protect information; and controls to manage human behaviour
Semester-VI			
BMC-601	**Biomedical Signal Processing**	CO1	Students would be able to interpret the signals and develop the system for its analysis
		CO2	Students would be acquainted with the basic electrophysiology of human body.
		CO3	Students would be able understand the use of different types of electrode.
BMC-602	**Biomedical Instrumentation-II**	CO1	They can interpret the ECG and
		CO2	Identify the abnormality.
BMD-601	**Nanomedicine (Elective-III)**	CO1	Understand how nano technological approaches can be used in biomedical therapies
		CO2	Understand biomaterials and interaction of biomaterials with cells, body fluids and tissue

		CO3	Understand basic stem cell biology and corresponding requirement for tissue engineering
		CO4	Understand the toxicological aspects of nanosized surfaces and particles Find, refer and evaluate available information
BMD-602	**Microprocessor and its Application (Elective-IV)**	CO1	Draw and describe architecture of 8085 and 8086 microprocessor.
		CO2	Interface various peripheral devices to the microprocessor.
		CO3	Write assembly language program for microprocessor.
		CO4	Design microprocessor based system for various applications.
ECC-607	**Control System**	CO1	Categorize different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified form.
		CO2	Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions.
		CO3	Formulate different types of analysis in frequency domain to explain the nature of stability of the system.
		CO4	Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system.
		CO5	Interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis.
		CO6	Characterize any system in Laplace domain to illustrate different specification of the system using transfer function concept
ECC-608	**Wireless Communication and Telemedicine**	CO1	Explain the basic principles of healthcare in telemedicine.
		CO2	Explain the different types of data storage and communication standards used in telehealth system.
		CO3	Discuss the ethical & legal issues involved in telemedicine.
		CO4	Discuss the role of telecommunication in Healthcare.
		CO5	Discuss the various applications of telemedicine.
BMC-651	**Signal Processing Lab.**	CO1	Students would be able to interpret the signals and develop the system for its analysis
BMC-652	**Biomedical Instrumentation Lab. -II**	CO1	Students would be aware with the repairing maintenance and calibration of the Analytical equipment's
BMC-671	**Minor Project-IV**	CO1	Development of devices
		CO2	Apply the principles in product development

MCC-601	**Indian Constitution**	CO1	Know the background of the present constitution of India.
		CO2	Understand the working of the union, state and local levels.
		CO3	Gain consciousness on the fundamental rights and duties.
		CO4	Be able to understand the functioning and distribution of financial resources between the centre and states.
		CO5	Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.
Semester-VII			
BMC-701	**Biomedical Instrumentation-III**	CO1	Students would be aware with the functioning and maintenance and the calibration of the above mentioned equipment's.
BMC-702	**Hospital Management**	CO1	Students would be conferred with the profound knowledge of hospital management
		CO2	To develop knowledge and understanding of key theories, concepts and models and also to critically analyze the situations in the organizational setup.
		CO3	It also helps in ensuring that the organizational goals and targets are met using minimum cost and waste.
		CO4	Understanding the importance of looking after health , welfare and safety of staff
BMD-701	**Quality Control in Biomedical Engineering (Elective-V)**	CO1	Learn the fundamental concepts of quality management in biomedical field.
		CO2	Learn the use of advanced tools in biomedical quality control field.
BMD-702	**Biomedical Ethics and IPR (Elective-VI)**	CO1	Memorize basic medical ethical system.
		CO2	Classification of Major Bioethical Areas.
		CO3	Illustrate Ethics of Scale.
		CO4	Knowledge of IPR filling process.
		CO5	Explain the Bioethical Success and Failure.
BMD-703	**Embedded System in Biomedical Engineering (Elective-VII)**	CO1	Understand the concept of embedded system design and its application in different design and product, Programming for Embedded System Design
		CO2	Get idea about working of processor and its application
		CO3	Get idea about working of processor and its application
		CO4	Select appropriate microcontroller for design Calculate memory requirement and other on-chip/off-chip peripheral requirement
		CO5	Understand requirement of a project as well as inputs and outputs of the system

		CO6	Make flowchart of different tasks and decisions Understand multitasking environment and development tools
		CO7	Design software for the target processor/controller
		CO8	Interface peripherals with the board
		CO9	Understand different communication protocols to make the system as a part of network
CSC-708	**Artificial Intelligence and Neural Network**	CO1	Define the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
		CO2	Classify AI techniques in applications which involve perception, reasoning and learning.
		CO3	Demonstrate about AI techniques for knowledge representation, planning, uncertainty management and exploration methods.
		CO4	Distinguish the knowledge of real world Knowledge representation, the modern view of AI as the study of agents that receive precepts from the environment and perform actions
		CO5	Defend a real world problem for implementation and understand the dynamic behaviour of a system.
		CO6	Formulate the machine learning techniques to design AI machine and enveloping applications for real world problems.
BMC-751	**Biomedical Instrumentation Lab-III**	CO5	Students would be conferred with the profound knowledge of biomedical instrumentation
BMC-752	**Hospital Management Case studies**	CO1	To develop knowledge and understanding of key theories, concepts and models and also to critically analyze the situations in the organizational setup.
		CO2	It also helps in ensuring that the organizational goals and targets are met using minimum cost and waste.
		CO3	Understanding the importance of looking after health , welfare and safety of staff
		CO4	Apply and evaluate best practices for protecting the machinery and resources of the organization.
BMC-771	**Minor Project-V**	CO1	Development of devices
		CO2	Apply the principles in product development
MCC-708	**Technical Report Writing**	CO1	Understand professional writing by studying management communication contexts and genres, researching contemporary business topics, analyzing quantifiable data discovered by researching, and constructing finished professional workplace documents.
		CO2	Recognize, explain, and use the formal elements of specific genres of organizational communication: white

			papers, recommendation and analytical reports, proposals, memorandums, web pages, wikis, blogs, business letters, and promotional documents.
		CO3	Understand the ethical, international, social, and professional constraints of audience, style, and content for writing situations a.) among managers or co-workers and colleagues of an organization, and b.) between organizations, or between an organization and the public.
Semester-VIII			
BMC-861	**Internship**	CO1	Work in the industrial environment Apply the knowledge in real applications

M.Tech. (Biomedical Engineering)

A. Programme Objectives:

1 **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2 **Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3 **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6 **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Program Specific Outcomes (PSOs):

1. Acquire knowledge of Instrumentation and Control Engineering with ability to evaluate, analyze and synthesize knowledge related to Biomedical Instrumentation.
2. Analyze complex problems related to Instrumentation and Control Engineering and synthesize the information for conducting research.
3. Think laterally to solve problems related to Instrumentation and Control Engineering with emphasis on Biomedical Instruments/devices/equipment and provide / suggest a range of solutions considering health, safety, societal, and environmental factors.
4. Extract knowledge through literature survey, experimentation and appropriate research methodology, techniques and tools.

5. Learn and use contemporary tools for solving problems related to Biomedical Instrumentation, measurement analysis and Control etc.
6. Understand group dynamics and rational analysis in order to achieve common goals. PO7: Ability to write clearly and to document own work for effective utilization.
7. Engage in life-long learning and learning through mistakes with / without external feedback.
8. Understand the impact of research and responsibility in order to contribute to the society. PSO10: Understand the role of a leader, leadership principles and attitude conducive to effective professional practice of Instrumentation and Control Engineering.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BMMT-501	**Applied Bioelectricity**	CO1	Identify the major bones and their processes as they relate to each region of the body.
		CO2	Identify the findings from a simulated healthcare record such as electrocardiogram data and pulmonary ventilation outcomes.
		CO3	Tell briefly the basic components and functions of the gastrointestinal, renal/urinary, endocrine/metabolic, hepatic/biliary, genital/reproductive and immunologic, systems.
		CO4	Identify the major structures of the human anatomy for the following; (i). Head and neck, thoracic, abdominopelvic, and upper and lower extremities, (ii). Major skeletal muscles, their actions, origins, insertions, and peripheral nerves, (iii). Central nervous system and plexuses, (iv). Respiratory system, and (v). Cardiovascular/hematologic system.
BMMT-503	**Biomaterials and Nanomedicine**	CO1	Characterize the material and define their biological application.
		CO2	Aware with the several applications of nanomaterials in biomedical.
		CO3	Differentiate between the biocompatible and non-biocompatible materials.
		CO4	Understand the basic knowledge of Nanotechnology and DNA structures.
		CO5	Provide the knowledge in basics of nanotechnology in biotechnology.
		CO6	Understand the application of Nanomaterials in biotechnology and acquire the knowledge about the DNA, proteins, amino acids, drug delivery, biomedicine etc.

BMMT-505	**Bio-instrumentation**	CO1	To understand the fundamentals of biomedical signals.
		CO2	To impart knowledge about the neurological signal processing.
		CO3	To provide a deep knowledge about the cardiological signal processing and analysis.
		CO4	To apply adaptive filtering techniques for canceling noise and interference in the various Bio-signals.
		CO5	To learn about pattern classification techniques and their use in diagnosis.
BMMT-521	**Human Anatomy and Physiology / Biomedical Computing**	CO1	To describes the form and organization of various anatomical structures and determines how they can functions.
		CO2	To give terms with precise meaning helps investigators to communicate effective.
		CO3	To provide knowledge about systems and how they are dependent on each other to survive and operate the human body.
		CO4	Provide the knowledge for sequence alignment and visualization along with phylogenetic and microarray analysis.
Semester II			
BMMT- 502	**Biomedical Imaging**	CO1	To gain knowledge about the various image enhancement techniques.
		CO2	To study the basic image fundamentals and transforms applicable in medical image analysis.
		CO3	To apply various segmentation techniques and algorithms in Medical Images.
		CO4	To study the applications of medical image analysis in various imaging modalities.
		CO5	To acquire knowledge about the medical image registration and fusion techniques.
BMMT- 504	**Advance Biomechanics**	CO1	To study about the bone structure and functions of skeletal muscle.
		CO2	To study the structure, movements, and loads applied on Upper Extremity and Lower Extremity.
		CO3	To study about the Linear and Angular kinetics and kinematics of human movement.
		CO4	To understand the fundamentals of finite element analysis.
		CO5	To implement the fundamental processing of Ansys.
BMMT- 506	**Biosensors and Transducers**	CO1	To understand the fundamentals of biomedical signals.
		CO2	To impart knowledge about the neurological signal processing.
		CO3	To provide a deep knowledge about the cardiological signal processing and analysis.

		CO4	To apply adaptive filtering techniques for canceling noise and interference in the various Bio-signals.
		CO5	To learn about pattern classification techniques and their use in diagnosis.
BMMT- 508	**IPR and Biomedical Ethics**	CO1	To gain knowledge on basic human values.
		CO2	To understand how to take responsibility for morals and mistakes.
		CO3	To understand the role of engineers in decision-making.
		CO4	To get familiar of ethical issues in medicine, health care and life science
		CO5	To develop aptitude to understand law and problems relevant to it.
Semester-III			
BMMT- 601	**Rehabilitation Engineering**	CO1	To study about the basic concepts of robots and types of robots.
		CO2	To study about manipulators, actuators and grippers.
		CO3	To study about various types of sensors and power sources.
		CO4	To study the various applications of robot in the medical field.
BMMT- 603	**BioMems and Embedded System**	CO1	To understand the working of MOEMS Technology.
		CO2	To understand the working principle of MEMS & Microsystems.
		CO3	To understand the concepts of BioMEMS & its application in healthcare.
		CO4	To study about the biomedical Nanotechnology & its application in research domain.
		CO5	To give an insight to the DNA based BioMEMS.
BMMT- 621	**Biomedical application to Physiotherapy and Orthotics**	CO1	To understand the basics of Biomechanical, physiological and anthropometric background.
		CO2	To impart the knowledge about the user information, controls, relationship between information and operation.
		CO3	To gain a deep knowledge about the different guidelines related to environmental factors.
		CO4	To understand basics of Tissue Engineering
		CO5	To understand fundamentals of cell mechanisms
		CO6	To teach the Physical & biological principles that serve as the scientific basis for understanding the interactions of biological molecules and cells with biomaterials employed for the fabrication of permanent implantable prostheses and as matrices for tissue engineering.
		CO7	To Study ergonomics in healthcare.
BMMT- 623	**Biomedical Signal Processing / Biomedical**	CO1	To understand the fundamentals of biomedical signals.
		CO2	To impart knowledge about the neurological signal processing.

	Information Technology	CO3	To provide a deep knowledge about the cardiological signal processing and analysis
		CO4	To apply adaptive filtering techniques for canceling noise and interference in the various Bio-signals
		CO5	To learn about pattern classification techniques and their use in diagnosis.
		CO6	To make them understand organs and advances in medical informatics and telemedicine.
		CO7	To impart knowledge on management of medical data.
		CO8	To introduce the basic concepts of tele-radiology.
		CO9	Brief about various applications in telemedicine.
Semester-IV			

M.Sc. (Biomedical Sciences)

A. Programme Objectives:

1 **Scientific knowledge:** Apply the knowledge of physics, chemistry, biology, zoology and mathematics to the solution of complex scientific problems.

2 **Problem analysis:** Identify, formulate, review research literature, and analyse complex **Scientific** problems reaching substantiated conclusions using first principles of physics, chemistry, biology, zoology and mathematics

3 **Design/development of solutions:** Design solutions for complex problems or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern science and tools including prediction and modeling to complex scientific activities with an understanding of the limitations.

6 **The science and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional scientific practice.

7 **Environment and sustainability:** Understand the impact of the professional science solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8 **Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the scientific practice.

9 **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Programme Specific Outcome:

1. testing and screening for lifestyle diseases like diabetes, cancer or cardiovascular disease; and screening for infectious ones such as rubella, hepatitis or Ebola

2. investigating and understanding the disease mechanisms, profile and progression

3. finding new, effective and innovative ways to detect diseases as early as possible (e.g. discovery of new biomarkers or a new method of detecting a biomarker)

4. working towards discovery and development of treatments, which could be preventive (vaccines) and/or therapeutic (drugs and medicines)

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BMMS-101	**Medical Biochemistry**	CO1	In-depth understanding of cell structure and functions, the fundamental unit of life and recent advancements.
		CO2	Understanding of biocatalysis and laboratory investigations related to bioreactions.
		CO3	To develop skills related to the clinical laboratory test useful for detecting health problems, determining prognosis and guiding the therapy of a patient.
		CO4	To gain a deeper understanding of aspects related to nutritional biochemistry and its clinical applications
		CO5	To develop an analytical mind to enhance the understanding of the biochemistry experiments and formulating reports.
BMMS-102	**Pharmaceutical Chemistry**	CO1	Understanding of key technologies involved in drug development from natural resources
		CO2	To know the concepts and applications of enzyme technology in clinical science
		CO3	Understanding the role of building blocks in disease cure and management along with their mechanism of action
		CO4	To understand the experimental process associated with the design and synthesis of biologically active molecules.
		CO5	Ability to design students research project and reports related to analytical method development and validation of APIs, herbal products, and phytochemistry
BMMS-103	**Advanced Human Physiology**	CO1	In-depth understanding for the anatomy and physiology of human body
		CO2	Ability to demonstrate the structural and functional aspects of major vital organs and systems like Central nervous system and plexuses, Respiratory system, and Cardiovascular/hematologic system
		CO3	Identify the musculoskeletal systems and their processes as they relate to each region of the body.

		CO4	To understand the impact of environmental on human physiology
		CO5	Skills to understand the advancements related to the human physiology
BMMS-104	**Bioinstrumentation**	CO1	To understand the principles of analytic instruments used for qualitative and quantitative detection of chemical and biological components
		CO2	To display the conceptual and practical skills related to the spectroscopic methods and its current applications.
		CO3	In-depth understanding of the working principles of mass spectrometry and identification of compatible technique
		CO4	Understanding the concepts related to the determination of quality control, purity and molecular structure of the sample through NMR
		CO5	Ability to develop logical lab reports and study designs using analytical techniques
BMMS-105	**Forensic Sciences**	CO1	Demonstrate competency in the collection, processing, analyses, and evaluation of evidence.
		CO2	Demonstrate competency in the principles of crime scene investigation, including the recognition, collection, identification, preservation, and documentation of physical evidence.
		CO3	Demonstrate an understanding of the scientific method and the use of problem-solving within the field of forensic science.
		CO4	Identify the role of the forensic scientist and physical evidence within the criminal justice system.
		CO5	Demonstrate the ability to document and orally describe crime scenes, physical evidence, and scientific processes.
BMMS-106	**Fundamental of Bioinformatics**	CO1	Skills development related to the acquisition, storage, analysis, and dissemination of biological data
		CO2	To develop practical skills related to the modeling of biological systems
		CO3	Ability to identify correlations between gene sequences and diseases,
		CO4	Ability to predict protein structures from amino acid sequences, to aid in the design of novel drugs
		CO5	Ability to understand new developments in genome bioinformatics and computational biology
BMMS-151	**Medical Biochemistry Lab.**	CO1	To develop essential research, diagnostic, and laboratory skills.
		CO2	To identify the structural elements of proteins, the basic features of enzyme catalysis and regulation, and

			the function of hemoglobin in oxygen binding and transport.
		CO3	Able to demonstrate skills related to the nucleic acids quantification
		CO4	Case studies related to nutritional deficiency
		CO5	To develop an analytical mind to enhance the understanding of the biochemistry experiments and formulating reports
BMMS-152	**Pharmaceutical Chemistry Lab.**	CO1	analytical method development and validation of APIs and formulations,
		CO2	standardization of herbal products using modern analytical techniques
		CO3	phytochemistry, natural product isolation from plants and their bioactivity,
		CO4	formulation development of phytochemicals
		CO5	Preparation of study reports and manuscripts
Semester II			
BMMS-201	**Medical Microbiology& Immunology**	CO1	Identification, classification, and characterization of bacterial species for the diagnosis of infectious diseases
		CO2	In-depth understanding of clinical aspects of pathogenic viruses.
		CO3	Enhanced understanding about the treatment of parasitic infection through advancing systems of their diagnoses.
		CO4	Understanding about the molecular and cellular basis of immune system.
		CO5	Understanding the processes that enable the immune systems to respond to evolving threats, and understand new, immunology-based disease treatments.
BMMS-202	**Genome Biology**	CO1	Enhanced understanding about the complexity of genetic inheritance in humans.
		CO2	Familiarity with the statistical tools used in genomic data analysis, linkage analysis by LOD score, association studies.
		CO3	Conceptual knowledge about the methods used for whole genome analysis and their applications..
		CO4	Theoretical skills related to the use of various databases containing annotation, experimental data from NGS, RNA seq and microarray and ENCODE.
		CO5	Ability to understand research advancements in the field of genomics

BMMS-203	**Molecular Oncology**	CO1	Understanding of tumor biology at cellular and molecular level
		CO2	Understanding of conventional cancer therapies and research advancements in cancer treatment
		CO3	Understanding of the cellular, genetic and epigenetic basis of cancer.
		CO4	Understanding the principles of Biomedical imaging technology in cancer
		CO5	Overall expansion of theoretical and practical aspects of oncology.
BMMS-204	**Advanced Medicinal Chemistry**	CO1	Knowing the structural activity relationship of different class of drugs.
		CO2	Understanding the importance of medicinal chemistry in drug discovery process
		CO3	Qualitative and quantitative applications of pharmacokinetics and pharmacodynamics principles
		CO4	Techniques for discovering molecules with desired biological activity
		CO5	Qualitative and quantitative applications of molecular modeling and computer aided drug design techniques
BTMS-203	**Genetics**	CO1	Understanding the principles of Classical Genetics.
		CO2	Solving hybrid cross genetic outcomes utilizing branch diagrams and/or Punnett squares. Using testcrosses to identify parental genotype and confirm the principle of segregation.
		CO3	Using the laws of probability to statistically analyze the outcomes of genetic crosses
		CO4	Understanding the importance of Drosophila in Genetics
		CO5	An overview of fundamental concepts behind the evolving fields of human genetics, genomics, and precision medicine.
BMMS-251	**Medical Microbiology& Immunology Lab**	CO1	Ability to conduct microbiology culture experiments
		CO2	Ability to carry out different types of microbial staining
		CO3	Ability to conduct antibiotic sensitivity profile and biochemical analysis of the given microbial culture
		CO4	Exposure to various immunological techniques including antigen-antibody interactions, quantization of antigens or antibody, ELISA, agglutination reactions
		CO5	Skills to prepare reports and short communications
BMMS-252	**Genome Biology Lab**	CO1	Ability to Construct Pedigree chart for family history.
		CO2	Basic understanding of experimental tools used in modern genomics

		CO3	Basic concepts related to DNA sequencing
		CO4	Practical skills related to the use of various databases containing annotation, experimental data from NGS, RNA seq and microarray and ENCODE.
		CO5	Understanding of next-generation sequencing experiments
Semester-III			
BMMS-301	**Pharmacology & Toxicology**	CO1	Advanced learning in molecular, cellular, neuro, receptor and organs systems pharmacology
		CO2	In-depth understanding of the drug properties, response, interactions
		CO3	Understanding for the molecular and cellular mechanisms of toxicity and to risk assessment.
		CO4	Advanced concepts in adverse effects of toxicology
		CO5	Ability to plan and conduct a pharmacology project and toxicological assays
BMMS-302	**Biomedical Instrumentation**	CO1	Explain basic electrophysiology mechanism involve in bio-potential generation
		CO2	Examine the bioelectrical and non-bioelectrical activities.
		CO3	Explain the working of patient monitoring system, diagnostic and therapeutic equipments
		CO4	Skills for data processing generated through biomedical instruments by softwares
		CO5	Overall understanding of the designing, manufacturing, maintenance, repair and operation of medical equipment.
BMMS-303	**Biomaterials and Tissue Engineering**	CO1	Conceptual knowledge about the principles of biomaterial.
		CO2	Understanding about the in-depth applications of biomaterials in clinical science
		CO3	Understanding of the methods used for biomaterials surface characterization and related properties
		CO4	Conceptual knowledge about the creation of artificial organs for transplantation through tissue engineering
		CO5	In-depth understanding of basic cell culture techniques, structure function relationships, cellular communication, natural and artificial biomaterials, and the basic equations governing cell survival and tissue organization.
BMMS-304	**Biomedical Waste Management**	CO1	Essential knowledge about the types of health care waste and its impact on health and environment
		CO2	Familiarity with the existing legislation, knowledge and practices regarding health care waste Management practices

		CO3	Conceptual skills to manage health care waste effectively and safely.
		CO4	Understanding of challenges related to safety issues for patients and medical staff.
		CO5	Case studies solution for Strategic planning and development and planning for Biomedical Waste Management
BMMS - 305	**Hospital Management & Biosafety**	CO1	Advanced understanding about the managerial and administrative roles at a hospital or a healthcare institute
		CO2	In-depth knowledge about the regulatory authorities related to hospital sector
		CO3	Case studies solution to demonstrate leadership skills, team-work, analytical skills, interpersonal skills, problem solving skills
		CO4	Understanding the importance of patient-centred care with a continuous quality improvement orientation ensure smooth functioning of core process by forecasting, streamlining patient flow, staff scheduling, planning space/ facilities/ supplies, maintenance.
		CO5	In-depth understanding of bioethics in medical research
BMMS-351	**Pharmacology & Toxicology Lab**	CO1	Ability to conduct in-vitro pharmacology experiments
		CO2	Ability to conduct in-vivo pharmacology experiments
		CO3	Ability to conduct in-vitro toxicology experiments
		CO4	Ability to conduct in-vivo toxicology experiments
		CO5	Conceptual knowledge about regulatory requirements for safety studies
BMMS-352	**Biomedical Instrumentation Lab.**	CO1	Practical knowledge about the working of different Biomedical Instruments.
		CO2	Ability to troubleshoot different Bio Medical machine / Instruments
		CO3	Calibrate and handle the equipments related to the patient care and monitoring
		CO4	Ability to apply apply hypothetical math and material science ideas to fix the challenges related to electrical circuits in the biomedical field.
		CO5	Ability to process data through softwares
BTMS-311	**Biostatistics**	CO1	Ability to calculate summary statistics from biomedical data
		CO2	Ability to interpret written and visual presentations of statistical data
		CO3	Evaluate and interpret results of descriptive statistics and regression methods

		CO4	Ability to choose the most appropriate statistical method to answer your research question
		CO5	Statistical analysis through softwares
Semester-IV			
BMMS-481	**Seminar**	CO1	Comprehensive Literature review skills for the chosen topic
		CO2	Critical appraisal of the reported outcomes
		CO3	Skills for preparation of visually attractive and logical presentation and posters
		CO4	Skills for presenting the debate and open discussions
		CO5	Skills for team work and self reflection
BMMS-471	**Project Work/Dissertation/ Industrial Training**	CO1	Identification of research area and topic
		CO2	Skills to develop research design
		CO3	Skills for study planning, timelines and costings
		CO4	Skills to lead the experiment project
		CO5	Data interpretation, original dissertation report preparation, and manuscript

B.Sc. (Biomedical Engineering)

A. Programme Objectives:

1 **Scientific knowledge:** Apply the knowledge of physics, chemistry, biology, zoology and mathematics to the solution of complex scientific problems.

2 **Problem analysis:** Identify, formulate, review research literature, and analyse complex **Scientific** problems reaching substantiated conclusions using first principles of physics, chemistry, biology, zoology and mathematics

3 **Design/development of solutions:** Design solutions for complex problems or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4 **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5 **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern science and tools including prediction and modeling to complex scientific activities with an understanding of the limitations.

6 **The science and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional scientific practice.

7 **Environment and sustainability:** Understand the impact of the professional science solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8 **Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the scientific practice.

9 **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Programme Specific Outcome:

1 It helps to develop scientific temper and thus can prove to be more beneficial for the society as the scientific developments can make a nation or society to grow at a rapid pace. Science graduates can go to serve in industries or may opt for establishing their own industrial unit.

2 After the completion of this course students have the option to go for higher studies i.e. M. Sc and then do some research for the welfare of mankind. After higher studies, students can join as scientist and can even look for professional job oriented courses.

3 This course also offers opportunities for serving in Indian Army, Indian Navy, Indian Air Force as officers. Students after this course have the the option to join Indian Civil Services as IAS, IFS etc.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BBM-101	**Human Anatomy and Physiology**	CO1	Label the functions of the human anatomy and physiology from a regional perspective for the following regions and systems: a. Head and neck, thoracic, abdominopelvic, and upper and lower extremities, Major skeletal muscles, their actions, origins, insertions, and peripheral nerves, Central nervous system and plexuses, Respiratory system, Cardiovascular/hematologic system.
		CO2	Identify the major structures of the human anatomy for the following: a. Head and neck, thoracic, abdominopelvic, and upper and lower extremities. Major skeletal muscles, their actions, origins, insertions, and peripheral nerves, Central nervous system and plexuses d. Respiratory system, Cardiovascular/hematologic system.
		CO3	Identify the major bones and their processes as they relate to each region of the body.
		CO4	Tell briefly the basic components and functions of the gastrointestinal, renal / urinary, endocrine / metabolic, hepatic / biliary, genital / reproductive and immunologic, systems.
		CO5	Identify the findings from a simulated healthcare record such as electrocardiogram data and pulmonary ventilation outcomes.
BBM-102	**Organic Chemistry**	CO1	Know and recall the fundamental principles of organic chemistry that include chemical bonding, nomenclature, structural isomerism, stereochemistry, chemical reactions and mechanism.
		CO2	Name the functional groups and different class of organic compounds. Recognize the basic practical skills for the synthesis and analysis of organic compounds.
		CO3	Predict the reactivity of an organic compound from its structure; Develop basic skills for the multi-step synthesis of organic compounds; Justify a reasonable mechanism for a chemical reaction.
		CO4	Demonstrate ability to work independently as well as within a team
		CO5	Manage resources and time and get along well with other members of the group.
GBT-101	**Basic Cell Biology**	CO1	Understand information about cells, including their composition, their function and cell-cycle checkpoints. The module on radiation biology will help to explore and gain insight into radiation-induced biological responses at molecular, cellular and tissue levels.

		CO2	Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
		CO3	Students will understand how these cellular components are used to generate and utilize energy in cells.
		CO4	Students will understand the cellular components underlying mitotic cell division.
		CO5	Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.
Semester: II			
BBM-201	**Diagnostic and Therapeutic Instrumentation**	CO1	Explain basic electrophysiology mechanism involve in bio-potential generation.
		CO2	explain the working of patient monitoring system, diagnostic and therapeutic equipments
		CO3	Examine the bioelectrical and non-bioelectrical activities.
		CO4	Calibrate and handle the equipments related to the patient care and monitoring.
		CO5	Students will know the definitions, basic principles and the applications of the available diagnostic and therapeutic devices
BBM-202	**Immunology**	CO1	Trace the history and development of immunology.
		CO2	Distinguishes between self and foreign molecules and thus alerts and mediates protection against attack by potentially infectious organisms. Also, describe surface membrane barriers and their protective functions, importance of phagocytosis and natural killer cells in innate body defense.
		CO3	Describe the roles of different types of T cells, B cells and APCs. Compare and contrast the origin, maturation process, and general function of B and T lymphocytes.
		CO4	Malfunctioning of the immune system leads to a number of disorders and diseases. Understanding the biology of the immune system is, therefore, key to developing strategies towards prevention and cure to a number of disorders and diseases that result due to interference in the functioning and regulation of the immune system.
GBT-201	**Principles of Genetics**	CO1	Discussing the progression of discovery from Classical to Modern Genetics, Defining basic concepts of Classical Genetics, Describing Mendel's experimental design, Utilizing conventional Mendelian genetic terminology, Explaining Mendel's principles of segregation, and independent assortment.
		CO2	Solving monohybrid cross genetic outcomes utilizing branch diagrams and/or Panetta squares, Using testcrosses to identify parental genotype and confirm the principle of segregation.

		CO3	Solving dihybrid cross genetic outcomes utilizing branch diagrams and/or Punnett squares. Analyzing the results of multihybrid crosses to confirm the principle of Independent Assortment.
		CO4	Using the laws of probability to statistically analyze the outcomes of genetic crosses.
Semester III			
BBM-301	**Analytical Instrumentation and its Applications**	CO1	Strategically plan analytical campaigns to apply to different types of samples and research objectives, including selection of the most appropriate technique/instrumentation for the students' research project.
		CO2	Undertake the correct sample preparation and characterization prior to analysis by the chosen techniques or instruments.
		CO3	Design an analytical work-flow to acquire data and achieve the research objectives of their project.
		CO4	Process data from the chosen instruments and demonstrate understanding of the limitations and quality of the data. Justify the approach taken to data processing.
		CO5	Write a clear and concise justification and description of the analytical techniques employed, suitable for publication in a scientific journal.
BBM-302	**Medical Physics**	CO1	Describe the construction and function of the x-ray system, describe the image formation process on radiographic film and digital imaging plates.
		CO2	Describe the conversion of a latent x-ray image into a radiologic image, Compare and contrast x-ray images with different quality characteristics.
		CO3	Describe how x-ray images are developed in a rapid film processor, Compare and contrast the basic radiation interactions that occur in matter exposed to x-rays.
		CO4	Explain how scattered radiation can affect the film and how its effects can be minimized, Recommend methods of improving an x-ray image with deficits. Describe the operating characteristics of conventional tomography
		CO5	Explain how fluoroscopy differs from conventional overhead radiography
BBM-303	**Molecular Biology**	CO1	Exhibit a base in genetics, knowledge on basic molecular Biology understanding of the execution of central dogma, and anatomy and physiology. Knowledge on the basic organization of the genome in prokaryotes and eukaryotes, on prokaryotic and eukaryotic replication, transcription and translation processes along with their discerning features.
		CO2	Demonstrate the knowledge of common and advanced laboratory practices in cell and molecular biology
		CO3	Exhibit clear and concise communication of scientific data

		CO4	Engage in review of scientific literature in the areas of biomedical sciences, Critique and professionally present primary literature articles in the general biomedical sciences field
GBT-301	**Microbiology**	CO1	Student will understand the microbial structure, growth and development, methods and role of sterilization in the context of study of microbes, the pathogenic microbes and the diseases caused by them, also focus on mechanisms of microbial pathogenesis and the host response, and the scientific approaches to investigate pathogenesis processes and emerging antimicrobial resistance.
		CO2	Students will be able to acquire, articulate, retain and apply specialized language and knowledge relevant to microbiology
		CO3	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.
		CO4	Students will communicate scientific concepts, experimental results and analytical arguments clearly and concisely, both verbally and in writing.
		CO5	Students will demonstrate engagement in the Microbiology discipline through involvement in research or internship activities, the Microbiology Student Association club (MSA) and outreach or mentoring activities specific to microbiology.
SBM-301	**Biocomputation**	CO1	Student will understand basic Computational biology and bioinformatics, various databases and their classification
		CO2	Students would be able in Sequence alignment and visualization and Phylogenetic and microarray analysis
		CO3	Student will understand the discipline of computational biology and drug design, the different aspects of nucleotide and protein sequence analyses, sequence alignments and their applications in understanding biology.
		CO4	Students will understand the basic strategic issues in drug discovery and development, principles of computational methods involved in lead generation virtual screening, quantitative structure activity relationship and molecular docking.
Semester-IV			
BBM-401	**Pathology**	CO1	Basic understanding of diseases and their pathogenesis, the topics are of introductory nature and build the concepts of how human system work in altered and diseased stage under the influence of various internal and external stimuli
		CO2	Describe topics like cellular adaptations, inflammation, neoplasia, cellular ageing and other infectious diseases.
		CO3	Get knowledge on laboratory exercises to substantiate and clarify the theoretical concepts.
		CO4	Upon successful completion of this course unit, the student should comprehend the general principles of disease and of biological and

			genetic processes involved in cancer development. The student should also be able to describe the most important diseases of selected organs.
BBM-402	**Techniques for Forensic Science**	CO1	Demonstrate competency in the collection, processing, analyses, and evaluation of evidence
		CO2	Demonstrate competency in the principles of crime scene investigation, including the recognition, collection, identification, preservation, and documentation of physical evidence.
		CO3	Demonstrate an understanding of the scientific method and the use of problem-solving within the field of forensic science.
		CO4	Identify the role of the forensic scientist and physical evidence within the criminal justice system.
		CO5	Demonstrate the ability to document and orally describe crime scenes, physical evidence, and scientific processes. Identify and examine current and emerging concepts and practices within the forensic science field.
BBM-403	**Biochemistry**	CO1	Demonstrate a broad knowledge of the fundamental introductory concepts of Chemistry, Biology and Physics.
		CO2	Demonstrate a thorough knowledge of the intersection between the disciplines of Biology and Chemistry.
		CO3	Demonstrate a proficiency in developing relevant biochemical questions, carrying out laboratory investigations to answer those questions, and critically analyzing, interpreting, and presenting in oral and written form the results of their experiments.
		CO4	Locate, critically analyze, interpret and discuss data, hypotheses, results, theories, and explanations found in the primary literature, applying knowledge from Chemistry and Biology.
		CO5	Appreciate the way in which practitioners in the disciplines of Biology and Chemistry intersect and bring their expertise to bear in solving complex problems involving living systems. Understand the societal impacts, both positive and negative, of science and technology and the limitations of science.
GBT-401	**Toxicology**	CO1	Critically evaluate different advanced exposure assessment methods
		CO2	Design strategies for exposure assessment
		CO3	Analyse and interpret exposure measurements applying different modelling tools (stochastic and deterministic)
		CO4	Characterize measurement error and its consequences
		CO5	Appreciate the advantages and disadvantages of toxicological and epidemiological studies for deriving dose-response relationships
SBM-401	**Biostatistics**	CO1	Student will understand statistical data analyses that come from deliberate experiment, the data collected from the population in the course of public health study and survey.
		CO2	Students will get training on how to conduct epidemiological surveys, design questionnaire and analyze the data. The students will get hands-on-training on 'R', a free software environment for statistical computing and graphics.

		CO3	use and interpret results of descriptive statistical methods effectively.
		CO4	Explain the principal methods of statistical inference and design.
		CO5	Read and learn new statistical procedures independently.
Semester-V			
BBM-501	**Medicinal Chemistry**	CO1	Correlating between pharmacology of a disease and its mitigation or cure.
		CO2	Understanding the drug metabolic pathways, adverse effect and therapeutic value of drugs.
		CO3	Knowing the structural activity relationship of different class of drugs.
		CO4	Well acquainted with the synthesis of some important class of drugs.
		CO5	Knowledge about the mechanism pathways of different class of medicinal compounds. 6. To understand the chemistry of drugs with respect to their pharmacological activity.
BBM-502	**Medical Biotechnology**	CO1	Students will understand infections caused by different bacteria and viruses, and learn the basic techniques and methods used in the diagnosis and therapy of various human diseases and in the production of biopharmaceuticals,
		CO2	Understand the concepts of cloning and expression of the desired gene. Students will understand how biological systems are applied in the advancement of medical biotechnology
		CO3	Develop an understanding of the Cytoskeleton and Cell Membrane.
		CO4	Discuss the structure of Microtubules, microfilaments.
BMD-501	**Pharmacology**	CO1	Identify the fundamental principles of pharmacokinetics and pharmacodynamics.
		CO2	Apply the pharmacodynamic and pharmacokinetic principles that describe drug actions in humans.
		CO3	Compare and contrast the specific pharmacology of the major classes of drugs, important distinctions among members of each class, the risks and benefits, in relation to the organ systems they affect, and the diseases for which they are used therapeutically.
		CO4	Identify the role of molecular genetics and genomic principles in pharmacotherapeutics and drug development.
BMD-502	**Radiation Biology**	CO1	Describe direct and indirect interactions between radiation and cells, describe the molecular basis of cellular radio sensitivity.
		CO2	Explain the influence of cell cycle, repair, repopulation and reoxygenation on tissue radio sensitivity, describe the components of a cell survival curve, given clinical data, draw a cell survival curve.
		CO3	Differentiate between cell survival curves of varying LET radiations, hypoxic and aerated cells as well as cell cycle phases, Identify the acute and late effects of radiation on living tissue.
		CO4	Describe the effects of whole body radiation, describe the long term effects of radiation, explain the effects of radiation on the developing embryo and fetus at each stage.

		CO5	Explain the effects of time, dose and fractionation on long term side effects and treatment effectiveness, describe the relationship between LET, RBE and OER
Semester: VI			
BBM-601	**Hospital Management**	CO1	Understand the need and importance of cost effective sustainable healthcare through demand generation and enhanced quality care
		CO2	Develop and apply various employee friendly systems for effective functioning of different administrative activities and support services of hospital.
		CO3	Promote patient centred care with a continuous quality improvement orientation ensure smooth functioning of core process by forecasting, streamlining patient flow, staff scheduling, planning space/ facilities/ supplies, maintenance, etc.
		CO4	Ensure optimum utilization of available limited resources, Sharpen managerial skills. Have an appreciation on the use of information technology in the hospital
BMD-601	**Medical Ethics**	CO1	Provide students with the research competencies required to work as professional scholars in bioethics
		CO2	train students in examining and analyzing the salient topics of contemporary healthcare ethics, especially regarding their normative, global and religious dimensions
		CO3	provide students with clinical experience through rotations in various clinical settings
		CO4	assist student in writing a practical project that qualifies for the professional doctorate
BMD-602	**IPR**	CO1	Students will understand the need for creation, protection, and commercialization of intellectual property in the area.
		CO2	Knowledge on various forms of Intellectual Property Rights, deals with the entire process of patent filling and taking some case studies.
		CO3	The students once they complete their academic projects, they get awareness of acquiring the patent and copyright for their innovative works.
		CO4	They also get the knowledge of plagiarism in their innovations which can be questioned legally.
BBM-671	**Project Work**	CO1	Student will understand how to connect the theoretical knowledge with actual practical things.
		CO2	Student will get a clear explanation of how the project works address to solve the Statement of a Problem.
			Student will get a perfect training on research domain.

B.Tech. (Biotechnology)

A. Programme Objectives:

1. An ability to apply the knowledge of mathematics, science, and engineering fundamentals in the areas of biotechnology, such as Bioprocess engineering, Genetic Engineering, Bioinformatics, Downstream Processing etc.
2. An ability to identify and analyze the complex biotechnology-oriented problems and to nurture the issues by providing appropriate solution
3. An ability to design a bio-based system, component or process or protocol to address the essential issues related to public health, environment, society, culture and safety
4. An ability to design, analyze, interpret and conclude the biological data using broad research based knowledge
5. An ability to educate the appropriate selection and application of current/ modern engineering techniques/ tools in the area of biotechnology
6. An ability to inculcate awareness among the students about the impact of various biological issues related to society, ethics, health, culture and safety
7. An ability to understand and demonstrate the need for the development of sustainable biotechnological solutions for addressing the environmental issues aligned with society
8. An ability to realize, commit and apply professional ethics by means of technology practice
9. An ability to inculcate the habit among students to function efficiently as an individual or in multidisciplinary team
10. An ability to communicate effectively through verbal and written mode with technical audience
11. An ability to create competency in the engineering management, finance principles and its application in multidisciplinary projects
12. An ability to recognize the need for life-long learning for sustaining professional career.

B. Program Specific Outcomes (PSOs):

1. Successful professional career and/ or higher studies by gaining knowledge in fundamental biological principles
2. Provide strong foundation in the core biotechnology courses to evaluate real life problems and to propose biotechnological solutions with economical and social viability
3. Sensitize on environmental, health and bioethical issues, Intellectual property rights, professional ethics and life-long learning through application orientated activities

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BAS 101	**Physics**	CO1	Understand the concepts of quantum physics for materials.
		CO2	Use of equipment for low and high energy applications.
		CO3	Solve engineering problems by applying the concepts of wave and particle nature of radiant energy.
		CO4	Apply the concept of energy band for semiconductors.
		CO5	Construct a quantum mechanical model to explain the behavior of a system at microscopic level.
BAS 105	**Remedial Mathematics-I**	CO1	Recall the the set, relation, function mapping and Complex numbers
		CO2	Learn the Roots of the quadratic equations, concept of A.P., G.P. and H.P
		CO3	Discuss the vector and trigonometry
		CO4	Operate the limit, continuity, differentiability and integration
		CO5	Apply the concept of two dimensional geometry
ECC 101	**Basic Electrical Engineering**	CO1	Memorize the concepts of KVL/KCL and network theorems in solving DC circuits
		CO2	Define the steady state behavior of single phase and three phase AC electrical circuits.
		CO3	Recall the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three-phase transformer
		CO4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications.
		CO5	To apply the components of low voltage electrical installations and perform elementary calculations for energy consumption
BAS 151	**Physics Lab**	CO1	Develop skills to impart practical knowledge in real time solutions.
		CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
		CO3	Design new experiments/instruments with practical knowledge.
		CO4	Gain knowledge of new concept in the solution of practical oriented problems.

ECC 151	**Electrical Engineering Lab**	CO1	Get an exposure to common electrical components and their ratings.
		CO2	Make electrical connections by wires of appropriate ratings.
		CO3	Understand the usage of common electrical measuring instruments.
		CO4	Understand the basic characteristics of transformers and electrical machines.
MEC 151	**Engineering Graphics & Design**	CO1	Draw orthographic projections of lines, planes and solids.
		CO2	Construct isometric scale, isometric projections and views.
		CO3	Draw sections of solids including cylinders, cones, prisms and pyramids.
		CO4	Draw projections of lines, planes, solids, isometric projections and sections of solids including cylinders, cones, prisms and pyramids using AutoCAD
AOC 101	**Basics of Communication**	CO1	Trained in English language including listening, speaking, reading and writing skills
		CO2	Developed the presentation skills for professional life
		CO3	Able to manage the work stress in professional life
		CO4	Able to control inter-personal conflicts.
Semester II			
BAS 202	**Chemistry**	CO1	Recall the instruments for atomic and molecular structure
		CO2	Determine Structure of Compound by spectroscopic methods.
		CO3	analyze the importance of Chemical Industry
		CO4	understand the basic concept of hardness of water and its removal techniques.
		CO5	Study the manufacture of different products like fuel, cement, polymer, glass, soap and detergents by modern methods
BAS 206	**Remedial Mathematics-II**	CO1	Recall the differentiation & its applications
		CO2	Learn the concept of three dimensional geometry.
		CO3	Discuss the determinants and Matrices
		CO4	Operate the Numerical techniques.
		CO5	Apply the interpolation formulae & numerical integration
CSC 201	**Programming for Problem Solving**	CO1	Understand the basics of Computer System and Hardware Organization
		CO2	Learn the different tests of Memory Units, Input and Output Devices and Input Output Ports.

		CO3	Understand Basics of Programming Languages and Operating Systems and Graphical User Interface and Windows
		CO4	Solve Programming Methodology, Arrays and Structures
		CO5	Apply techniques of Operations and Expressions.
HSM 201	**Professional Communication and Soft Skills**	CO1	Trained in English language including listening, speaking, reading and writing skills.
		CO2	Developed the presentation skills Reading Techniques
		CO3	Able to manage the Essential Grammar.
		CO4	Able to Basic Technical Writing Skills and Nature and Style of sensible Writing
BAS 251	**Chemistry Lab**	CO1	Use of different analytical instruments.
		CO2	Measure molecular/system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water
		CO3	Measure hardness of water.
		CO4	Estimate the rate constant of reaction.
		CO5	Determine Structure of Compound by spectroscopic methods.
CSC 251	**Programming for Problem Solving Lab**	CO1	Explain the basic syntax, structure and execution of programs written in C language.
		CO2	Develop the C code for a given algorithm.
		CO3	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
		CO4	Write programs that perform operations using derived data types.
Semester-III			
HSS-308	**Management Concepts and Practices**	CO1	Develop and prepare for communications in a technical organization.
		CO2	Develop skills for writing business letters and reports.
		CO3	Participate in debates and interviews at global forum.
		CO4	Communicate through phone and e-mail for business communication.
		CO5	Coordinate meetings and projects in a technical organization.
BAS-311	**Biology for Engineers**	CO1	Understand the biological concepts from an engineering perspective
		CO2	Understand the concepts of biological sensing and its challenges
		CO3	Understand development of artificial systems mimicking human action

		CO4	Integrate biological principles for developing next generation technologies
		CO5	Understand the biological concepts in Human health
BAS-313	**Biostatistics**	CO1	Critically analyze research methodologies identified in existing literature.
		CO2	Propose and distinguish appropriate research designs and methodologies to apply to a specific research project.
		CO3	Use basic and modern statistical software to analyze the biological and clinical data.
		CO4	Develop a comprehensive research methodology for a research question.
		CO5	Apply the understanding of feasibility and practicality of research methodology for a proposed project
BTE-317	**Biophysical Techniques**	CO1	Explain the basic principles of analyses and detection systems involved in photometric, fluorometric and luminescence -based methods.
		CO2	Explain principles of electrophoresis and immunochemical techniques and discuss how these techniques can be used in molecular medicine.
		CO3	Discuss the use of enzyme kinetics in analytical methods.
		CO4	Explain basic principles for chromatographic separation techniques.
		CO5	Discuss quality control, error sources, documentation and storage of experimental data.
BTC-301	**Biochemistry**	CO1	Describe the daily requirement, digestion and absorption of carbohydrates, proteins and lipids.
		CO2	Discuss the metabolic pathways of carbohydrates and metabolic disorders associated with item.
		CO3	Explain the metabolic pathways of lipids and metabolic disorders associated with item.
		CO4	Demonstrate the metabolic pathways of amino acids, nucleic acids and associated disorders.
		CO5	Summarize the hormonal regulation of metabolic pathways
BTC-302	**Cell Biology**	CO1	Describe the cell structure, components of cell, enzymes to emphasize the importance of cell as the basic unit of an organism.
		CO2	An understanding about the role of various cellular organelles in modifying the functions of the cells, especially, metabolism and protein synthesis.
		CO3	The role of cytoskeleton and modes of cellular transport will be discussed.

		CO4	Understanding the cellular regulation through various types of cell signaling, cell division, apoptosis and cell differentiation.
		CO5	Provide an overall understanding of the epithelial cells and cancer with a focus on neurobiology and neurodegenerative diseases
BTC-351	**Biochemistry Lab.**	CO1	Ability to understand fundamental concepts of biology, chemistry and biochemistry.
		CO2	Ability to apply basic principles of chemistry to biological systems and molecular biology.
		CO3	Ability to relate various interrelated physiological and metabolic events.
		CO4	The student will get practical knowledge of Preparation of buffers and measurement of pH,
		CO5	Qualitative tests of carbohydrates, Qualitative tests of proteins & Amino Acids, Comparative evaluation of different methods of protein analysis: UV, Lowry, Biuret, Bradford.
BTC-352	**Cell Biology Lab.**	CO1	The candidate would have gained knowledge about the morphology of the basic microorganisms.
		CO2	Basic knowledge about the operation and sterilization procedures in the laboratories would have been gained.
		CO3	Different staining techniques to visualize the live and dead microorganisms would have been practiced.
		CO4	An overview about blood cells and its morphology would have been studied.
		CO5	Knowledge about different stages of cells would have been gained
BTC-361	**Minor Project**	CO1	The student may develop a process of interest to achieve strategic goals
		CO2	The student may develop skills to manage creative teams and project process effectively and efficiently
		CO3	The student may develop a leadership effectiveness in organizations
		CO4	The students may acquire concepts to address specific management needs
		CO5	The student may develop a tool to for the betterment of the society
MCC-301	**Essence of Indian Traditional Knowledge**	CO1	Identify the concept of Traditional knowledge and its importance.
		CO2	Explain the need and importance of protecting traditional knowledge.

		CO3	Illustrate the various enactments related to the protection of traditional knowledge.
		CO4	Interpret the concepts of Intellectual property to protect the traditional knowledge.
		CO5	Explain the importance of Traditional knowledge in Agriculture and Medicine
Semester-IV			
HSS-403	**Entrepreneurship**	CO1	Have the ability to discern distinct entrepreneurial traits.
		CO2	Know the parameters to assess opportunities and constraints for new business ideas.
		CO3	Understand the systematic process to select and screen a business idea.
		CO4	Design strategies for successful implementation of ideas.
		CO5	Write a business plan.
BTE-422	**Chemical Engineering Principles**	CO1	To classify the biological basics and bioprocessing.
		CO2	Discuss the difference between bioprocesses and chemical processes.
		CO3	Bioprocess design and operation Choice of bioreactor Heat & mass transfer considerations and scale up of bioprocesses.
		CO4	Recall the role of amino acids in enzyme catalysis
		CO5	Introduction to bioprocess monitoring/control.
BTC-401	**Genetics**	CO1	Discuss the basic organization of the human genome.
		CO2	Explain the Mendelian inheritance patterns in humans and the associated complications.
		CO3	Describe the Mitochondrial inheritance, X-inactivation.
		CO4	Learn in detail about the chromosomal basis of human diseases and genetics of pregnancy.
		CO5	Describe the different types of mutations and their relevance for diseases and basic concepts in molecular pathology.
BTC-402	**Microbiology**	CO1	Basic information regarding the microbes, types, their importance and the development of Microbiology.
		CO2	Understand the advanced microscopic techniques in the morphological identification of microorganisms along with the microbial structural information.
		CO3	Describe the information about the microbial metabolism and the nutritional requirements.
		CO4	Basics of microbial growth, isolation and quantification methods and how the energy is being utilized to synthesis the biomolecules.

		CO5	The basic characteristics, and reproduction of fungi, mold and bacteriophages together with industrial applications explained in detail.
BTC-403	**Molecular Biology**	CO1	Exhibit a knowledge base in genetics, cell and molecular biology, and anatomy and physiology.
		CO2	Demonstrate the knowledge of common and advanced laboratory practices in cell and molecular biology.
		CO3	Exhibit clear and concise communication of scientific data.
		CO4	Engage in review of scientific literature in the areas of biomedical sciences.
		CO5	Critique and professionally present primary literature articles in the general molecular biology field.
BTC-451	**Genetics Lab.**	CO1	The basic organization of the human genome.
		CO2	Explain the Mundelein inheritance patterns in humans and the associated complications.
		CO3	Describe the Mitochondrial inheritance, X-inactivation.
		CO4	Learn in detail about the chromosomal basis of human diseases and genetics of pregnancy.
		CO5	Describe the different types of mutations and their relevance for diseases and basic concepts in molecular pathology.
BTC-452	**Microbiology Lab.**	CO1	Student will be well versed in culture media preparation and sterilization techniques.
		CO2	Students will be familiar with microscopic methods in the study of microorganisms by various staining techniques.
		CO3	Students would have learnt different methods to quantify microbes
		CO4	Students would gain knowledge about antibiotic sensitivity assay and effects of various disinfectants on microbes.
		CO5	At end of this course, students would have learnt the effect of different parameters on bacterial and yeast growth.
BTC-453	**Molecular Biology Lab.**	CO1	By the end of this course, students should be able to demonstrate knowledge and understanding of the principles underpinning DNA isolation from various sources.
		CO2	By the end of this course, students should be able to demonstrate knowledge and understanding of restriction digestion.

		CO3	By the end of this course, students should be able to demonstrate the ability to carry out competent cell preparation and transformation.
		CO4	By the end of this course, students should be able to demonstrate the ability to carry out phage titration.
		CO5	By the end of this course, students will be aware of the hazardous chemicals and safety precautions in case of emergency.
BTC-461	**Minor Project**	CO1	The student may develop a process of interest to achieve strategic goals
		CO2	The student may develop skills to manage creative teams and project process effectively and efficiently
		CO3	The student may develop a leadership effectiveness in organizations
		CO4	The students may acquire concepts to address specific management needs
		CO5	The student may develop a tool to for the betterment of the society
MCC-401	**Environmental Sciences**	CO1	Understand the environmental issues pertaining to day-to-day living; gain awareness for need of environmental education vis-à-vis education for sustainable development.
		CO2	Understand and be aware of the management of natural resources; importance of the conserving energy and environmental resources.
		CO3	Understand the need for intellectual property associated with endemic and valuable biological resources.
		CO4	Understand about global issues associated with climatic changes and international protocols.
		CO5	Aware of the diverse variety of social issues associated with environmental deterioration involving human component such as population, rights, ethics
Semester-V			
BTC-501	**Plant and Animal Tissue culture**	CO1	An ability to apply knowledge of mathematics, science, and engineering.
		CO2	Ability to design and conduct experiments, as well as to analyze and interpret data.
		CO3	Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, societal, political, ethical, health and safety, manufacturability, and sustainability.
		CO4	Ability to function on multidisciplinary teams.

		CO5	Ability to identify, formulate, and solve engineering problems.
BTC-502	**Immunotechnology**	CO1	Relate the formation and phases of active and passive immune reactions with immunotherapeutic products.
		CO2	Describe agents producing immune reaction
		CO3	Compose the pharmaceutical design and application fields of immunological agents
		CO4	Relate the formation and phases of active and passive immune reactions with immunotherapeutic products
		CO5	Compose the pharmaceutical design and application fields of immunological agents
BTD-501	**Enzyme Technology**	CO1	Understand the relationship between properties and structure of the enzymes, their mechanism of action and kinetics of enzymatic reactions.
		CO2	Skilled to characterize the enzymes in each enzymatic class, examples of such enzymes and their application in practice.
		CO3	Have knowledges in the field of biosensors and immobilized systems.
		CO4	Skilled with the use of enzymes in medicine, food, organic synthesis, genetics and other areas sectors.
		CO5	Discuss the applications of enzymes in different industries
BTD-502	**Genetic Engineering**	CO1	Learn about the vectors and their ideal characteristics.
		CO2	Understand different methods of recombinant DNA techniques like labeling DNA, PCR and gene sequencing.
		CO3	Gain knowledge about prokaryotic and mammalian expression vectors and cloning in plants.
		CO4	Learn about preparation of genomic and cDNA libraries, mutagenesis, and cloning techniques for altering gene expression.
		CO5	Learn about various applications of rDNA technology and how to handle the genetically modified organisms.
BMO- 501	**Biomaterials**	CO1	Students would have learnt the different types of biological buffers and biomolecules with their significant functions.
		CO2	Students would have knowledge about the structure and the chemical reactions involved in different biochemical pathways towards the energy generation processes.

		CO3	Students will be able to understand the sources and types of proteins, enzymes, vitamins, hormones etc involved in wide range of biochemical reactions.
		CO4	Students will be able to understand the biochemical values of metabolic pathways in relation to metabolic clinical disorders.
		CO5	Students would have learnt the key principles involved in bioenergetics of various pathways.
BIO-501	**Bioinformatics**	CO1	Infer the biological problems using appropriate in silico approaches.
		CO2	Select the suitable tools or servers to solve the specific biological issue and curate experimental data.
		CO3	Perform and analyze database similarity search and sequence alignment.
		CO4	Construct and analyze phylogenetic trees.
		CO5	Use appropriate tools and packages to analyze varied range of biological problems.
BTC-551	**Plant and Animal Tissue culture Lab.**	CO1	Students will acquire knowledge about differentially expressed genes
		CO2	Students will acquire knowledge about the structure and function of chloroplast and mitochondria
		CO3	Students will acquire knowledge about secondary metabolites synthesis
		CO4	Students will acquire knowledge about agrobacterium and plant viruses
		CO5	Students will acquire knowledge about molecular pharming
BTC-561	**Minor Project**	CO1	The student may develop a process of interest to achieve strategic goals
		CO2	The student may develop skills to manage creative teams and project process effectively and efficiently
		CO3	The student may develop a leadership effectiveness in organizations
		CO4	The students may acquire concepts to address specific management needs
		CO5	The student may develop a tool to for the betterment of the society
MCC-501	**Cyber Security**	CO1	Describe network security services and mechanisms.
		CO2	Symmetrical and Asymmetrical cryptography
		CO3	Data integrity, Authentication, Digital Signatures.
		CO4	Various network security applications, IPSec, Firewall, IDS, Web security, Email security, and Malicious software etc

Semester-VI			
BTC-601	**Animal Biotechnology**	CO1	Upon completion of the course the students will learn about the production of regulatory proteins
		CO2	Upon completion of the course the students will learn about different viral vectors
		CO3	Upon completion of the course the students will learn about hybridoma technology
		CO4	Upon completion of the course the students will learn about gene therapy and probes
		CO5	Upon completion of the course the students will learn about assisted reproductive techniques
BTC-602	**Food Biotechnology**	CO1	Students will acquire knowledge about intentional food additives and enzymes in food processing
		CO2	Students will acquire knowledge about food fermentation and intoxication
		CO3	Students will acquire knowledge about processing food
		CO4	Students will acquire knowledge about various food preservation techniques
		CO5	Students will acquire knowledge about dairy and milk products
BTD-601	**Bioprocess Engineering**	CO1	Define process control terminologies and identify suitable mode of controlling a given process.
		CO2	Develop suitable control equations for bioprocess dynamics.
		CO3	Examine the closed loop control system and select suitable control action.
		CO4	Analyze the stability of control system in Laplace and frequency domain.
BTD-602	**Medical Biotechnology**	CO1	Demonstrate a systematic knowledge of medical biotechnology at the forefront of research.
		CO2	Have a critical awareness of applications to biomedical science, disease and diagnosis.
		CO3	Demonstrate a comprehensive understanding of the practical, professional and/or research skills necessary for working as a Biotechnologist with the medical sphere.
		CO4	Demonstrate the intellectual skills of handling complex issues systematically and creatively enabling originality in problem solving.
		CO5	Exhibit postgraduate generic skills of initiative and personal responsibility, enabling independent decision making.

AIO-601	**Agriculture Biotechnology**	CO1	Apply in vitro techniques for plant breeding and propagation.
		CO2	Analyze problems of agrobiotechnology.
		CO3	Compare effectiveness of different genetic methods.
		CO4	Impart the knowledge to create own business
BIO-601	**Genomics and Proteomics**	CO1	Recall and relate the role of genes, genetic code, recombinant methods in rDNA technology.
		CO2	Describe the role of various enzymes in genetic manipulation.
		CO3	Make use of the techniques involved in isolation, purification and separation of nucleic acids.
		CO4	Apply rDNA technology in various fields using suitable methodology.
		CO5	Appraise the use of genetic engineering principles for gene therapies
BTC-651	**Animal Biotechnology Lab.**	CO1	Explain the significance difference between plant cell culture and basics of animal cell culture.
		CO2	Characterize the animal cell using biochemical and molecular biology techniques.
		CO3	Apply the principles of genetic engineering for the modification of animal cell for research and industrial use.
		CO4	Apply animal biotechnology for the commercial bio-products.
BTC-652	**Food Biotechnology Lab**	CO1	Understanding the various causes of food deterioration and food poisoning. Identification of appropriate processing, preservation, and packaging method.
		CO2	Analyze product quality and effect of processing technique on it.
		CO3	Identify important species of pathogenic microbes and describe factors that affect their growth in various types of food.
		CO4	Analysis of food related hazards and Hazard Analysis Critical Control Point (HACCP) method
BTC-661	**Minor Project**	CO1	The student may develop a process of interest to achieve strategic goals
		CO2	The student may develop skills to manage creative teams and project process effectively and efficiently
		CO3	The student may develop a leadership effectiveness in organizations
		CO4	The students may acquire concepts to address specific management needs

		CO5	The student may develop a tool to for the betterment of the society
MCC-601	**Indian constitution**	CO1	Identify and explore the basic features and modalities about Indian constitution.
		CO2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level.
		CO3	Differentiate different aspects of Indian Legal System and its related bodies.
		CO4	Discover and apply different laws and regulations related to engineering practices.
		CO5	Correlate role of engineers with different organizations and governance models.
Semester-VII			
BTC-701	**Plant Biotechnology**	CO1	Explain the various components of plant tissue culture media, e.g. minerals, growth factors, hormones, and what governs the choice of components,
		CO2	Explain the various steps taken to establish and optimise media for particular purposes in particular species, without the aid of texts.
		CO3	Explain and perform some of the more advanced techniques, e.g. embryo rescue, and protoplasting.
		CO4	Establish and maintain plants in tissue culture and micropropagation, including morphogenesis.
		CO5	Investigate and define a protocol to establish an unknown species and test its response.
BTC-702	**Environmental Biotechnology**	CO1	This course aims to introduce fundamentals of Environmental Biotechnology.
		CO2	The course will introduce major groups of microorganisms tools in biotechnology and their most important environmental applications.
		CO3	On completion of course, students will be able to understand the use of basic microbiological, molecular and analytical methods, which are extensively used in environmental biotechnology.
		CO4	Evaluate the significance and the main technologies used in environmental biotechnology.
		CO5	Describe methods used to detect and identify microorganisms in the environment
BTD-701	**Pharmaceutical Biotechnology**	CO1	Evaluate different pharmaceutical parameters of current biotechnology products.
		CO2	Determine parameters related to stability and formulation of biotechnology products
		CO3	Discuss quality control procedures related to biotechnology products.

		CO4	Discuss novel formulation methods for better delivery of biotechnology derived drugs.
		CO5	Discuss the delivery of biotechnology products by the parenteral, oral, transdermal and nasal routes of administration.
BTD-702	**Downstream Processing**	CO1	Explain the significance of downstream processing in bioprocess industry.
		CO2	Evaluate primary separation techniques for product recovery
		CO3	Choose the techniques for product enrichment and purification.
		CO4	Utilize membrane based operations for product purification.
		CO5	Apply downstream processing concepts for commercial bio-products.
BMO-701	**IPR and Engineering Ethics**	CO1	Upon completion of the course the students will learn about basics of entrepreneurship
		CO2	Upon completion of the course the students will learn about protection of rights
		CO3	Upon completion of the course the students will learn about different types of patents
		CO4	Upon completion of the course the students will learn about patent filing
		CO5	Upon completion of the course the students will learn about biosafety levels
BIO-702	**Drug Design**	CO1	Review pharmaceutical methodology for the design of new drugs and propose synthetic pathways for their preparation.
		CO2	Devise appropriate methodology for the design of new drugs.
		CO3	Apply drug design methodology, including computer-aided and related techniques to the design of a new drug.
		CO4	Review and present data to peers and demonstrators with responsibility and accountability
BTC-751	**Plant Biotechnology Lab.**	CO1	To understand the fundamentals of plant cells, their structure and functions.
		CO2	To learn the nitrogen fixation mechanism and significance of viral vectors.
		CO3	To gain knowledge about the plant tissue culture techniques.
		CO4	To use the gained knowledge for the development of therapeutic products.

		CO5	To learn about the transgenic plants, their production and applications
BTC-752	**Environmental Biotechnology Lab.**	CO1	Evaluate the significance and the main technologies used in environmental biotechnology.
		CO2	Describe methods used to detect and identify microorganisms in the environment.
		CO3	Describe and solve problems relating to basic concepts in biological nutrient removal.
		CO4	Use of various approaches to anaerobic digestion of wastes and solve related problems**.**
BTC-761	**Minor Project**	CO1	The student may develop a process of interest to achieve strategic goals
		CO2	The student may develop skills to manage creative teams and project process effectively and efficiently
		CO3	The students may develop a leadership effectiveness in organizations
		CO4	The students may acquire concepts to address specific management needs
		CO5	The student may develop a tool to for the betterment of the society
MCC-701	**Technical report writing**	CO1	The students would have gained knowledge to disseminate the area of interest
		CO2	The students would have gained knowledge about literature survey
		CO3	The students would have gained knowledge to select the methodologies for the research work
		CO4	The students would have gained knowledge about the principles behind the process
		CO5	The students would have gained knowledge about the expected outcome of the work
Semester-VIII			
BTC-871	**Seminar ,Project Work and Internship**	CO1	Upon completion of the project work the students would have achieved the expected outcome of the research
		CO2	Upon completion of the project work the student would have gained knowledge to develop a product which will benefit the society
		CO3	Upon completion of the project work the student would have predicted the commercial probability of their product
		CO4	Upon completion of the project work the student would gain knowledge about the success rate of the product
		CO5	Upon completion of the project work the student would have assessed the impact of the research work

M. Tech. (Biotechnology)

A. Program Outcomes (POs):

1. Biochemistry Majors will gain proficiency in basic laboratory techniques in both chemistry and biology, and be able to apply the scientific method to the processes of experimentation and hypothesis testing.
2. Senior Biochemistry Majors will be able to demonstrate an understanding of fundamental biochemical principles, such as the structure/function of biomolecules, metabolic pathways, and the regulation of biological/biochemical processes.
3. Students in the Biochemistry Major will be able to apply and effectively communicate scientific reasoning and data analysis in both written and oral forums.
4. Students in the Biochemistry Major will understand and practice the ethics surrounding scientific research.
5. Graduates will be able design, perform experiments, analyze and interpret data for investigating complex problems in biochemical engineering and related fields.
6. Graduates will be able to decide and apply appropriate tools and techniques.
7. Graduates will be able to justify societal, health, safety and legal issues and understand his responsibilities in biotechnological engineering practices
8. Graduates will be able to understand the need and impact of biotechnological solutions on environment and societal context keeping in view need for sustainable solution.
9. Use the techniques, skills, and modern engineering tools necessary for engineering practice.
10. Design system, components or processes to meet realistic needs of society, environment, health and safety, and sustainability.
11. Recognize the need for, and an ability to engage in life-long learning.
12. Graduates will be able to demonstrate knowledge of project and finance management when dealing with Biochemical problems.

B. Program Specific Outcomes (PSOs):

1. Demonstrate proficiency in basic science and foundation engineering courses.
2. Demonstrate a working knowledge of advanced biochemistry and life science for the industrial applications and human welfare.
3. Demonstrate the application in biotechnology and allied industries designing, developing and providing solutions for product/processes/technology development.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BTMT-501	**Fundamentals of Biostatistics**	CO1	Apply the principles of statistics for designing microbiological experiment, statistical analysis, and interpretation of results
		CO2	Operate and solve exercise using computation statistics software
		CO3	Get acquitted with basic approach of research methodology
BTMT-503	**Applied Plant and Animal Biotechnology**	CO1	Understand the Concept and different types in Animal Cell Culture.
		CO2	Apply the use of molecular biology techniques for plants and animals
		CO3	Learn to genetically engineer the animals to improve sustainability, productivity and suitability for pharmaceutical, agricultural and industrial applications.
		CO4	Learn the genetic engineering of plants to improve crop productivity.
BTMT-505	**Advanced Computational Biotechnology**	CO1	Learn the basic tools & techniques used in applications of Bio-informatics
		CO2	Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
		CO3	Explain about the methods to characterize and manage the different types of Biological data.
		CO4	Classify different types of Biological Databases.
		CO5	Introduction to the basics of sequence alignment and analysis
BTMT-507	**Microbial Biotechnology**	CO1	To highlight the roles and characteristics of microorganisms in field of Biotechnology
		CO2	To impart knowledge on the basic concept of multiplication in microorganism
		CO3	To study in detail the growth, genetic organization of microorganisms and impact of environment on their growth
		CO4	To evaluate explicitly, the metabolic pathways, role of microbes in public health; insight into the physical and chemical control of microorganisms
BTMT-581	**Seminar**	CO1	Upon completion of the project work the students would have achieved the expected outcome of the research
		CO2	Upon completion of the project work the student would have gained knowledge to develop a product which will benefit the society
		CO3	Upon completion of the project work the student would have predicted the commercial probability of their product
		CO4	Upon completion of the project work the student would gain knowledge about the success rate of the product
		CO5	Upon completion of the project work the student would have assessed the impact of the research work

CSMT-509	**Fundamentals of Computers & Programming**	CO1	Understand computer basics and programming basics.
		CO2	Understand binary number system
		CO3	Begin using the Java programming language and Display output on the console.
		CO4	Explain the differences between syntax errors, runtime errors, and logic errors.
Semester II			
BTMT-502	**Advanced Immunotechnology**	CO1	Describes the basics of modern immunotechnology, the development of the products of the immunotechnology, the application of immunological methods in biotechnology, pharmacy, diagnostics, therapy and scientific investigation;
		CO2	Explains the connection between immunotechnology and other nature sciences.
		CO3	Explains the importance of immunotechnology for the development of other sciences, the input of immunotechnology to the biotechnology.
		CO4	Explains the basic use of the concepts of immunotechnology, adapting them to the laboratory work; analyzes and summarizes the scientific information.
BTMT-504	**Advanced Bioprocess Engineering**	CO1	Explain the significance of downstream processing in bioprocess industry.
		CO2	Evaluate primary separation techniques for product recovery.
		CO3	Choose the techniques for product enrichment and purification.
		CO4	Utilize membrane based operations for product purification.
		CO5	Apply downstream processing concepts for commercial bio-products
BTMT-506	**Applied Recombinant DNA Technology**	CO1	Recall and relate the role of genes, genetic code, and genetic engineering in Biotechnology.
		CO2	Describe the role of various enzymes in genetic manipulation.
		CO3	Make the use of the techniques involved in isolation, purification and separation of nucleic acids
		CO4	Apply rDNA technology in various fields using suitable methodology.
		CO5	Appraise the use of genetic engineering principles for gene therapies.
BTMT-522	**Principles in Biotechnology/ Tissue Engineering**	CO1	Describe the basic techniques to manufacture scaffolds from raw biomaterials and explain the different prerequisites for the biomaterials.
		CO2	Explain nature design concepts in the biomaterials field.
		CO3	Differentiate biomaterials regarding their properties and assess their usage in a specific application.
		CO4	Describe the most common techniques to test cell biocompatibility of biomaterials and apply them on different biomaterials.
		CO5	Correlate the protein structure of a biomaterial with its properties as a biomaterial.

BTMT-524	**Recombinant DNA Technology Lab**	CO1	Understand and develop the concept of recombinant DNA technique.
		CO2	Learn the basic techniques used in cloning and expression of foreign genes.
		CO3	Understanding of genetic engineering techniques used in digestion and expression of foreign DNA.
Semester-III			
BTMT-601	**Bioinstrumentation**	CO1	Explain the principles, need and SOP of laboratory instruments
		CO2	Pertain the theory, principles of chromatographic, electrophoretic, spectrophotometric and radioisotope techniques
		CO3	Demonstrate various instruments and techniques
BTMT-603	**Downstream Processing and Bioseparation**	CO1	Perform bioreactor operations as applicable in bioprocess industries.
		CO2	Scale-up, simulate and model bioprocess operation
		CO3	Carry out separation and purification of fermentation products
BTMT-605	**Food Engineering and Quality Control**	CO1	. Describe and outline the principles of food processing design and production techniques
		CO2	Collect and interpret the data from experiments in different food processing operations
		CO3	Analyse the quality parameters of food products from different food processing operations
		CO4	Generate a quality management system based on the Hazard Analysis Critical Control Point (HACCP) principles to food processing
		CO5	Identify and explain issues relevant to food processing and food quality management systems
BTMT-621	**Metabolic Engineering / Nanobiotechnology**	CO1	Provide basic understanding about the new branch of Biotechnology –Bio nanotechnology
		CO2	Functioning of Bionanomachines and its advantages and uses
		CO3	Knowledge about the Biomolecular design and the Biomolecular Structure determination and how it is in bio nanotechnology.
BTMT-623	**Minor Project**	CO1	The student may develop a process of interest to achieve strategic goals
		CO2	The student may develop skills to manage creative teams and project process effectively and efficiently
		CO3	The student may develop a leadership effectiveness in organizations
		CO4	The students may acquire concepts to address specific management needs
		CO5	The student may develop a tool to for the betterment of the society
Semester-IV			
BTMT-692	**Dissertation**	CO1	Upon completion of the project work the students would have achieved the expected outcome of the research
		CO2	Upon completion of the project work the student would have gained knowledge to develop a product which will benefit the society

		CO3	Upon completion of the project work the student would have predicted the commercial probability of their product
		CO4	Upon completion of the project work the student would gain knowledge about the success rate of the product
		CO5	Upon completion of the project work the student would have assessed the impact of the research work

M.Sc. (Biotechnology)

A. Programme Objectives:

1. Graduates will gain and apply knowledge of Biotechnology, Science and Engineering concepts to solve problems related to field of Biotechnology.
2. Graduates will be able to identify, analyze and understand problems related to biotechnology Engineering and finding valid conclusions with basic knowledge in biotechnology Engineering.
3. Graduates will be able to design and develop solution to Biotechnology Engineering problems by applying appropriate tools while keeping in mind safety factor for environmental & society.
4. Graduates will be able design, perform experiments, analyze and interpret data for investigating complex problems in biotechnology Engineering and related fields.
5. Graduates will be able to decide and apply appropriate tools and techniques in biotechnological manipulation.
6. Graduates will be able to justify societal, health, safety and legal issues and understand his responsibilities in biotechnological engineering practices
7. Graduates will be able to understand the need and impact of biotechnological solutions on environment and societal context keeping in view need for sustainable solution.
8. Use the techniques, skills, and modern engineering tools necessary for engineering practice.
9. Design system, components or processes to meet realistic needs of society, environment, health and safety, and sustainability.
10. Recognize the need for, and an ability to engage in life-long learning.
11. Acquire knowledge of contemporary issues.
12. Graduates will be able to demonstrate knowledge of project and finance management when dealing with Biotechnology Engineering problems.

B. Program Specific Outcomes (PSOs):

1. Able to apply fundamental knowledge of basic Interdisciplinary content ((Physical and Mathematical) along with applied bioscience courses to apply the knowledge in following state of art subjects Bioinformatics and Computational Biology, Structural biology, Drug de- signing, Genomics and Proteomics
2. Able to apply basic knowledge and skills of various aspects of biotechnology to ad- dress the problems of food security, healthy food production, diseases etiology and environment.
3. Able to pursue research in industry and institutions related animal, plant ,environment biotechnology or to be able to pursue higher studies in diverse fields of biotechnology and interdisciplinary programs by applying principles of management, environmental, ethical, and social issues.

4. Able to apply principles of soft computing skills, problem solving, creative thinking, group dynamics, team building, leadership skills, decision making skills, contributing to overall personality, career development and innovation.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BTMS-101	**Principles of Microbiology**	CO1	Identify microbiological techniques, the defining characteristics of the major groups of microorganisms and apply to study microbial phylogeny
		CO2	Classify the nutritional types of microorganisms and measure microbial growth
		CO3	Evaluate how microorganisms interact with the environment in beneficial or detrimental ways
		CO4	Assess impact of plant- microbe interaction on agriculture in both beneficial and detrimental ways. Identify industrially important microbes
		CO5	Determine ways in which microorganisms play an integral role in disease, and the microbial and immunological methodologies are used in disease treatment and prevention
		CO6	Apply the scientific method by stating a question; researching the topic; determining appropriate tests; performing tests; collecting, analyzing, and presenting data and effective communicate with both specialist and non-specialist audiences/community
BTMS-102	**Biochemistry**	CO1	Demonstrate an understanding of carbohydrate, protein, lipid and nucleic acid metabolism.
		CO2	Distinguish between different metabolic processes and their impact in metabolism of biomolecules.
		CO3	Select particular metabolic pathway involved in carbohydrate, protein and fat related metabolic issues
		CO4	Apply and analyse the knowledge related to bioenergetics in living system.
BTMS-103	**Fundamentals of Bioinformatics**	CO1	Explain the theoretical knowledge of database system and algorithms.
		CO2	Analyze and discuss the results in light of molecular biological knowledge (sequence alignment and phylogenetic tree plot)
		CO3	Collect the proficient knowledge to solve biological system- a multi-disciplinary problem

		CO4	Develop the key skills of molecular modeling techniques currently practiced in any pharmaceutical research and development unit.
BTMS-104	**Enzymology**	CO1	Understand the growth kinetics, Monod equation and explain the role of various factors affecting the process of growth. They will also be able to define the media for submerged and solid-state fermentation process and sterilization
		CO2	State the significance of application of process technology on enzyme production, enzyme kinetics, solve the mass balance of production process, learn the process of oxygen transfer rate, agitation systems
		CO3	Collect the proficient knowledge of design of fermenter and operation of fermentation process, methods of translation of laboratory data to pilot scale process
BTMS-105	**Intellectual property rights, Biosafety & Bioethics**	CO1	To understand and follow the regulatory framework important for the product safety and benefit for the society.
		CO2	To devise business strategies by taking account of IPRs
		CO3	To acquire adequate knowledge in the use of genetically modified organisms and its effect on human health
		CO4	To gain more insights into the regulatory affairs.
BTMS-151	**Principles of Microbiology Lab.**	CO1	Identify microbiological techniques, the defining characteristics of the major groups of microorganisms and apply to study microbial phylogeny
		CO2	Classify the methods to measure microbial growth
		CO3	Evaluate how microorganisms interact with the environment in beneficial or detrimental ways
		CO4	Identify industrially important microbes
		CO5	Apply the scientific method by stating a question; researching the topic; determining appropriate tests; performing tests; collecting, analyzing, and presenting data and effective communicate with both specialist and non-specialist audiences/community
BTMS-152	**Biochemistry Lab.**	CO1	To apply knowledge of biochemistry in various cellular functions, inculcate a knowledge of various issues related to life processes and the application of research involved in functioning of the different cell organelles and accessories.
		CO2	To design and analyze the experiments related with the different molecules involved in biochemistry.

		CO3	To identify, formulate, and solve problems arisen due to the inefficient functioning of the various life processes and anatomical aspects of plants and animals.
		CO4	To use the techniques, skills, and modern tools necessary for imbalances in various life processes, design a research project, collect and analyze data, and interpret results
BTMS-107	**Fundamentals of Computer & IT**	CO1	Demonstrate the use of mathematical software and solve simple mathematical problems.
		CO2	Explain the needs of hardware and software required for a computation task.
		CO3	State typical provisions of cyber law that govern the proper usage of Internet and computing resources.
		CO4	Explain the working of important application software and their use to perform any engineering activity.
		CO5	Demonstrate the use of Operating system commands and shell script
Semester II			
BTMS-201	**Food & Dairy Technology**	CO1	To understand the science behind processing of foods and its impact on nutritive value of food stuffs.
		CO2	To provide in-depth knowledge on production of processed food products.
		CO3	To enable students to acquire skill in processing of various food items.
		CO4	To improve the students entrepreneurial skill.
BTMS-202	**Immunotechnology**	CO1	To apply knowledge of immunology in various cellular functions, inculcate knowledge of various issues related to immunological reactions eg the application of and research involved in functioning of the different molecules and moieties in the reactions.
		CO2	To design and analyze the experiments related with the different molecules involved in immunology and use of the various techniques in the immunology to study the kinetics and rationale behind each phenomenon.
		CO3	To identify, formulate, and solve problems arisen due to the inefficient functioning of the various immunological phenomenon leading to various immunological diseases.
		CO4	To use the techniques, skills, and modern tools necessary for imbalances in various life processes, design a molecular cell biology research project, collect and analyze data, and interpret results

BTMS-203	**Genetics**	CO1	Able to describe the different methods of genetic testing
		CO2	Demonstrate Knowledge and practical skills of molecular genetic analysis of genetic diseases
		CO3	Performing of polymerase chain reaction, cloning and transformation
		CO4	Construction of pedigrees and analysis of pattern of inheritance in the families
		CO5	Updating current Knowledge regarding genetics, genomics, genomic medicine etc.
BTMS-204	**Cell Biology**	CO1	Apply knowledge of cell biology in various cellular functions, inculcate a knowledge of various issues related to cell biology, the application and research involved in functioning of the different cell organelles.
		CO2	Design and analyze the experiments related with the different molecules involved in cell biology and use of the various techniques in the cell biology to study the kinetics and rationale behind each phenomenon.
		CO3	Identify, formulate, and solve problems arisen due to the inefficient functioning of the various life processes like cell to cell communication, cell cycle regulation, movement processes of a cell or system.
		CO4	Use the techniques, skills, and modern tools necessary for imbalances in various life processes, design a cell biology research project, collect and analyze data, and interpret results
BTMS-251	**Food & Dairy Technology Lab**	CO1	To make the students familiar with operations in food and dairy units
		CO2	To acquire knowledge on dairy processing techniques.
		CO3	To enable the students familiar with food processing techniques.
		CO4	To develop the skill involved in Food and Dairy Processing Techniques through doing the experiments
BTMS-252	**Immunotechnology Lab**	CO1	Apply knowledge of immunology, inculcate a knowledge of various issues related to immunology eg vaccines etc. and immunological techniques.
		CO2	Design and conduct experiments, as well as to analyze and interpret data of different immunological methods. To identify, formulate, and solve problems arisen due to the inefficient functioning of the immune system.

		CO3	Use the techniques, skills, and modern tools necessary for detection of the immunological diseases, design an immunology research project, collect and analyze data, and interpret results.
		CO4	Demonstrate knowledge and understanding of the engineering principles and apply these to manage projects work a recognition of the need for and an ability to engage in life-long learning.
BTMS-206	**Bioenergy Engineering**	CO1	Demonstrate general knowledge and understanding of some of the basic facts, concepts and principles relating to plants, in particular the composition and properties of plants and the different ways in which plant products have been utilized by humans
		CO2	Analysis of bioenergy systems and their potential in future energy supply.
		CO3	Make sense of information presented in different ways, including textual, numerical, graphical, multimedia and web-based material.
		CO4	Working with cross-cutting problems related to bioenergy -
		CO5	Planning processes linked to the establishment of bioenergy facilities.
BMMS-203	**Molecular Oncology**	CO1	To demonstrate transformed phenotype and its molecular and cellular basis, the pathogenesis of cancer, including the interactions with the microenvironment and the immune system, and molecular cancer progression up to the metastatic diffusion.
		CO2	Identification of the phases of development and the tumor types relevant to human oncology and define molecular targets for innovative targeted therapies.
		CO3	To demonstrate the pathogenetic mechanisms of the main immune pathologies (immunodeficiency, allergy, autoimmunity), as well as the role of the immune system in the natural and vaccine-elicited immunity to infectious agents, cell and organ transplants, and cancer.
Semester-III			
BTMS-301	**Plant Biotechnology**	CO1	Demonstrate the knowledge about the techniques of Plant Tissue Culture techniques, Lab organization & measures adopted for aseptic manipulation and nutritional requirements of cultured tissues.
		CO2	Apply knowledge for large scale clonal propagation of plants through various micropropagation techniques and Production of secondary metabolites under *in vitro* conditions.

		CO3	Develop skill in raising transgenics resistant to biotic & abiotic stresses & quality characteristics and their role in crop improvement.
		CO4	Design and implement experimental procedures using relevant techniques
BTMS-302	**Recombinant DNA Technology**	CO1	Apply the principles of molecular biology techniques
		CO2	Analyze the experimental data to select a suitable PCR for a particular application
		CO3	Evaluate selectivity and specificity of vectors for cloning genes and their expressions
		CO4	Examine gene function, gene modulation and their effects on improvement of crops and animals.
BTMS-303	**Animal Biotechnology**	CO1	To demonstrate foundational knowledge of Cell culture techniques and competence in laboratory techniques. Student can set up a tissue culture lab to carry out research.
		CO2	To acquire knowledge in animal cloning and its applications by various methods.
		CO3	To acquire adequate knowledge in the use of genetically modified organisms and its beneficial uses.
		CO4	To gain more insights into the ethical issues and regulatory affairs.
BTMS-304	**Environmental Biotechnology**	CO1	Identify the problems related to environment and the Environment Protection Acts and Legislations
		CO2	Apply advanced knowledge on environmental waste management (waste water and solid waste)
		CO3	Design techniques for bioremediation process
		CO4	Identify and evaluate the importance of biofuels and organic farming
		CO5	Apply the scientific method by stating a question; researching the topic; determining appropriate tests; performing tests; collecting, analyzing, and presenting data and effective communicate with both specialist and non-specialist audiences/ community
BTMS-351	**Plant Biotechnology Lab**	CO1	Demonstrate the knowledge about the techniques of Plant Tissue Culture techniques, Lab organization & measures adopted for aseptic manipulation and nutritional requirements of cultured tissues.
		CO2	Apply knowledge for large scale clonal propagation of plants through various micropropagation techniques
		CO3	Develop skill in raising transgenics resistant to biotic & abiotic stresses & quality characteristics and their role in crop improvement.

		CO4	Design and implement experimental procedures using relevant techniques.
		CO5	Production of secondary metabolites under *in vitro* conditions.
BTMS-352	**Recombinant DNA Technology Lab.**	CO1	Apply the principles of molecular biology techniques
		CO2	Analyze the experimental data to select a suitable PCR for a particular application
		CO3	Evaluate selectivity and specificity of vectors for cloning genes and their expressions
		CO4	Examine gene function, gene modulation and their effects on improvement of crops and animals
HSMS-301	**Biostatistics**	CO1	An ability to apply knowledge of mathematics and statistics to design and conduct experiments, as well as to analyze and interpret data related to domain of biology.
		CO2	An ability to design a system, component, or process to performing research in biological system and addressing the challenges associated with the interaction between living systems and non -living materials.
		CO3	An ability to apply the knowledge of basic mathematical & statistical tools used in biological research/ biotechnology in industry and research lab.
		CO4	An ability to understand the principle and application of Differential Calculus, Differential Equations and various Computational Techniques
		CO5	An ability to function in multidisciplinary teams. An ability to identify, formulate, and solve Science/Engineering problems.
BMMS-301	**Pharmacology & Toxicology**	CO1	Demonstrate the principles of pharmacodynamics and pharmacokinetics
		CO2	Illustrate toxicity risk assessment and fate of toxicants in humans
		CO3	Evaluate acute and chronic toxicity of environmental chemicals
		CO4	Develop competence in handling drugs and toxic materials
		CO5	Integrate theoretical and practical knowledge acquired in pharmacology and toxicology for advanced studies
Semester-IV			
BTMS-461	**Industrial Training and Presentation**	CO1	Upon completion of the project work the students would have achieved the expected outcome of the research

		CO2	Upon completion of the project work the student would have gained knowledge to develop a product which will benefit the society
		CO3	Upon completion of the project work the student would have predicted the commercial probability of their product
		CO4	Upon completion of the project work the student would gain knowledge about the success rate of the product
		CO5	Upon completion of the project work the student would have assessed the impact of the research work

M.Sc. (Microbiology)

A. Programme Objectives:

1. Students will 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, the Microbiology Student Association club (MSA) and outreach or mentoring activities specific to microbiology.
5. Graduates will be able to decide and apply appropriate tools and techniques in microbial manipulation.
6. Graduates will be able to justify societal, health, safety and legal issues and understand his responsibilities in microbiology practices
7. Graduates will be able to understand the need and impact of biotechnological solutions on environment and societal context keeping in view need for sustainable solution.
8. Use the techniques, skills, and modern engineering tools necessary for engineering practice.
9. Design system, components or processes to meet realistic needs of society, environment, health and safety, and sustainability.
10. Recognize the need for, and an ability to engage in life-long learning.
11. Acquire knowledge of contemporary issues.
12. Graduates will be able to demonstrate knowledge of project and finance management when dealing with Biotechnology Engineering problems.

B. Program Specific Outcomes (PSOs):

1. Explain relationships and apply appropriate terminology relating to the structure, metabolism, genetics, and ecology of prokaryotic microorganisms, eukaryotic microorganisms, and viruses.
2. Explain interactions between opportunistic and pathogenic microorganisms and susceptible hosts in contacts that result in infection and/or disease and apply these interactions to disease symptoms.
3. Explain nonspecific body defenses and the immune responses and apply this understanding to the infectious disease process as well as the prevention and control of infectious diseases.
4. Explain principles of physical and chemical methods used in the control of microorganisms and apply this understanding to the prevention and control of infectious diseases.
5. Exhibit strong, independent learning, analytical and problem solving skills with special emphasis on design, communication, and ability to work in teams.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
MBMS-101	**Principles of Microbiology**	CO1	Basic information regarding the microbes, types, their importance and the development of Microbiology
		CO2	Understand the advanced microscopic techniques in the morphological identification of microorganisms along with the microbial structural information.
		CO3	Describe the information about the microbial metabolism and the nutritional requirements.
		CO4	Basics of microbial growth, isolation and quantification methods and how the energy is being utilized to synthesis the biomolecules.
		CO5	The basic characteristics, and reproduction of fungi, mold and bacteriophages together with industrial applications explained in detail.
MBMS-102	**Biochemistry**	CO1	Provide basic understanding of carbohydrates, lipids, and proteins and their roles in normal biological processes.
		CO2	Explain the metabolic pathways of carbohydrates along with their roles in providing energy.
		CO3	Knowledge about the structural units of proteins, amino acids, and their metabolism will be given.
		CO4	Information about fatty acids and its metabolism and the structural units of genetic code will be provided.
		CO5	Describe the cellular processes involved in the generation of energy using different source materials.
MBMS-103	**Fundamentals of Bioinformatics**	CO1	Infer the biological problems using appropriate in silico approaches.
		CO2	Select the suitable tools or servers to solve the specific biological issue and curate experimental data.
		CO3	Perform and analyze database similarity search and sequence alignment.
		CO4	Construct and analyze phylogenetic trees.
		CO5	Use appropriate tools and packages to analyze varied range of biological problems.
MBMS-104	**Enzymology**	CO1	To understand the IUBMB system of enzyme classification To learn the factors involving and factors affecting the enzyme activity.
		CO2	To know the catalytic activity of enzyme and its regulation. To learn the enzyme used in clinical diagnosis and industries.

		CO3	To learn the kinetics of single and multi enzyme substrate enzyme catalysed reaction Know to solve the problems based on single and multi substrate reactions.
		CO4	To learn the enzyme inhibition kinetics and the problems related to it
		CO5	To learn the enzyme immobilization; methods of immobilizing the enzymes and their kinetics.
MBMS-105	**Intellectual property rights, Biosafety & Bioethics**	CO1	Understand the Fundamentals of intellectual property systems and the new regimes for trade and exchange of genetic resources and the prospects/problems/risks for developing countries.
		CO2	Description and discussion of various IPR regimes governing the exchange of genetic resources.
		CO3	Skilled and able to describe the subjects of strategic importance to economic and social development.
		CO4	Make the long-term perspective and help to contribute to institutional strengthening
		CO5	Skill capacity development in the cooperating countries.
MBMS-107	**Fundamentals of Computer & IT**	CO1	Understand the basic concept of computer language
		CO2	Discuss the internal architecture of CPU and input device and output device
		CO3	Skilled and able to assemble of low and high level languages.
		CO4	Working with windows operating system.
		CO5	Skilled in network topology and connecting devices
MBMS-151	**Principles of Microbiology Lab**	CO1	To understand the identifications of various microorganisms
		CO2	Sterilization of equipments, glass wares, media and other accessories used in microbiology laboratory. Preparations of culture media: nutrient broth and nutrient aga
		CO3	Describe the Growth curve observations and growth characteristics of bacteria and yeast
		CO4	Testing of microbiological qualities of milk and water
		CO5	Skilled Anti-microbial sensitivity test. For various micro-organisms
MBMS-152	**Biochemistry Lab**	CO1	Demonstration of proper use of volume and weight measurement devices
		CO2	Explain the chromatographic method for amino acids estimation using ninhydrin reagent
		CO3	Knowledge about the Extraction of chloroplastic pigments, anthocyanin, carotenoids estimation and qualitative analysis by paper chromatography
		CO4	Determination of enzyme activity and effect of different factors

		CO5	Skilled to determination of K_m and $V_{max\ values}$
Semester II			
MBMS-201	**Food & Dairy Technology**	CO1	To understand the significance and activities of microorganisms in food and role of intrinsic and extrinsic factors on growth and survival of microorganisms in food and dairy.
		CO2	To know the spoilage mechanisms in foods and dairy and thus identify methods to control deterioration and spoilage
		CO3	To recognize and describe the characteristics of important pathogens and spoilage microorganisms in foods and dairy.
		CO4	To learn various methods for their isolation, detection and identification of microorganisms in food and dairy and employ in industries
		CO5	To identify ways to control microorganisms in food and dairy and thus know the principles involving various methods of food preservation
MBMS-202	**Immunotechnology**	CO1	After providing basic knowledge of .immunology, its two arms of immunity will be discussed in detail. further, the external agents that provoke immune responses will be taught.
		CO2	Information about humoral immunity, the involvement of b lymphocytes and its product, antibody, inimmunity will be explained monoclonal antibody production and its use in therapy and diagnosis will betaught. a basic understanding about the various immunological techniques will be taught.
		CO3	Another important topic of mhc that governs antigen processing will explained.
		CO4	The ways through which t and b lymphocytes get activated so that they can play a role in the elimination of antigens will be discussed.
		CO5	Some of the diseases that involve the innate and acquired immunity will be taught along with current vaccine strategies used.
MBMS-203	**Bacteriology & Virology**	CO1	Apply principles of safety, quality assurance, and quality control.
		CO2	Evaluate specimen acceptability.
		CO3	Describe basic morphology and physiology of parasites and fungi.
		CO4	Classify parasites and fungi.
		CO5	Perform appropriate laboratory techniques used in the processing of specimens and identification of parasites and fungi. also evaluate and correlate test results with patient condition(s).

MBMS-204	**Cell Biology**	CO1	Describe the cell structure, components of cell, enzymes to emphasize the importance of cell as the basic unit of an organism.
		CO2	An understanding about the role of various cellular organelles in modifying the functions of the cells, especially, metabolism and protein synthesis.
		CO3	The role of cytoskeleton and modes of cellular transport will be discussed.
		CO4	Understanding the cellular regulation through various types of cell signaling, cell division, apoptosis and cell differentiation.
		CO5	Evaluate the cell differentiation.
MBMS-251	**Food & Dairy Technology Lab**	CO1	Basics of lactic acid by Lactobacillus Sp. or Streptococcus Sp
		CO2	Understanding the food fermentation and food preservation methods
		CO3	To analytical techniques in food quality control using microbial Biosensors
		CO4	Describe the dairy microbiology and Production of fermented milk by Lactobacillus acidophilus
		CO5	Skilled to developed the dairy technology industry
MBMS-252	**Immunotechnology Lab**	CO1	To understanding the preparation and identification of cells
		CO2	To describe Immunization, collection of serum
		CO3	Knowledge of Different types of antigen–antibody cross reaction
		CO4	Various experiments on Immunodiffusion Immunoelectrophores is widely used
		CO5	ELISA (Enzyme linked immunosorbent assay) techniques
BTMS-206	**Bioenergy Engineering**	CO1	Define process control terminologies and identify suitable mode of controlling a given process.
		CO2	Develop suitable control equations for bioprocess dynamics.
		CO3	Examine the closed loop control system and select suitable control action.
		CO4	Analyze the stability of control system in Laplace and frequency domain.
		CO5	This unit also help students for design the equipments in biomass production industries.
GMBM-201	**Molecular Oncology**	CO1	It is an elective paper which deals with fundamentals required for understanding the cancer at molecular level.
		CO2	It helps the students to appreciate the phases of cell cycle and mechanisms involved in apoptosis.

		CO3	It helps students to learn the updated therapeutics of cancer as well.
		CO4	It helps the students to appreciate the phases of cell cycle and mechanisms involved in apoptosis.
		CO5	It helps students to learn the updated therapeutics of cancer as well It is an elective paper which deals with fundamentals required for understanding the cancer at molecular level.
Semester-III			
MBMS-301	**Microbial Genetics**	CO1	Students will be taught cell division, genetic materials, their structure and types, mechanism of replication of DNA.
		CO2	Students gain knowledge in gene concepts and genetic code, gene expression, gene regulation and also learn about mutation.
		CO3	By the end of study in this course, the student will be able to identify and distinguish genetic regulatory mechanism at different levels
		CO4	Developed a fairly good knowledge about the three well known mechanisms by which genetic material is transferred among the microorganisms namely transformation, transduction and conjugation.
		CO5	Hands on skills of isolation of plasmid DNA from bacterial cells and its visualization by performing agarose gel electrophoresis.
MBMS-302	**Recombinant DNA Technology**	CO1	Learn about the vectors and their ideal characteristics.
		CO2	Understand different methods of recombinant DNA techniques like labeling DNA, PCR and gene sequencing.
		CO3	Gain knowledge about prokaryotic and mammalian expression vectors and cloning in plants.
		CO4	Learn about preparation of genomic and cDNA libraries, mutagenesis, and cloning techniques for altering gene expression.
		CO5	Learn about various applications of rDNA technology and how to handle the genetically modified organism.
MBMS-303	**Microbial Physiology & Diversity**	CO1	Describe common groups of bacteria and archaea in different ecosystems, and their role in biogeochemical key processes in these environments.
		CO2	Describe for cultivation-independent methods for studies of the composition of microbial communities and for the function and occurrence of individual groups.
		CO3	Describe genomic-based methods to study microbial diversity in nature and for the mechanisms behind it.
		CO4	Describe important interactions within microbial communities and between microorganisms and plants and animals.

		CO5	Evaluate, synthesise and present scientific studies of genetic and functional microbial diversity in different ecosystems
MBMS-304	**Environmental Biotechnology**	CO1	Understand and assimilate. The concepts and specific terminology of environmental biotechnology.
		CO2	Search and manage information from various sources
		CO3	Describe the scientific bases that are applied by environmental biotechnology.
		CO4	Describe the properties of microorganisms with potential application to processes of environmental biotechnology.
		CO5	Explain the technologies, tools and techniques in the field of environmental biotechnology.
GMBM-301	**Pharmacology & Toxicology**	CO1	Demonstrate the principles of pharmacodynamics and pharmacokinetics
		CO2	Discuss drug dosage, exposure and target specificity
		CO3	Demonstrate the basic principles of toxicology
		CO4	Illustrate toxicity risk assessment and fate of toxicants in humans
		CO5	Demonstrate the experimental approach for analyzing drug action. Evaluate acute and chronic toxicity of environmental chemicals
MBMS-352	**Recombinant DNA Technology Lab**	CO1	To understanding the guidelines for working in rDNA technology
		CO2	Describe the Isolation of genomic DNA
		CO3	Bacterial transformation. And conjugation
		CO4	Skilled to know Polymerase chain reaction for example RT-PCR
		CO5	Evaluate the Primer designing by software.
HSMS-301	**Biostatistics**	CO1	Basic concept of classification of data, diagrams and graphs.
		CO2	Understanding of bionomial distribution and poison distribution
		CO3	Demonstrate the positive and negative correlation
		CO4	Illustrate the chi square and f test
		CO5	Skilled to experimental design and analysis
GMBM-301	**Pharmacology & Toxicology**	CO1	Understanding of drug target on central nervous system
		CO2	Demonstrate the drug targeting on different parts of body
		CO3	Knowledge of chemotherapeutics agents
		CO4	Illustrate the classification of various pesticides
		CO5	Skilled Main routes of entry and factors affecting, distribution, biotransformation and elimination dynamics.

Semester-IV			
MBMS-461	**Industrial Training and Presentation**	CO1	Prepare project report for biotechnology entrepreneurship.
		CO2	Address the market challenges for a new enterprise.
		CO3	Setup enterprise for new biotechnology product.
		CO4	Assess the global market scenario of their product.
		CO5	commercialization of products in national and international markets .

B.Tech. (Agri-Informatics)

A. ProgrammeObjectives (POs):

1. **Engineering Knowledge:** Apply the knowledge of agriculture, science, engineering, and computer science for the solution of complex problems.
2. **Problem Analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess Societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long Learning in the broadest context of technological change.

B. Program Specific Outcomes (PSOs):

1. To educate student about the basic concepts, fundamental principles of Agriculture and Agri-informatics and their relevance with IT.
2. To train student about programming languages with backend tool to develop software for agriculture data collection, analysis and management.
3. To develop skills this covers the diverse areas of IT application for computation of water and nutrient requirement of agricultural crops.
4. To teach student about the use of information technology for Precision agriculture.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BAS 101	**Physics**	CO1	Understand the concepts of quantum physics for materials.
		CO2	Use of equipment for low and high energy applications.
		CO3	Solve engineering problems by applying the concepts of wave and particle nature of radiant energy.
		CO4	Apply the concept of energy band for semiconductors.
		CO5	Construct a quantum mechanical model to explain the behavior of a system at microscopic level.
BAS 105	**Remedial Mathematics-I**	CO1	Recall the set, relation, function mapping and Complex numbers
		CO2	Learn the Roots of the quadratic equations, concept of A.P., G.P. and H.P
		CO3	Discuss the vector and trigonometry
		CO4	Operate the limit, continuity, differentiability and integration
		CO5	Apply the concept of two dimensional geometry
ECC 101	**Basic Electrical Engineering**	CO1	Memorize the the concepts of KVL/KCL and network theorems in solving DC circuits
		CO2	Define the steady state behavior of single phase and three phase AC electrical circuits.
		CO3	Recall the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three-phase transformer
		CO4	Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications.
		CO5	To apply the components of low voltage electrical installations and perform elementary calculations for energy consumption
BAS 151	**Physics Lab**	CO1	Develop skills to impart practical knowledge in real time solutions.
		CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
		CO3	Design new experiments/instruments with practical knowledge.
		CO4	Gain knowledge of new concept in the solution of practical oriented problems.
ECC 151	**Electrical Engineering Lab**	CO1	Get an exposure to common electrical components and their ratings.

		CO2	Make electrical connections by wires of appropriate ratings.
		CO3	Understand the usage of common electrical measuring instruments.
		CO4	Understand the basic characteristics of transformers and electrical machines.
MEC 151	**Engineering Graphics & Design**	CO1	Draw orthographic projections of lines, planes and solids.
		CO2	Construct isometric scale, isometric projections and views.
		CO3	Draw sections of solids including cylinders, cones, prisms and pyramids.
		CO4	Draw projections of lines, planes, solids, isometric projections and sections of solids including cylinders, cones, prisms and pyramids using AutoCAD
AOC 101	**Basics of Communication**	CO1	Trained in English language including listening, speaking, reading and writing skills
		CO2	Developed the presentation skills for professional life
		CO3	Able to manage the work stress in professional life
		CO4	Able to control inter-personal conflicts.
Semester II			
BAS 202	**Chemistry**	CO1	Recall the instruments for atomic and molecular structure
		CO2	Determine Structure of Compound by spectroscopic methods.
		CO3	analyze the importance of Chemical Industry
		CO4	understand the basic concept of hardness of water and its removal techniques.
		CO5	Study the manufacture of different products like fuel, cement, polymer, glass, soap and detergents by modern methods
BAS 206	**Remedial Mathematics-II**	CO1	Recall the differentiation & its applications
		CO2	Learn the concept of three dimensional geometry.
		CO3	Discuss the determinants and Matrices
		CO4	Operate the Numerical techniques.
		CO5	Apply the interpolation formulae & numerical integration
CSC 201	**Programming for Problem Solving**	CO1	Understand the basics of Computer System and Hardware Organization
		CO2	Learn the different tests of Memory Units, Input and Output Devices and Input Output Ports.
		CO3	Understand Basics of Programming Languages and Operating Systems and Graphical User Interface and Windows
		CO4	Solve Programming Methodology, Arrays and Structures
		CO5	Apply techniques of Operations and Expressions.

HSM 201	**Professional Communication and Soft Skills**	CO1	Trained in English language including listening, speaking, reading and writing skills.
		CO2	Developed the presentation skills Reading Techniques
		CO3	Able to manage the Essential Grammar.
		CO4	Able to Basic Technical Writing Skills and Nature and Style of sensible Writing
BAS 251	**Chemistry Lab**	CO1	Use of different analytical instruments.
		CO2	Measure molecular/system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water
		CO3	Measure hardness of water.
		CO4	Estimate the rate constant of reaction.
		CO5	Determine Structure of Compound by spectroscopic methods.
CSC 251	**Programming for Problem Solving Lab**	CO1	Explain the basic syntax, structure and execution of programs written in C language.
		CO2	Develop the C code for a given algorithm.
		CO3	Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
		CO4	Write programs that perform operations using derived data types.
Semester III			
HSS-308	**Humanities and Social Sciences**	CO1	Describe the influence of historical forces on the current practice of management.
		CO2	Identify and evaluate social responsibility and ethical issues involved in business situations and logically articulate own position on such issues.
		CO3	Explain how organizations adapt to an uncertain environment and identify techniques managers use to influence and control the internal environment.
		CO4	Describe the process of management's four functions: planning, organizing, leading, and controlling.
		CO5	Identify and properly use vocabularies within the field of management to articulate one's own position on a specific management issue and communicate effectively with varied audiences.
BAS- 311	**Biology for Engineers**	CO1	Understand the biological concepts from an engineering perspective
		CO2	Understand the concepts of biological sensing and its challenges
		CO3	Understand development of artificial systems mimicking human action
		CO4	Integrate biological principles for developing next generation technologies.
AIC-301	**Production Technology of Field Crops**	CO1	To know the Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops.

		CO2	Identify weeds in rabi season crops, Pulses-chickpea, lentil, peas; oilseeds-rapeseed, mustard and sunflower; sugar crops-sugarcane, Medicinal and aromatic crops-mentha, lemon grass and citronella, Forage crops-berseem, lucerne and oat.
		CO3	Through proper knowledge of irrigation scheduling in rabi crops, additional area can be increased of low water requiring crops.
		CO4	Constraints in production of oilseeds and pulses maybe identified through course content.
		CO5	Production technology of kharif cereals and millets fulfill the need of human consumption and milch cattle.
AIC-302	**Data structure using 'C'**	CO1	Demonstrate different methods for traversing trees
		CO2	Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms
		CO3	Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs
		CO4	Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
AIC-303	**Agriculture for Engineers**	CO1	knowledge of appropriate agricultural, and/or biological sciences, and/or natural resource topic
		CO2	Competencies in relevant fields such as: biological materials, computer and automatic control systems, information systems, machine systems, modified environment design, natural resource systems, processing systems, and structural design
		CO3	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factor
		CO4	To Understand to use the techniques, skills and modern engineering tools necessary for engineering practice.
Semester IV			
HSS-403	**Humanities and Social Sciences**	CO1	Basic concepts and elements of entrepreneurship.
		CO2	Entrepreneurship success and failure and involvement of women.
		CO3	Elements of business plan, market analysis and management.
		CO4	Financial schemes offered by various financial institution.
		CO5	Role of central government and state government in promoting entrepreneurship.
CSC-403	**Operating System**	CO1	Basic concepts and elements of operating system.
		CO2	Process management and scheduling.
		CO3	Process synchronization and deadlock characteristics.

		CO4	Basic concepts of memory management and different file structures.
		CO5	Components of hardware and software and different computer languages.
AIC-401	**Soil and Water Conservation**	CO1	Basic concepts and elements of soil and water conservation.
		CO2	Erosion of soil and various control strategies
		CO3	Elements of irrigation and their management.
		CO4	Basic concepts of irrigation management, types and water harvesting technology.
AIC-402	**Internet and Web Technology**	CO1	Basic concepts and elements of internet technology.
		CO2	HTML commands, text formatting, text styles and their elements.
		CO3	Functioning and advantages of javascript and its command.
		CO4	Active server pages, cookies and their elements.
AIC-403	**Agricultural informatics**	CO1	Basic concepts and elements of internet technology.
		CO2	Basic concepts of e-agriculture and ICT.
		CO3	Concepts and structure of computer modelling in agriculture.
		CO4	Use of geospatial technology and various IT tools in agriculture.
		CO5	Basic concepts of smart agriculture and use of smart apps, smart market and smart sensors.
Semester-V			
AIC-501	**Object Oriented Programming using C++**	CO1	To perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members
		CO2	To demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance
		CO3	To demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems
		CO4	To Learn syntax and features of exception handling
		CO5	To demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using applets
AIC-502	**Natural Resources Management**	CO1	To develop the ability to relate principles of NRM to successful NRM planning
		CO2	To assess what data is needed for specific NRM projects and how to gather it and analyze it.

		CO3	To describe a range of management methods and gauge their appropriateness to the solution of particular problems
		CO4	To gain exposure to comprehensive NRM projects
		CO5	To develop the ability to critically evaluate NRM projects
CSC-503	**Database Management Systems**	CO1	Awareness of database management basics and different models that we use for database.
		CO2	Design and architecture of relational model, relational algebra and SQL queries.
		CO3	Implement different form of normalization.
		CO4	Logical representation of internet database.
		CO5	Analysis and concepts of transaction, concurrency and recovery systems
CEC-502	**Watershed Planning and Management**	CO1	Calculate watershed parameters and analyze watershed characteristics to take appropriate management action.
		CO2	Quantify soil erosion and design control measure
		CO3	Apply land grading techniques for proper land management.
		CO4	Suggest suitable harvesting techniques for better watershed management
Semester VI			
AIC-601	**Agricultural Meteorology**	CO1	To Learn different metrological parameters like rainfall, temperature, RH and other weather parameters.
		CO2	To Learn about various instruments and devices used for weather forecasting and other weather parameters.
		CO3	To learn Agro-climatologically characterization, using different methodologies;
		CO4	Apply appropriate models for weather forecasting
		CO5	To Develop and validate adaptation strategies to increasing climate variability and climate change and other changing conditions in the physical, social and economic environments of farmers
AIC-602	**Artificial Intelligence**	CO1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
		CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and Learning.
		CO3	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine Learning models
		CO4	Demonstrate proficiency in applying scientific method to models of machine learning.
		CO5	Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

CSC-607	**Multimedia Computing**	CO1	Understand the characteristics of different media; understand the representations of different multimedia data
		CO2	Understand different data formats; be able to take into considerations in multimedia system designs
		CO3	Understand the characteristics of human's visual system
		CO4	Understand the characteristics of human's audio system; be able to take into considerations in multimedia techniques design and implementation
		CO5	Understand different compression principles; understand different compression techniques; understand different multimedia compression standards; be able to design and develop multimedia systems according to the requirements of multimedia applications.
DCS-603	**Cloud Computing**	CO1	Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
		CO2	Apply fundamental concepts in cloud infrastructures to understand the tradeoffs in power, efficiency and cost, and then study how to leverage and manage single and multiple datacenters to build and deploy cloud applications that are resilient, elastic and cost-efficient.
		CO3	Discuss system, network and storage virtualization and outline their role in enabling the cloud computing system model.
		CO4	Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.
Semester VII			
AIC-701	**Bioinformatics for Agriculture**	CO 1	Basic concepts of different biological databases (nucleotide and protein).
		CO 2	Protein databases and the process to access and use them.
		CO 3	Methods of sequence alignments (pairwise and multiple) and use of BLAST, FASTA etc, and their applications.
		CO 4	Alignment search tools.
AIC-702	**IoT for Agriculture**	CO 1	Basic concepts and elements of IoT.
		CO 2	Standardization of protocols and issues related with IoT.
		CO 3	Architecture, design and principles of IoT and resource modeling and abstraction.
		CO 4	Basic concepts of WoT and its comparison with IoT.
		CO 5	Smart and Industrial applications IoT.

ECC-708	**Remote Sensing and GIS Techniques**	CO 1	Basic elements of Geographical Information System (GIS) technology and data modeling in agriculture.
		CO 2	Various methods of spatial data analysis.
		CO 3	Basic concepts of digitization process and use of maps and spatial information.
		CO 4	Elements of remote sensing and its merits and demerits and use in spectral characterization of vegetation, soil and water.
		CO 5	Basic learning of data acquisition and processing and use of GPS technology in agriculture.
CSC-709	**Data Warehousing and Data Mining**	CO 1	Basic elements of data warehousing and data mining and processing of multidimensional data in agriculture.
		CO 2	Various methods of designing of data warehouse and concept hierarchy generation.
		CO 3	Basic concepts of architecture of a data mining system.
		CO 4	Elements of data mining and its merits and demerits.
		CO 5	Basic learning of data mining processing and use of this technology in agriculture.
Semester VIII			
AIC-	**Seminar**	CO1	Project Work and Internship (CAI_ 61/_71/_81)

B.Sc. (Agriculture)

A. Programme Objectives:

1. **Engineering Knowledge:** Apply the knowledge of agriculture science, biological science, and computer science for the solution of complex problems.
2. **Problem Analysis:** Identify, formulate, research literature, and analyse complex agricultural problems reaching substantiated conclusions using first principles of mathematics, engineering and agricultural sciences.
3. **Design/development of solutions:** Design solutions for complex agricultural problems that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to complex agricultural activities.
6. **The Engineer and Society:** To inculcate awareness among the students about the impact of various agricultural issues related to society, ethics, health, culture and safety.
7. **Environment and Sustainability:** Understand the impact of the agricultural solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms.
9. **Individual and Team Work:** An ability to inculcate the habit among students to function efficiently as an individual or in multidisciplinary team.
10. **Communication:** Communicate effectively on complex agricultural activities with the with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the agricultural principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long Learning in the broadest context of technological change.

B. Program Specific Outcomes (PSOs):

1. To educate students about scientific, economic and environmental principles supporting agricultural production and land use.
2. To develop sense of awareness among the students so that they can understand the problems of farmers and rural people.
3. To train students about the most modern methods used in crop improvement like traditional breeding and modern biotechnology methods.
4. To develop skills of post-harvest management and marketing of agriculture products.

C. Course outcome (COs):

Course Code	Course Name	Course outcomes	
Semester-I			
AGS-101	**Fundamentals of Horticulture**	CO 1	Identify and research career opportunities in the horticulture industry as well as emerging trends
		CO 2	Demonstrate an understanding of the composition, fertility and biology of soil and how they relate to good plant growth
		CO 3	Propagate, grow, and maintain plants in horticulture production systems
		CO 4	Demonstrate a fundamental understanding of plant identification, selection, use and maintenance of plantmaterial best suited for conventional and sustainable landscapes
		CO 5	Identify and prescribe sustainable options in horticulture which benefit the environment while maintaining productivity and economic viability
		CO 6	Identify common biotic and abiotic plant pests and disorders and develop strategies to manage them in an environmentally safe and sustainable manner
AGS-102	**Fundamentals of Plant Biochemistry and Biotechnology**	CO 1	Understand the significance of Biochemistry
		CO 2	Describe the chemistry of carbohydrates, lipids, proteins and amino acids
		CO 3	Describe the classification and structural organization of proteins
		CO 4	Describe the mechanism of enzyme action and identify the classes of enzymes and factors affecting action
		CO 5	Describe the catabolic reactions of carbohydrates, lipids and amino acids
		CO 6	Understand the significance of Biochemistry
AGS-103	**Fundamentals of Soil Science**	CO 1	Understand how and why different soils behave and perform differently.
		CO 2	Apply understanding of soil processes to predict soil behavior and performance.
		CO 3	Able to make environmentally and economically sound soil management decisions.
		CO 4	Able to predict soil behavior and field performance.
AGS-104	**Introduction to Forestry**	CO 1	Demonstrate skills of critical analysis and application of scientific methods in forest science and management. Make decisions and exercise informed judgement in relation to native forest, plantation and agroforestry science and management.
		CO 2	Demonstrate imagination, initiative and enterprise in problem-solving.
		CO 3	Evaluate issues with reference to sound ethical frameworks and sustainability.
		CO 4	Demonstrate well-developed judgement on principles of social justice and professional standards.
		CO 5	Demonstrate broad and coherent knowledge of forest science and management.

		CO 6	Apply disciplinary knowledge and skills in professional and community settings.
AGS-105	**Comprehension &Communication Skills in English**	CO 1	Review the grammatical forms of English and the use of these forms in specific communicative contexts, which include: class activities, homework assignments, reading of texts and writing
		CO 2	Develop and enhance competence in the four modes of literacy: writing, speaking, reading and listening
		CO 3	Develop their ability as critical readers and writers
		CO 4	Demonstrate a short research paper using the drafting process
AGS-106	**Fundamentals of Agronomy**	CO 1	Identify new developments in agricultural production systems.
		CO 2	Describe the principles of sustainability in relation to agricultural practices.
			Identify drought-tolerant crops and management practices.
		CO 3	Compare and contrast local and global agricultural systems.
		CO 4	Analyze the potential impacts of climate change on agriculture and food security.
AGB-107	**Introductory Biology***	CO 1	Describe levels of organization and related functions in plants and animals.
		CO 2	Identify the characteristics and basic needs of living organisms and ecosystems.
		CO 3	Explain the processes of growth and development in individuals and populations.
		CO 4	Understand the scientific investigations.
		CO 5	Demonstrate cell division and cell cycle.
AGM-107	**Elementary Mathematics***	CO 1	Demonstrate algebraic facility with algebraic topics including linear, quadratic, exponential, logarithmic, and trigonometric functions,
		CO 2	Produce and interpret graphs of basic functions of these types,
		CO 3	Solve equations and inequalities, both algebraically and graphically, and
		CO 4	Solving and model applied problems
		CO 5	Apply the Fundamental Theorem of Calculus
		CO 6	Use appropriate modern technology to explore calculus concepts.
AGS-108	**Agricultural Heritage***	CO 1	Understand the significance of landscaping.
		CO 2	Describe the agricultural biodiversity, indigenous knowledge systems and resilient ecosystems.
		CO 3	Describe the sustained provision of multiple goods and services.
		CO 4	Describe the maintenance and adaptation of globally significant agricultural biodiversity
		CO 5	Understand the agriculture heritage importance.
AGS-109	**Rural Sociology & Educational Psychology**	CO 1	Understand concept of rural sociology, its importance in agricultural extension, characteristics of Indian rural society
		CO 2	Understand social groups, social stratification, culture, social values, social control and attitudes, leadership and training
		CO 3	Understand concept of educational psychology, intelligence, personality, perceptions, emotions, frustration, motivation, teaching and learning

Semester-II			
AGS-201	**Fundamentals of Genetics**	CO 1	To state the basic principles, concepts and biological processes involved in genetics.
		CO 2	To explain structure and function of the DNA molecule to its functional role in encoding genetic material, make deductions about gene regulation and DNA mutations.
		CO 3	To plan experiments for the study of cell structure, cell division stages, chromosome structures and apply the Hardy-Weinberg Law in analyzing population genetics for gene frequency, sex linkage, equilibrium, and heterozygote frequency.
		CO 4	To analyse chromosome variation, including rearrangements, aneuploidy and polyploidy as well as cell division in different plant growth stages.
		CO 5	To interpret which is the appropriate growth stages of plant cell for different research purpose.
		CO 6	To Construct pedigrees and analysis of pattern of inheritance in the families.
AGS-202	**Agricultural Microbiology**	CO 1	Memorize the basic principles and concepts of agricultural microbiology.
		CO 2	Explain the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes and microbiology concepts as applicable to diverse areas such as medical, industrial, environment, genetics, agriculture, food and others.
		CO 3	Develop key practical skills/competencies in working with microbes for study and use in the laboratory as well as outside, including the use of good microbiological practices.
		CO 4	Analyze problems involving microbes, articulate these with peers/ team members/ other stake holders, and undertake remedial measures/ studies etc.
		CO 5	Assess various relationships microorganisms have with their environments, including pathogenic, symbiotic and commensal lifestyles. In addition, also assess how microorganisms can be utilised in agricultural biotechnology, including specific techniques such as cloning and expression of genes using microorganisms.
		CO 6	Develop a model microbial system to explain the catabolic and anabolic pathways of energy production and their growth kinetics.
AGS-203	**Soil and Water Conservation Engineering**	CO 1	Memorize the concepts and techniques of agricultural study and research of modern techniques aimed at improving soil quality and water- related management.
		CO 2	Explain the degradation of productive soil globally and its effect thereon, also to know about the causes about water scarcity and their solution to fight against the evil effects through soil and water conservation technologies.

		CO 3	Apply knowledge of mathematics, agriculture, and engineering to solve real world problems.
		CO 4	Compare the different agronomical and engineering measures adopted for erosion control.
		CO 5	Evaluate the best possible soil and water conservation practices according to the available resources and topographic conditions of given land area.
		CO 6	Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, and sustainability.
AGS-204	**Fundamentals of Crop Physiology**	CO 1	Recall the basic terminologies, concepts, principles and different mechanisms in plants
		CO 2	Explain the various physiological processes that occur in plants required for its growth and development.
		CO 3	Apply their knowledge of crop physiology for analytical thinking and solving practical problems experienced in agricultural systems.
		CO 4	Examine the physiology of crop adaptation to their environment and phenological development.
		CO 5	Evaluate the different strategies used by plants to acquire and utilize resources, and formulate a logical argument of their impact on crop productivity.
		CO 6	Equip students with skills and techniques related to plant physiology so that they can design either their own experiments for farmers etc.
AGS-205	**Fundamentals of Agricultural Economics**	CO 1	Memorize the basic principles and concepts of economics in the agricultural field.
		CO 2	Describe and explain models of production, supply and demand of agricultural and food products on national and international markets.
		CO 3	Select, apply and interpret indicators of farm business success (family farms, crafts, co-operatives, companies) by standard mathematical, statistical and economic analysis methods.
		CO 4	Analyse elements of business success in agriculture and food-processing as well as elements that determine economic role of agriculture in national economy
		CO 5	Assess the various business elements which are involved in different sectors of agriculture.
		CO 6	Propose methods of micro- and macroeconomic decision making in agriculture in different agro-ecological and agro-economic circumstances.
AGS-206	**Fundamentals of Plant Pathology**	CO 1	Recall the objectives, concepts, disease diagnosis and its management in plant pathology.
		CO 2	Explain the roles of microorganism to cause disease in plants, their pathogenesis and epidemiology.
		CO 3	Plan/ Apply management strategies for the control of plant disease according to the crop grown.

		CO 4	Compare the different disease management methods under various crop production systems.
		CO 5	Assess the best possible disease management by keeping in mind the concept of Integrated Disease Management.
		CO 6	Develop various hypothetical/ real-time models for plant disease detection and its management which will be farmers/ user friendly, economically viable and ecologically sustainable.
AGS-207	**Fundamentals of Entomology**	CO 1	Memorize the basic information of entomology (i.e. insect identification, morphology, physiology and behaviour) acquired during the course program.
		CO 2	Classify the harmful pests of crops, vegetables, fruits, stored grains and household pests as well as insects of economic importance.
		CO 3	Demonstrate different control methods of pest according to the nature of damage in crops and use of pesticide application equipment's as per the need.
		CO 4	Examine the methods of managing beneficial and pest insect populations adopted. Prepare mounted specimens and label according to discipline protocol
		CO 5	Select the methods which show evolutionary and ecological relationships of insects with other life forms and the impact of insects relative to human health and well-being and animal and plant health.
		CO 6	Develop various hypothetical/ real-time models for pest detection and its management which will be farmers/ user friendly, economically viable and ecologically sustainableand models which will be helpful in generating employment for small and medium scale industries utilizing the virtues of beneficial insects
AGS-208	**Fundamentals of Agricultural Extension Education**	CO 1	Recall the basic concepts, objectives, principles and process of Extension Education.
		CO 2	Explain the extension system in India, various programmes extension / agriculture development programmes launched by ICAR/ Govt. of India, new trends in agriculture extension.
		CO 3	Organize meetings, fairs, choupal in rural areas and demonstrations of new agricultural research/ practices in field by adopting the best possible medium of communication. To ensure the dissemination of current best practices, organize cooperatives, and implement secondary programs.
		CO 4	Examine the behavior of the rural people towards the schemes/ programmes conducted in the rural area.
		CO 5	Assess the response of the people is either positive or negative towards a particular activity and to rectify it by improvising or modifying the programmes according to the need of the audience.
		CO 6	Develop strategies for more quick and easy understandable way of communicating with the rural masses in order to bridge

			the gap between scientists and farmers i.e. lab to land approach which will be helpful in income generation and engaging more people in agricultural practices by adopting new technologies.
AGS-209	**Communication Skills and Personality Development**	CO 1	Students will analyze basic communication skills.
		CO 2	Students will analyze intercultural communication skills.
		CO 3	Students will analyze interpersonal communication skills.
		CO 4	Students will analyze public speaking communication skills
Semester III			
AGS-301	**Crop Production Technology – I (Kharif Crops)**	CO1	Describe the principles of sustainability in relation to agricultural practices.
		CO2	Identify drought-tolerant crops and management practices.
		CO3	Compare and contrast local and global agricultural systems.
		CO4	Identify new developments in agricultural production systems.
		CO5	Analyze the potential impacts of climate change on agriculture and food security.
AGS-302	**Fundamentals of Plant Breeding**	CO1	Memorize the basic concepts and principles of breeding and methods used for testing the seed sample.
		CO2	Describe how the basic concepts, principles, tools and techniques of seed testing can be utilized in production of healthy seed.
		CO3	Apply different tools and techniques involved in analysis of seed viability, germination status as well as physical and genetic impurities.
		CO4	Evaluate the requirement of seed production techniques of self and cross pollinated crops.
		CO5	Prescribe the breeding methods of crops.
AGS-303	**Agricultural Finance and Cooperation**	CO1	Present, discuss, and defend financial decisions by using appropriate terminology.
		CO2	Prepare reports containing appropriate terminology.
		CO3	Develop interpersonal and teamwork skills.
		CO4	Identify ethical dilemmas within the finance setting.
		CO5	Identify, evaluate and select alternative courses of action for addressing the ethical dilemma.
AGS-304	**Agri- Informatics**	CO1	Identify appropriate information technology to analyze agriculture data.
		CO2	Define geographic information system, information system related to agriculture.
		CO3	Discuss software related to the collection of crop data.
		CO4	Identify the agro climatic zones.
AGS-305	**Farm Machinery and Power**	CO1	Know differences between conventional vs. reduced vs. conservation tillage.
		CO2	Differentiate primary and secondary tillage; identify tillage implements associated with either the primary or secondary tillage category.

		CO3	Understand why a producer might do conservation vs. conventional tillage.
		CO4	Describe strip tillage, ridge tillage, no-tillage, mulch tillage, and vertical tillage.
		CO5	Perform all pre-inspection and operations of at least two different types of farm machinery.
AGS-306	**Production Technology for Vegetables and Spices**	CO1	Understand practical knowledge on specialized production techniques of vegetables and spices.
		CO2	Understand will Importance of vegetables & spices in human nutrition improved and national economy.
		CO3	Explain knowledge about quality requirement and production and techniques
		CO4	Develop Managing skills for solving field problems.
AGS-307	**Environmental Studies and Disaster Management**	CO1	Understand the natural environment and its relationships with human activities.
		CO2	Characterize and analyse human impacts on the environment.
		CO3	Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.
		CO4	Capacity to integrate knowledge and to analyse, evaluate and manage the different public health aspects of disaster events at local and global levels.
		CO5	Capacity to obtain, analyse, and communicate information on risks, relief needs and lessons Learned from earlier disasters in order to formulate strategies for mitigation in future scenarios.
AGS-308	**Statistical Methods**	CO1	Understand some basic concepts in statistics.
		CO2	Be familiar with some elementary statistical methods of analysis of data viz. Measures of Central Tendency, Dispersion, Moments, Skewness, and Kurtosis and to interpret them.
		CO3	Analyze data pertaining to attributes and to interpret the results.
		CO4	Understand statistics approach in agriculture research.
AGS-309	**Livestock and Poultry Management**	CO1	Develop and evaluate animal production and management systems by integrating knowledge of animal genetics, nutrition, reproduction, and other relevant disciplines and applying scientific and quantitative reasoning to solve real-world challenges.
		CO2	Locate, critically evaluate, and apply information from scholarly animal science literature and other sources to expand personal understanding and knowledge of animal sciences, providing a foundation for lifelong Learning.
		CO3	Create and interpret graphs, tables and diagrams illustrating scientific data and concepts, and understand basic concepts relating to the design and analysis of research in the animal sciences.
		CO4	Communicate effectively about animal sciences to a range of

			audiences, both orally and in writing, using appropriate traditional and emerging media.
		CO5	Engage actively and effectively in discussion of complex issues relevant to the animal sciences by understanding and appreciating: a. the importance of animals to the health and well-being of society; b. economic, environmental, animal welfare, and societal impacts of animal production and management systems at the global and local level; c. varied ethical perspectives on animal practices; d. the role of science in informing debates.
		CO6	Appreciate the breadth and depth of professional opportunities in animal sciences relating to: The keeping of animals for food and fibre production and other purposes (e.g., companionship, research and teaching, biotechnology, sports, species conservation);The application of scientific principles to animal breeding, reproduction, feeding, growth and development, health management, housing, handling, and end – product safety and quality.
Semester IV			
AGS-401	**Crop Production Technology –II (Rabi Crops)**	CO1	Know the Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops.
		CO2	Identify weeds in Rabi season crops.
		CO3	To understand the yield attributing characters of Rabi crops and Estimate yield of Rabi crops.
		CO4	Acquire skill and technique involve in field and crop observation.
		CO5	Students will awareness of the nature of field crop production including the knowledge, skills and abilities required for field crop production.
		CO6	Carry out field observations, including sowing-methods, depth, plant density, Nursery bed and transplanting, Crop density and geometry, Optimum plant population.
		CO7	To encourage the development of employability skills in field crop production.
		CO8	Understand about the procedure of harvesting and threshing of crops.
AGS-402	**Production Technology for Ornamental Crops, MAP and Landscaping**	CO1	Importance and scope of Ornamental Crops, MAPs and Landscaping.
		CO2	Knowledge about production technology of cut flower, loose flower, medicinal and aromatic plants
		CO3	Uses of tree, shrub, climbers, potted plants in landscaping
		CO4	Processing and value addition in ornamental plants and MAPs produce.
AGS-403		CO1	Describe the environmental aspects of non-conventional and conventional energy resources

	Renewable Energy and Green Technology	CO2	Know the need of renewable energy resources, historical and latest developments.
		CO3	Describe the use of solar energy and the various components used in the energy production with respect to various applications.
		CO4	Appreciate the need of Wind Energy and the various components used in energy generation.
		CO5	Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications.
		CO6	Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.
AGS-404	**Problematic Soils and their Management**	CO1	The students get knowledge about different kind of problem soil in India and there characteristics
		CO2	The students will understand how to control or improve the soil fertility.
AGS-405	**Production Technology for Fruit and Plantation Crops**	CO1	To provide technical and scientific cultivation practices of different fruit and plantation crops.
		CO2	To provide field knowledge and acquaint the students with practical field.
		CO3	Students will get knowledge on technical cultivation techniques of different fruits and plantation crops.
		CO4	Students will able to identify different practical issues related to fruits and planation crops.
AGS-406	**Principles of Seed Technology**	CO1	Core competency in the subject & comparative evidence on development of seed.
		CO2	High analytical ability in understanding the application of scientific principles and students will acquire skills & handling operations of different equipment's in seed science laboratory.
AGS-407	**Farming System & Sustainable Agriculture**	CO1	Interpret farming systems and its significance.
		CO2	Design an efficient cropping system.
		CO3	Demonstrate sustainability in agriculture.
		CO4	Propose integrated farming systems.
		CO5	Determine the efficiency of farming systems.
AGS-408	**Agricultural Marketing Trade & Prices**	CO1	Acquire knowledge on transforming agriculture into agribusiness.
		CO2	Comprehend the procedures of setting up of agro-based industries.
		CO3	Analyse the various activities and linkages in agri-value chain and the business environment.
		CO4	Assess the capital, financial and marketing management of agribusiness.
		CO5	Develop skills in project formulation, appraisal and evaluation.
		CO6	Do agribusiness.
AGS-409		CO1	Illustrate crop model concepts and soil-plant-atmospheric continuum 2.

	Introductory Agro-meteorology & Climate Change	CO2	Summarize the importance of crop growth models to increase crop production 3
		CO3	Develop yield models for different crops to predict yield 4.
		CO4	Comprehend weather forecasting 5.
		CO5	Explain about various simulation models for preparation of agro advisories 6.
		CO6	Make use of crop models and statistical approaches to predict yield of crops, forecast pests and diseases and prepare agro-advisories
Semester V			
AGS-501	**Principles of Integrated Pest and Disease Management**	CO1	Createtheawarenessaboutadverseeffectsofpesticideontheenvironment and need for environment friendly approach for management of insect pests and pathogens.
		CO2	Gainknowledgeabouttheconceptsandtoolsofpestanddisease management.
		CO3	Understand the planning of agricultural ecosystem, tolerance of pest damage, timing of different pest control tactics to manage the pest and pathogens population effectively.
		CO4	Learn about the use of different pest and pathogen control techniques in a harmonious manner.
		CO5	Understand the role of IPM in sustainable agriculture as the future of modern plant protection and pest and pathogens control strategy.
AGS-502	**Manures, Fertilizers and Soil Fertility Management**	CO1	Knowledge of different manure and fertilizers used in different crops according to soil Condition
		CO2	Tounderstandessentialityofplantnutrientsandmechanismofnutrienttransport to plant and factor affecting nutrient availability.
		CO3	Know how the soil fertility can be maintained for better crop production for longer period.
		CO4	To be able about procedure of soil testing and establish soil testing laboratory in future as an entrepreneur.
AGS-503	**Pests of Crops and Stored Grain and their Management**	CO1	Familiarized with identification of different insect pest of field, horticulture, ornamentals, vegetables and stored grains at the field level.
		CO2	Understand how insects affect animal and Plant health and agricultural production, and be able to safely manipulate populations of beneficial and destructive species in habitats and in production agro-ecosystems with minimal environmental impact.
		CO3	Relate the biology, diversity, distribution of insects, and the irrelationships to crop and the environment condition of a particular area.
		CO4	Understand identification of nature of damage and symptoms caused by the pest so suitable technique of pest management can be apply for effective control.
		CO5	Management of crop pest through Integrated Pest Management approach without side effect on plant, animal and environment health.

AGS-504	**Diseases of Field and Horticultural Crops and their Management –I**	CO1	Know the common pathogens of different diseases.
		CO2	Acquiretheknowledgeaboutetiology,andsymptomsofthesediseaseswhich helps in diagnosis of the diseases of field and horticultural crops
		CO3	Know means of dispersal of these diseases suitable management methods can be applied.
		CO4	Adopt Eco-friendly and economically suitable management practices.
AGS-505	**Crop Improvement-I (Kharif Crops)**	CO1	Learn importance of wild relative to produce new varieties of kharif crop
		CO2	Learn about gene preservation methods for further use to improve kharif crops.
		CO3	Learn applications of breeding method to improve kharif crops.
		CO4	Apply new genetic approaches to achieve a definite ideotype of khaif crop.
		CO5	Identify resistance gene related to kharif crop with high yield potential against pest and pathogen and utilization genes.
AGS-506	**Entrepreneurship Development and Business Communication**	CO1	Understand the basic concepts, principles of entrepreneurship development and business communication
		CO2	Explain entrepreneurship development programme, government policies, schemes and incentives for promotion of entrepreneurship and social responsibility of business
		CO3	Develop strategies for marketing and management in small businesses venture.
		CO4	Analyze the business environment in order to identify business opportunities
		CO5	Interpret their own business plan
		CO6	Design a business model bases on different entrepreneurial strategies.
AGS-507	**Geoinformatics and Nano-technology and Precision Farming**	CO1	Recall the basic concepts, principles of geo informatics and nanotechnology
		CO2	Explain various applications of geoinformatics and nanotechnology in agriculture. Also explain more effective use of inputs results in greater cropyield and/or quality, without polluting the environment.
		CO3	Precision agriculture can address both economic and environmental issues that surround production agriculture today.
		CO4	Encourage the farmers to study of spatial and temporal variability of the input parameters using primary data at field level.
		CO5	Creating awareness amongst farmers about consequences of applying imbalanced doses of farm inputs like irrigation, fertilizers, insecticides and pesticides.

AGS-508	**Intellectual Property Rights**	CO1	Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
		CO2	Explain the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
		CO3	Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautious steps to be taken to prevent infringement of proprietary rights in products and technology development.
		CO4	Be familiar with the processes of Intellectual Property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.
		CO5	Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.
		CO6	Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing
AGS-551	**Practical Crop Production – I (*Kharif*crops)**	CO1	In the course study students will be acquainted with the knowledge of profitable crop production technology.
		CO2	Course content will help to students/farmers about ruminative crop production techniques.
		CO3	It helps to adopt diversified farming system according to available farming situation.
		CO4	It will assist to encourage the sustainable agriculture system.
		CO5	Profitable based farming system can we adopted with the help of course content
Semester VI			
AGS-601	**Rainfed Agriculture & Watershed Management**	CO1	Understand about rainfed agriculture and its introduction, problem and prospects in India as well as objectives, principles and component of watershed management
		CO2	Perform Comprehensive Assessment of Water Management in Agriculture, coordinated by the International Water Management Institute, and noted a close correlation between hunger, poverty and water. However, it concluded that there was much opportunity to raise productivity from rainfed farming.
		CO3	Utilization of rainfall water for a larger area by suitable watershed management techniques
		CO4	Conservation of soil by adopting latest soil conservation techniques will help in obtaining higher production of Rainfed crops

AGS-602	**Protected Cultivation and Secondary Agriculture**	CO1	Gain knowledge about green house technology, types of greenhouses and construction of green houses.
		CO2	Course will give the knowledge of Green house equipment's, materials of construction for traditional and low cost green houses.
		CO3	ThiscoursewillhelpthestudentstoLearnaboutIrrigationsystems usedin greenhouses, shade net house in protected cultivation.
		CO4	By this course student, get the concepts of cleaning and grading Moisture measurement.
		CO5	Students will be able to understand the Material handling equipment, principle and working.
AGS-603	**Diseases of Field and Horticultural Crops and their Management-II**	CO1	Know the common pathogens of different diseases.
		CO2	Acquire the knowledge about etiology, and symptoms of these diseases, which helps in diagnosis of the diseases of field and horticultural crops.
		CO3	By knowing means of dispersal of these diseases suitable management methods can be applied
		CO4	Eco-friendly and economically suitable management practices may be adopted.
AGS-604	**Post-harvest Management and Value Addition of Fruits and Vegetables**	CO1	Understand the post-harvest technology of horticultural crops.
		CO2	Understand the value addition of horticulture crops.
		CO3	Understand the workspace, tool and equipment design for PHT and value addition.
		CO4	Study the various certification and accreditation i.e. FPO, ISO and other levelling.
AGS-605	**Management of Beneficial Insects**	CO1	Adopt apiculture, sericulture and lac culture as an entrepreneur according to agro climatic zone.
		CO2	Understand commercial methods of rearing, equipment, seasonal management, insect pest and disease and important species for commercial use of honey bee, silkworm and lac insect.
		CO3	Identify of different bio control agents (Predator, Parasite and Parasitoids) and their use for sustainable pest management.
		CO4	Learn about mass multiplication technique of biological control agents and established a bio control lab in future as an entrepreneur.
AGS-606	**Crop Improvement-II** ***(Rabi crops)***	CO1	Learn importance of wild relative to produce new varieties of Rabi crop.
		CO2	Learn Gene preservation method for further use to improve Rabi varieties.
		CO3	Learn s to apply breeding method to improve Rabi crops.
		CO4	Identify resistance gene relate to Rabi crop with high yield potential against Pest and pathogen and utilization genes.
		CO5	Learn new genetic approaches to achieve a definite ideotype of Rabi crop.

AGS-607	**Principles of Organic Farming**	CO1	Learn importance of wild relative to produce new varieties of Rabi crop.
		CO2	Learn Gene preservation method for further use to improve Rabi varieties.
		CO3	Learns to apply breeding method to improve Rabi crops.
		CO4	Identify resistance gene relate to Rabi crop with high yield potential against Pest and pathogen and utilization genes.
		CO5	Learn new genetic approaches to achieve a definite ideotype of Rabi crop.
AGS-608	**Farm Management, Production & Resource Economics**	CO1	Gain Knowledge on a comprehensive treatment of the traditional agricultural production economics topics employing both detailed graphics and differential calculus.
		CO2	Focus on the neoclassical factor-product, factor-factor and product-product models, and is suitable for an advanced undergraduate or a beginning graduate –level course in static production economics.
		CO3	Understand limited resources available in the economy. Realize the need to exploit and utilize through development and improvement of production techniques.
		CO4	Make them aware of the availability of rich natural endowments to achieve sustainable agricultural development with this knowledge they can challenge the problems of unemployment inequality shortage of food productions, poverty and be useful to compete advanced agricultural economies.
		CO5	Gain knowledge of the causes of regional variations in productivity and production, social and economic inequality, size of land holdings and lack of quality inputs etc. And suggest appropriate measures for the whole economy
AGS-609	**Principles of Food Science and Nutrition**	CO1	Critically evaluates the information on food science and nutrition issues appearing in the popular press.
		CO2	Discuss the important pathogen and spoilage microorganism in foods.
		CO3	Discuss basic principles and practices of cleaning and sanitation in food preparation operation.
		CO4	Identify and explain nutrients in foods and the specific functions in maintaining health.
AGS-651	**Practical Crop Production –II (*Rabi* crops)**	CO1	Get acquainted with the knowledge of profitable crop production technology.
		CO2	Help students/farmers about ruminative crop production techniques.
		CO3	Help to adopt diversified farming system according to available farming situation.
		CO4	Encourage the sustainable agriculture system.
		CO5	Adopt Profitable based farming system with the help of course content

Semester VII			
AGS-771	**Rural Agricultural Work Experience and Agro-industrial Attachment(RAW E &AIA)**		
Semester VIII			
DAG- 01	**Agribusiness Management**	CO1	Learn the important agricultural policies, agribussiness management and understand the types and functioning of agro-based industries.
		CO2	Learn to set up the agro-based industries.
		CO3	Learnt the different aspects of business environment.
		CO4	Learn the planning and implementation of business plans and capital management.
		CO5	Learn the different aspects of management of agri-market.
DAG- 02	**Agrochemicals**	CO1	To learn of agrochemicals and their merits and demerits in agriculture.
		CO2	Different herbicides and fungicides and their mode of action.
		CO3	Different insecticides, their use and fate in India and their alternatives.
		CO4	Different types of fertilizers and their application to crop.
		CO5	Complex and mixed fertilizers and the fertilizer control order.
DAG- 03	**Commercial Plant Breeding**	CO1	Methods of plant reproduction, pollination and overview of seed production.
		CO2	Genetic purity test of hybrids and hybrid seed production of different crops.
		CO3	production of quality seeds of vegetables under open and protected environment
		CO4	Biotechnological tools for development of cultivars and tissue culture techniques.
		CO5	IPR issues related to commercial plant breeding.
DAG- 04	**Landscaping**	CO1	Principles of landscaping, gardens and their types.
		CO2	Selection and propagation of trees and their use in architecture.
		CO3	Selection and propagation of climbers and creepers and their use in architecture and pot management.
		CO4	Bonsai and lawn management.
		CO5	Bio-aesthetic planning and different types of landscaping of public places.
DAG-05	**Food Safety and Standards**	CO1	Recall the basic concepts, principles and practices involved in food safety.
		CO2	Explain the type of food contaminants and their identification as well as their management.
		CO3	Apply control measures against contamination using best storage practices and safe temperatures
		CO4	Examine the different methods hazards management in various food items.

		CO5	Understand the importance of maintaining a written food safety management system to control food safety hazards.
DAG- 06	**Biopesticides&Bio fertilizers**	CO1	Recall the basic concepts, principles and practices of bio pesticides.
		CO2	Mass production and quality control of bio pesticides.
		CO3	Learn different types of bio fertilizers.
		CO4	Mass production and quality control of bio fertilizers and their storage.
		CO5	Learn production and usage of cyanobacterial and mycorrhizal bio fertilizers.
DAG- 07	**Protected Cultivation**	CO1	Recall the basic concepts, principles and practices of protected cultivation.
		CO2	Designing and materials used in greenhouse making.
		CO3	Learn different types of irrigation methods and planting materials used in protected cultivation.
		CO4	Learn basic concepts and production of different horticultural crops in green houses.
		CO5	Learn basic concepts and production of different medicinal and aromatic plants in greenhouses.
DAG- 08	**Micro propagation Technologies**	CO1	Recall the basic concepts, principles and practices of micro propagation techniques
		CO2	Learn different stages micro propagation.
		CO3	Learn different types of techniques used for micro propagation.
		CO4	Learn about cryopreservation.
DAG- 09	**Hi-tech. Horticulture**	CO1	Recall the basic concepts, principles and practices of micro propagation techniques for horticultural crops.
		CO2	Learn different methods of protected cultivation.
		CO3	Learn different types of techniques and components of precision farming.
		CO4	Learn about precision farming for horticultural crops.
DAG-10	**Weed Management**	CO1	Recall the basic concepts, characterization and classification of weeds.
		CO2	Learn different types of herbicides and their mode of action.
		CO3	Learn different types of techniques and components of bio-herbicides.
		CO4	Learn about components of integrated herbicide management.
DAG- 11	**System Simulation and Agro-advisory**	CO1	Learn the different system approach and crop models.
		CO2	Learn elementary crop growth models, their calibration and validation.
		CO3	Learn different types of modelling techniques for crop production estimations.
		CO4	Learn about components of weather forecasting and its tools and techniques.
		CO5	Learn the basic concepts of crop simulation models.
DAG- 12	**Agricultural Journalism**	CO1	Recall the basic concepts, history and classification of agricultural journalism.

		CO2	Learn different components of agricultural journalism and newspaper designing.
		CO3	Learn different types of techniques and components of agricultural stories and other agricultural news sources.
		CO4	Learn about components of writing agricultural stories and editorial mechanics.

M.Tech. Agri-informatics

A. Programme Objectives:

13. **Engineering Knowledge:** Apply the knowledge of agriculture science, biological science, and computer science for the solution of complex problems.
14. **Problem Analysis:** Identify, formulate, research literature, and analyse complex agricultural problems reaching substantiated conclusions using first principles of mathematics, engineering and agricultural sciences.
15. **Design/development of solutions:** Design solutions for complex agricultural problems that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
16. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
17. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to complex agricultural activities.
18. **The Engineer and Society:** To inculcate awareness among the students about the impact of various agricultural issues related to society, ethics, health, culture and safety.
19. **Environment and Sustainability:** Understand the impact of the agricultural solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
20. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms.
21. **Individual and Team Work:** An ability to inculcate the habit among students to function efficiently as an individual or in multidisciplinary team.
22. **Communication:** Communicate effectively on complex agricultural activities with the with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
23. **Project Management and Finance:** Demonstrate knowledge and understanding of the agricultural principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
24. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B. Program Specific Outcomes (PSOs):

5. To educate students about scientific, economic and environmental principles supporting agricultural production and land use.
6. To develop sense of awareness among the students so that they can understand the problems of farmers and rural people.
7. To train students about the most modern methods used in crop improvement like traditional breeding and modern biotechnology methods.
8. To develop skills of post-harvest management and marketing of agriculture products.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
AIMT-501	**Introduction to Information Technology**	CO1	Understand the basic concepts of information technology, its history and approaches.
		CO2	Learn different tools of information technology such as computers, operating systems etc.
		CO3	Explain different information ecosystems and specialized application software.
		CO4	Illustrate coding fundamentals and different coding languages.
		CO5	Apply the concepts of information technology in real life.
AIMT-503	**Programming &Programming Paradigms**	CO1	Distinguish between different programming paradigms.
		CO2	Choose an adequate programming paradigm in solving specific software engineering problems.
		CO3	Apply at least one language from imperative, object-oriented and declarative paradigm
		CO4	Classify programming languages according to the paradigms they belong to.
		CO5	Recognize the concepts of same kind from different programming languages and paradigms.
		CO6	Employ adequate naming and code organization conventions.
AIMT-505	**Application of computer and information technology in rural development**	CO1	Explain the importance of computer and information technology in citizen service delivery.
		CO2	Discuss the role of computer and information technology in rural development.
		CO3	Highlight applications of computer and information technology in agriculture development.
		CO4	Describe the role of computer and information technology and GIS in creating livelihood opportunities in rural communities.
AIMT-507	**Agricultural Economics and Trade**	CO1	The students will be learn to improve decision making about things like agricultural production methods, agricultural input levels and resource conservation etc.
		CO2	Students should be able to communicate effectively, economic concepts, decision-making, and agricultural and trade concepts.
		CO3	Students should have the skills to fit into a business, agency, or academic environment and use economic concepts to quantify and analyse issues related to their employer's issues.

AIMT-551	**Object Oriented Programming Lab**		
AIMT-581	**Seminar**		
Semester II			
AIMT-502	**Database technology and applications**	CO1	Explain the characteristics, architecture of database approach, describe the components, major functions of a database system and give examples of their use.
		CO2	Compare and contrast appropriate data models, including concepts in modeling notation and how they would be used.
		CO3	Create a relational database schema in SQL, use SQL to create a non-procedural query, write a stored procedure that deals with parameters and has some control flow, to provide a given functionality.
		CO4	Familiarize with the related areas in databases and gaining familiarity with other popular databases used in the industry.
AIMT-504	**Information resources, information retrieval and technical communication**	CO1	Students will access, use and communicate information from a variety of technologies.
		CO2	Students will seek alternative viewpoints, using information technologies.
		CO3	Students will critically assess information accessed through the use of a variety of technologies.
		CO4	Students will use organizational processes and tools to manage inquiry and technology to aid collaboration during inquiry.
		CO5	Students will use technology to investigate and/or solve problems. Students will use electronic research techniques to construct personal knowledge and meaning.
AIMT-506	**Software engineering and quality management**	CO1	Gain knowledge of basic Software engineering methods and practices, and their appropriate application.
		CO2	Describe software engineering layered technology and Process frame work.
		CO3	Understanding of software requirements, data models, object models, context models and behavioural models and different software architectural styles.
		CO4	Understanding of implementation issues such as modularity and coding standards, software testing approaches.
		CO5	Describe software measurement and software risks, of software evolution and related issues such as version management.
		CO6	Understanding on quality control and how to ensure good quality software

AIMT-521	**Decision Support System**	CO1	Distinguish among data processing systems, management information systems, and decision support/expert systems.
		CO2	Integrate the major components of decision support systems (DSS) and expert systems (ES).
		CO3	Capture decision rules based on knowledge provided by an acknowledged expert and codify those rules as assertions, rules, and ad hoc procedures.
		CO4	Analyze how information is used to solve problems.
		CO5	Utilize commercial spreadsheet and database integrated packages to develop "what if" simulation models to support the decision- making process.
		CO6	Have a working knowledge of datagram and internet socket programming.
AIMT-522	**Knowledge Management**	CO1	Use a framework and a clear language for knowledge management concepts.
		CO2	Describe how valuable individual, group and organizational knowledge is managed throughout the knowledge management cycle.
		CO3	Define the different knowledge types and explain how they are addressed by knowledge management.
		CO4	Describe the major roles and responsibilities in knowledge management implementations.
		CO5	Identify some of the key tools and techniques used in knowledge management applications.
		CO6	Identify and evaluate major KM issues such as ethics, knowledge ownership vs. authorship, copyright, intellectual property and knowledge sharing incentives.
AIMT-523	**Value-added services and digital network including wireless and sensor networks**	CO1	Understand the basics of information theory and coding techniques.
		CO2	Determine the minimum number of bits per symbol required to represent the source and the maximum rate at which a reliable Communication can take place over the channel.
		CO3	Describe and determine the performance of different waveform techniques for the generation of digital representation of signals.
		CO4	Determine methods to mitigate inter symbol interference in baseband transmission system.
		CO5	Describe and determine the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel.
		CO6	Understand various spreading techniques and determine bit error performance of various digital communication systems.

AIMT-524	**Agricultural bioinformatics**	CO1	To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
		CO2	Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
		CO3	Explain about the methods to characterise and manage the different types of Biological data.
		CO4	Classify different types of Biological Databases.
		CO5	Introduction to the basics of sequence alignment and analysis.
		CO6	Overview about biological macromolecular structures and structure prediction methods.
AIMT - 552	**Operating System Lab**		
AIMT-582	**Seminar**		
Semester III			
AIMT-601	**Data communication and computer networks, information security, network economy**	CO1	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
		CO2	Have a basic knowledge of the use of cryptography and network security.
		CO3	Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.
		CO4	Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure.
		CO5	Have a working knowledge of datagram and internet socket programming
AIMT-603	**Farm health management, expert systems and organic agriculture**	CO1	The student will be able to explain the major aspects of agricultural practices and traditions through time and throughout the world.
		CO2	The student will be able to explain in general the relationships among culture, economics, politics, science, and agricultural development.
		CO3	A solid understanding of the cross-cultural interactions and exchange that linked the world's people and facilitated agricultural development is also expected.
		CO4	The student will study and analyze the refereed-journal articles, texts, and practices that represent the perspectives of different societies and agricultural traditions.
		CO5	To show how agricultural scientists are attempting to minimize agricultural pollution and sustain food production adequate for the world's population.

AIMT-605	**e-governance, cloud computing, standards, interoperability and digital preservation**	CO1	Analyze and explain the concepts of cloud computing.
		CO2	Demonstrate the types and services in cloud computing.
		CO3	Describe the Email Communications and Collaborating on Group Projects and Events.
		CO4	Illustrate and Simulate Schedules and Task Management.
		CO5	Develop Web-Based Communication Tools.
AIMT-621	**Agricultural Credit and Financial Inclusion**	CO1	Understand the institutional and non-institutional sources of credit system and various banks related.
		CO2	Basic components of business management in agriculture.
		CO3	Analyse the factors associated with agricultural business.
AIMT-622	**Geo Informatics**	CO1	Give examples of interdisciplinary applications of Geospatial Information Science and Technology.
		CO2	Apply GIS analysis to address geospatial problems and/or research questions.
		CO3	Demonstrate proficiency in the use of GIS tools to create maps that are fit-for-purpose and effectively convey the information they are intended to.
		CO4	Effectively communicate and present project results in oral, written, and graphic forms.
		CO5	Demonstrate confidence in undertaking new (unfamiliar) analysis using GIS, troubleshoot problems in GIS, and seek help from software/website help menus and the GIS community to solve problems.
AIMT-623	**Climate change and its impact on agricultural production**	CO1	Understand the physical basis of the natural greenhouse effect, including the meaning of the term radiative forcing
		CO2	Know something of the way various human activities are increasing emmissions of the natural greenhouse gases, and are also contributing to sulphate aerosols in the troposphere.
		CO3	Demonstrate an awareness of the difficulties involved in the detection of any unusual global warming ‘signal’ above the ‘background noise’ of natural variability in the Eath's climate and of attributing (in whole or in part) any such signal to human activity
		CO4	Understand that although a growing scientificconsensus has become established through the IPCC, the complexities and uncertainties of the science provide opportunity for climate sceptics to challenge the Panel's findings.

AIMT-624	**Strategic research and extension plan SREP) for agricultural development**	CO1	To review the SREP methodology followed in the pilot districts with a focus on linkages and identification and prioritization of research, extension and development issues.
		CO2	To analyze the mechanism followed in each state for implementation of SREP outputs in operationalizing strategies evolved.
		CO3	To identify the gaps in SREP methodology and its implementation process and suggest appropriate measures to overcome the gaps.
		CO4	To evolve future directions for up-scaling and institutionalization of SREP approach.
AIMT-671	**Minor project**		
AIMT-681	**Seminar**		
Semester IV			
AIMT-692	**Dissertation**		

Master of Business Administration (M.B.A.)

A. Program Objectives (POs)

1. Possess wide spectrum of managerial skills along with competency building qualities in specific areas of management and business studies.
2. Select and apply appropriate tools for decision making required for ill structured managerial problems.
3. Students will be able to independently conduct theoretical as well as applied research.
4. To practice sound knowledge of the entrepreneurial process and inculcate creativity and innovation among students.
5. Analyze ethical implications of business practices using advanced levels of ethical reasoning

B. Program Specific Outcomes (PSOs)

1. To enrich communication, ethical values, team work, professional and leadership skill sets of students.
2. To integrate knowledge, skill and attitude that will sustain an environment of learning and creativity among the students with an assurance for good careers.
3. Analyze the economic, social and environmental issues related to business.
4. Ability to identify, explore and harness opportunities presented by emerging trends and changing business environment.
5. Understand the leadership skills through internship training.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BSMB101	**Management Principles and Practice**	CO1	Identify the key contributors and their contributions in the development of management thought.
		CO2	Assume the roles and responsibilities associated with managerial functions.
		CO3	Describe the four management functions of planning, organizing, leading, and controlling.
		CO4	Describe the Effective plans co-ordinate the organizational work and eliminate unproductive effort.
		CO5	To find out good control system should be easily installed and economically maintained.
BSMB102	**Managerial Economics**	CO1	Understand tools and techniques of managerial economics to enable them to appreciate its relevance in Decision-Making.
		CO2	Explore the economics of information and network industries.
		CO3	Understand how economics affect the business strategy of companies in these industries.
		CO4	Develop economic way of thinking in dealing with practical business.
BSMB103	**Financial Accounting and Analysis**	CO1	Understand the basic concepts of financial accounting.
		CO2	Understand accounting process as an information system for decision-making.
		CO3	Use of various tools of accounting for analyzing business situations and to take decision.
		CO4	Analyze the financial position business.
BSMB104	**Statistics for Management**	CO1	Describe basic concepts of statistics.
		CO2	Examine various Measures of Central Tendency, Measures of Dispersion, Correlation and Regression analysis in decision making.
		CO3	Interpret the trend analysis with different methods of time series analysis.
		CO4	Explain basic concepts of probability and perform probability theoretical distributions.
BSMB105	**Legal Aspects of Business**	CO1	Acquire a sound understanding of the legal aspects of the laws affecting businesses.
		CO2	Apply basic legal knowledge to business transactions.
		CO3	Communicate effectively using standard business and legal terminology.

		CO4	Analyze a given business context using basic understanding of the applicable Acts and develop a suitable operational framework.
BSMB106	**Business Environment**	CO1	Understand the relationship between environment and business, and its components.
		CO2	Understand the economic, socio-cultural and technological environment.
		CO3	Explain the economic policies, legislation and economic reforms laid by the government.
		CO4	Demonstrate and develop conceptual framework of business environment in international business.
BSMB107	**Business Communication**	CO1	Recognize the various elements of communication, channels of communication and barriers to effective communication.
		CO2	Express themselves effectively in routine and special real world business interactions.
		CO3	Take part in professional meetings, group discussions, telephonic calls, elementary interviews and public speaking activities.
		CO4	Create and deliver effective business presentations, using appropriate technology tools, for common business situations.
BSMB108	**Computer Applications in Management**	CO1	Explore various methods that Information Technology can be used to support existing businesses and strategies.
		CO2	Achieve hands-on experience with productivity/application software to enhance business activities.
		CO3	Accomplish projects utilizing business theories, Internet resources and computer technology.
		CO4	Work with simple design and development tasks for the main types of business information systems.
Semester II			
BSMB201	**Organizational Behaviour**	CO1	To identify the concept of organizational behavior to understand the behavior of people in the organization.
		CO2	To demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
		CO3	To explain the complexities associated with management of the group behavior in the organization.
		CO4	To examine how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.
BSMB202	**Management Accounting**	CO1	Understand the basic concepts of cost accounting and management accounting.

		CO2	Solve the problems related to managerial decisions using the techniques of management accounting.
		CO3	Use of various tools of management accounting for analyzing business situations and to take decision.
BSMB203	**Operations Research**	CO1	To explain the basic Operations Research concepts and terminologies.
		CO2	To identify operations research techniques for determining the optimal allocation of resources such as materials, machines, manpower etc.
		CO3	To interpret certain techniques of Operations Research in getting the best possible solution to a problem involving limited resources.
		CO4	To interpret most widely used O.R. techniques such as transportation, assignment, inventory control, simulation in decision making.
		CO5	To identify project goals, performance criteria and resource requirements in order to achieve project success.
BSMB204	**Marketing Management**	CO1	Understand strong conceptual knowledge in the functional area of marketing management.
		CO2	Develop marketing strategies based on segmentation, target marketing and positioning by examining consumer behavior.
		CO3	Evaluate the relevance of marketing concepts impact on environmental change while designing marketing plans, strategies and practices.
		CO4	Understand the product life cycle, product mix and branding.
		CO5	Explain factors influencing pricing decisions.
BSMB205	**Financial Management**	CO1	Understand the concept of time value of Money.
		CO2	To evaluate the various projects by different methods.
		CO3	Understand and compare the theories of dividend policy.
		CO4	To analyze and evaluate the various available financing options.
		CO5	Identify the major sources of short-term financing available to the firm.
BSMB206	**Human Resource Management**	CO1	To State the basic concept of Human Resource Management and role played by HR Manager.
		CO2	To explain the key issues related to administering the human elements such as recruitment, selection, motivation, placement, compensation, appraisal, career planning, diversity, ethics, and training.
		CO3	To schedule appropriate implementation, monitoring and assessment procedures of training.
		CO4	To interpret the significance of employee compensation benefits to both employers and employees.

		CO5	To value the concept of performance management and outline its role in contemporary organizations.
BSMB207	**Production and Operations Management**	CO1	Identify the role of Operations in overall Business Strategy of the industry.
		CO2	Discuss the application of operations management policies and techniques to the service sector as well as manufacturing firms.
		CO3	Evaluate the vital factors and their interdependence of these factors in the design of effective operations system.
		CO4	Classify the trends and challenges of Operations Management in the current business scenario.
		CO5	Explain the students with the tools and techniques for effective utilization of operational resources and managing the processes to produce good quality products and services at competitive prices.
BSMB208	**Management Information System**	CO1	Evaluate the role of information systems in today's competitive business environment.
		CO2	Identify and describe important features of organizations in order to build and use information systems successfully.
		CO3	Demonstrate systems analysis, design and decision making in a business setting.
		CO4	Define and describe the fundamentals of hardware, software, database management, data communications and systems related to the management activities of an organization.
		CO5	Assess how information systems support the activities of managers and end-users in organizations.
		CO6	Identify the principal management challenges posed by the ethical and social impact of information systems and management solutions.
Semester-III			
BSMB301	**Strategic Management**	CO1	Formulate organizational vision, mission, goals, and values.
		CO2	Develop strategies and action plans to achieve an organization's vision, mission, andgoals.
		CO3	Develop powers of managerial judgment, how to assess business risk, and improve ability to make sound decisions and achieve effectiveoutcomes.
		CO4	Evaluate and revise programs and procedures in orderto achieve organizationalgoals.
BSMB302	**International Business**	CO1	To define the nature, scope, and role of international business & globalization.

		CO2	To discuss the theoretical aspects of international business and the functions of international organizations.
		CO3	To explain the concept of economic integration and international economic environment.
		CO4	To interpret the Organizational structure for international business operations.
		CO5	To examine the business implications of international economic environment.
BSMB303	**Research Methodology**	CO1	Explain the basic framework of research process involved in research.
		CO2	Construct the research proposal related to business or management problems.
		CO3	Interpret the importance of coding, editing, tabulation and analysis in doing research.
		CO4	Design the questionnaire related to primary data collection method.
		CO5	Operate the concept of statistical analysis which includes various tests like t-test, F Test, Z test, ANOVA and Chi Square test.
		CO6	Identify the mechanism and techniques of report writing.
BSMB304	**Supply Chain Management**	CO1	To explain the concept of supply chain management and logistics management.
		CO2	To describe performance measurement and control tools.
		CO3	To interpret the E business framework related to supply chain management.
MARKETING			
BSMB3MK1	**Consumer Behaviour and Sales Management**	CO1	Identify the factors which influence consumer behavior.
		CO2	Examine the major stages which consumers usually go through when making a consumption-related decision.
		CO3	Identify the major individual, social and cultural factors that affect consumer's decision-making process.
		CO4	Appraise the process involved in personnel selling and its management.
		CO5	Explain the decisions involved in planning and organizing the sales efforts.
BSMB3MK2	**Marketing of Non-Profit Organisations**	CO1	Understand the use of marketing concepts, theories and practices as applied to non-profit organizations.
		CO2	Work with local nonprofit organizations to provide volunteer support and to conduct marketing plans that will aid the organizations in accomplishing their missions and obtaining their objectives.

		CO3	Apply their knowledge of marketing by utilizing planning and implementation tools to improve organizational performance.
BSMB3MK3	**Integrated Marketing Communication**	CO1	Understand a company and its marketing communications activities.
		CO2	Describe a range of media and methods available to marketers.
		CO3	Demonstrate a comprehensive understanding of Marketing Communications theories and Concepts.
		CO4	Design an advertising Campaign.
		CO5	Develop an awareness of the connection between marketing communications tools, and how each can be used effectively- individually or in an integrated mix.
		CO6	Explain emerging trends of integrated marketing communication.
FINANCE			
BSMB3FM1	**Security Analysis and Portfolio Management**	CO1	Analyze the environment of investment and risk return framework.
		CO2	Understand the value of assets and manage investment portfolio.
		CO3	Design, analyze, choose and evaluate portfolios along with a deep understanding of Capital market.
		CO4	Understand and create various investment strategies on the basis of various market conditions.
		CO5	Measure riskiness of a stock or a portfolio position.
BSMB3FM2	**Financial Markets and Services**	CO1	To define the roles, structure, functioning and operations of Indian financial market.
		CO2	To explain the working of money market and capital market.
		CO3	To discuss the management of primary market and secondary market.
		CO4	To examine various financial services with their functions.
		CO5	To describe the legal and regulatory aspects and implications of Indian banking.
BSMB3FM3	**Corporate Tax Planning**	CO1	To provide basic knowledge of India's tax laws.
		CO2	To understand the basic concepts of Tax management, Tax evasion and Tax avoidance.
		CO3	To provide Understanding of Corporate tax in India
		CO4	To develop skills of Corporate Tax Planning and impact of various business decisions.
		CO5	To provide knowledge of Tax planning with reference to business restructuring.
HUMAN RESOURCE			
BSMB3HR1	**Knowledge Management**	CO1	To explain the concept of knowledge management.
		CO2	To understand the planning regarding organization structure

		CO3	To describe the strategies related to knowledge management.
BSMB3HR2	**Organizational Change and Development**	CO1	To define the models and approaches of Organizational change and development.
		CO2	To discuss the assumptions and relevance of organizational development and effectiveness
		CO3	To explain the roles and functions of designing organization structure.
		CO4	To interpret the intervening strategies of Organizational change and development.
BSMB3HR3	**Performance Management and Competency Mapping**	CO1	Explain the performance management & Performance appraisal
		CO2	Compare and contrast various organizational performance management programs and best Practices and define attributes of effective performance management
		CO3	Design an organizations performance management process that is compliant with law and Supports organizational mission and strategy.
		CO4	Evaluate a performance appraisal system
		CO5	Construct competency model
		CO6	Conduct competency mapping exercise.
		CO7	Develop Assessment center for competency identification.
OPERATIONS MANAGEMENT			
BSMB3OM1	**Facilities Management**	CO1	To understand the product selection, design and production layouts through basic strategies with computer applications.
		CO2	To Understand different types of production processes and facility layout suitable for manufacturing different categories of products.
		CO3	To identify and analyze the problems in the existing layout or material handling system and to optimize the layout or material handling system.
		CO4	To develop layout design procedure and layouts for typical applications in the industries and suggesting appropriate material handling strategies in the industries.
BSMB3OM2	**Production Planning and Control**	CO1	To understand the concept of capacity planning, aggregate planning and process of aggregate planning.
		CO2	To understand the concept of Master Production Schedule and Material Requirement Planning and identify their elements.
		CO3	To design an appropriate strategy for resource planning through appropriate MRP tool.
		CO4	To explain demand forecasting, production planning tools & production control tools.

		CO5	To demonstrate the Production Planning and Control and its functions for effective and efficient operations management.
BSMB3OM3	**Project Management**	CO1	To understand the basic project management skills with a strong emphasis on issues and problems associated with delivering successful projects.
		CO2	To explain the importance, scope and functions of project management in successful project with productivity.
		CO3	To evaluate, prioritize and select projects from a list of potential projects.
		CO4	To illustrate the estimation of guidelines for time, costs and resources required for project management by applying different methods.
		CO5	To evaluate and monitor the performance of the project with different approaches.
INTERNATIONAL BUSINESS			
BSMB3IB1	**International Business Environment**	CO1	To explain the nature, scope, and role of international business & globalization.
		CO2	To discuss the theoretical aspects of international business and the functions of international organizations.
		CO3	To explain the concept of economic integration and international economic environment.
		CO4	To interpret the Organizational structure for international business operations.
BSMB3IB2	**International Marketing**	CO1	To provide understanding of product and pricing decisions appropriate for international market.
		CO2	To analyze the international marketing strategies.
		CO3	To understand how companies adjust their international strategies based on the global environmental changes.
		CO4	To build skills and respect toward the understanding of cultures of nations by critically analyzing the social, political, legal, and economic forces that affect the business performance of international marketing.
BSMB3IB3	**Financing Of International Trade**	CO1	Explain the concepts of international trade and finance and apply for the management decisions.
		CO2	To analyze impact of WTO on current global trade in detail.
		CO3	To apply the different methods to mitigate the foreign trade and exchange rate risks in their respective.
AGRI - BUSINESS MANAGEMENT			
BSMB3AG1	**Agribusiness and Rural Marketing**	CO1	To enable students to gain knowledge on agricultural marketing, challenges and prospects for improving agricultural marketing system.

		CO2	To gain skills to analyze marketing functions, marketing information and intelligence.
		CO3	To impart knowledge of the marketing efficiency and agricultural prices.
		CO4	Provide the platform to the students of Marketing of Agricultural Inputs.
BSMB3AG2	**Agri Input Management**	CO1	Explain the basic concept of Agri input management.
		CO2	Interpret the importance of business environment related to agricultural input management.
		CO3	Analyze the marketing strategies of agricultural input management.
		CO4	Analyze the financial strategies of agricultural input management.
BSMB3AG3	**Farm Business Management**	CO1	To acquaint students with the ever-changing role of a farm manager in today's economy.
		CO2	To gain a working knowledge of the economic and business principals necessary to survive and thrive in today's agricultural environment.
		CO3	To understand the financial management of a farming operation. This includes construction and use of financial statements, a general understanding of the financial industry, organizational business structures and taxation.
		CO4	To understand the importance of personal financial management and its direct impact on a business.
Pharma Business Management			
BSN6PH1	**Pharmaceutical Marketing**	CO1	Understand the marketing concepts and techniques; and applications of the same in the pharmaceutical industry.
		CO2	Describe the concept of product management and product life cycle.
		CO3	Discuss he various components of promotion of pharmaceutical products.
		CO4	Explain the different pharmaceutical marketing channels.
		CO5	Evaluate the role of mass media in product advertising.
BSMB3PH2	**Regulatory Framework of Pharmaceutical Business**	CO1	Understand the law of contract, Capacity of contract and legal requirements of entering into a contract.
		CO2	Demonstrate an understanding of the legal environment of business.
		CO3	Apply basic legal knowledge to business transactions.
BSMB3PH3	**Sales Promotion and Brand Management in**	CO1	Explaining the meaning of sales promotion, nature and growing importance of sales promotion.
		CO2	Describe the post testing, implementing and evaluating the sales promotion programs.

	Pharmaceutical Business	CO3	Explain the making necessary modifications for effective sales promotion programs.
		CO4	Elaborate the relevance of brand and value awareness in an effective marketing system.
Semester-IV			
BSMB401	**Entrepreneurship Development**	CO1	Explain the meaning and significance of entrepreneurship and understand the process of entrepreneurial action.
		CO2	To discuss the Theories of Entrepreneurship and analyze global impact of Entrepreneurship.
		CO3	To demonstrate & design the business plan.
		CO4	To evaluate the financial schemes offered by various financial institutions, like Commercial Banks, IDBI, ICICI, SIDBI, SFCs.
		CO5	To discuss and employ role of Central Government and State Government in promoting entrepreneurship with various incentives, subsidies, grants, etc.
BSMB402	**Corporate Social Responsibility and Corporate Governance**	CO1	To explain the concept of Corporate Social Responsibility and Corporate Governance.
		CO2	To describe the stakeholders related to corporate sustainability.
		CO3	To interpret the risk evaluation and risk management related to project.
BSMB403	**E- Business**	CO1	Understand the E-Commerce and E- business infrastructure and trends.
		CO2	Analyze different types of portal technologies and deployment methodologies commonly used in the industry.
		CO3	Analyze the effectiveness of network computing and cloud computing policies in a multi- location organization.
		CO4	Analyze real business cases regarding their e-business strategies and transformation processes and choices.
		CO5	Integrate theoretical frameworks with business strategies.
MARKETING			
BSMB4MK4	**International Marketing**	CO1	To provide understanding of product and pricing decisions appropriate for international market.
		CO2	To gain experience in developing international marketing strategies.
		CO3	To understand how companies adjust their international strategies based on the global environmental changes (e.g., globalization)
		CO4	To build skills and respect toward the understanding of cultures of nations by critically analyzing the

			social, political, legal, and economic forces that affect the business performance of international marketing.
BSMB4MK5	**Rural Marketing**	CO1	To identify the opportunities and constraints of Rural Marketing.
		CO2	To demonstrate product, pricing, distribution and promotional strategies related to rural marketing.
		CO3	To identify the factors which influence rural consumer behavior.
		CO4	To evaluate the STP Strategy for rural market product.
FINANCE			
BSMB4FM4	**International Financial Management**	CO1	Understand international capital and foreign exchange market
		CO2	Understand the concept of balance of payments and how it helps to forecast exchange rates.
		CO3	Identify and appraise investment opportunities in the international environment
		CO4	Examine the risk relating to exchange rate fluctuations and develop strategies to deal with them
		CO5	Analyze the operations of international financial markets including past and present exchange rate systems.
		CO6	Explain the exposures of MNCs and non-MNCs in terms of operating, transaction and translation.
BSMB4FM5	**Project Planning and Evaluation**	CO1	To explain the concept of Project Planning
		CO2	To understand the planning and execution phases of a project.
		CO3	To describe the network techniques of project management
		CO4	To compare and evaluate the techniques of capital budgeting.
		CO5	To understand the issues of public enterprise
HUMAN RESOURCE			
BSMB4HR4	**Industrial Relations and Labor Laws**	CO1	To explain the concept of industrial relations.
		CO2	To interpret the international dimensions of Industrial relations.
		CO3	To explain the role of Workers' Participation in Management.
		CO4	To interpret the role Grievance Redressal.
BSMB4HR5	**Compensation Management**	CO1	Students will be able to discuss key concepts related related to compensation components, factors, theory, role of Trade Unions and government and other stake holder
		CO2	To describe different Job Evaluation techniques for determining basic pay and will be able to demonstrate a sample Job Evaluation tool
		CO3	To evaluate various components of a compensation package, how to structure them, and how to develop a company's compensation policy

		CO4	To describe different statutory/ voluntary benefits, perks, incentives, and employee services offered by different organizations in order to motivate employees for better performance and retention
		CO5	To discuss the role of collective bargaining / executive compensation negotiations in determining various employee/ executive benefits
		CO6	Participants will be able to understand recent trends in executive compensation, rewards and recognition programs, and employee benefits.
OPERATIONS MANAGEMENT			
BSMB4OM4	**Materials Management**	CO1	To develop an ability to perform the role of materials manager in an organization**.**
		CO2	To analyze the inventory situation of a company and suggest improvements.
		CO3	To understand the ethical issues in purchasing and negotiations.
		CO4	To manage the activities of material manager like purchasing, inventory analysis, storage etc; in a scientific manner.
BSMB4OM5	**Total Quality Management and Quality Standards**	CO1	To learn the basic concepts of quality from organizational point of view.
		CO2	To learn the concept of total quality management from western and Japanese approach.
		CO3	To learn the internal politics, quality culture, education and training of the organization.
INTERNATIONAL BUSINESS			
BSMB4IB4	**Export Management and Documentation**	CO1	Understand various import process and procedures.
		CO2	Analyze the principle of international business and strategies adopted by firms for the expansion.
		CO3	Explain the concepts in trade documentation in international business with respect to foreign trade.
BSMB4IB5	**International Logistics Management**	CO1	Analyze Business Models, Business Strategies and Competitive Advantage.
		CO2	Formulate and implement Warehouse Strategies.
		CO3	Recognize the requirements for Transportation and International Logistics.
AGRI - BUSINESS MANAGEMENT			
BSMB4AG4	**Management of Cooperatives**	CO1	Explain the basic concept of management of cooperatives.
		CO2	Interpret the role of government in the development of cooperatives.
		CO3	Analyze the strategies of Financing of cooperatives, staffing in cooperatives and training methods in cooperatives.
		CO4	Analyze the Management practices of successful cooperatives in India.

BSMB4AG5	**Plantation Management**	CO1	To explain the current scenario of plantation industries in India.
		CO2	To demonstrate product, pricing, distribution and promotional strategies related to plantation crops.
		CO3	To interpret the financial management in plantations management.
		CO4	To evaluate the social, economic and technological aspects related to plantation management.
Pharma Business Management			
BSMB3PH4	**Pharmaceutical Retail Management**	CO1	Evaluate current retailing trends based on consumer, legal and competitive environments.
		CO2	Identify various retail opportunities and evaluate the strategies associated with each type of opportunity.
		CO3	Distinguish and characterize the factors and management tools that retailers consider and use when developing their merchandising skills.
		CO4	Assess current Indian retail practices in their ability to respond to environmental trends.
BSMB3PH5	**Supply Chain Management in Pharmaceutical Industry**	CO1	To explain the concept of supply chain management and logistics management.
		CO2	To describe performance measurement and control tools.
		CO3	To interpret the E business framework related to supply chain management.

Master of Commerce (M.Com.)

A. Program Objectives (POs)

1. To demonstrate professional expertise in financial planning, control and decision making.
2. Integrate cognitive and analytical skills to manage financial aspects.
3. Sensitizing professional ethics and societal needs with holistic development.
4. Work with the wide domain knowledge for a successful career with effective communication skills, teamwork and leadership qualities.
5. Possess wide spectrum of managerial skills along with competency building qualities in specific areas of commerce.

B. Program Specific Outcomes (PSOs)

1. Understand the concepts of basic accounting and business operations.
2. Apply the learning from the courses and develop strategies for global business issues.
3. Apply the knowledge of the business policies, auditing, finance both at the macro and micro level.
4. To cater to the manpower needs of companies in Accounting, Taxation, Auditing, Financial analysis and Commerce.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BSMC101	**Management Principles and Practice**	CO1	Identify the key contributors and their contributions in the development of management thought.
		CO2	Assume the roles and responsibilities associated with managerial functions.
		CO3	Describe the four management functions of planning, organizing, leading, and controlling.
		CO4	Describe the Effective plans co-ordinate the organizational work and eliminate unproductive effort.
		CO5	To find out good control system should be easily installed and economically maintained.
BSMC102	**Managerial Economics**	CO1	Understand tools and techniques of managerial economics to enable them to appreciate its relevance in Decision-Making.
		CO2	Explore the economics of information and network industries.
		CO3	Understand how economics affect the business strategy of companies in these industries.
		CO4	Develop economic way of thinking in dealing with practical business.
BSMC103	**Financial Accounting and Analysis**	CO1	Understand the basic concepts of financial accounting.
		CO2	Understand accounting process as an information system for decision-making.
		CO3	Use of various tools of accounting for analyzing business situations and to take decision.
		CO4	Analyze the financial position business.
BSMC104	**Statistics for Management**	CO1	Describe basic concepts of statistics.
		CO2	Examine various Measures of Central Tendency, Measures of Dispersion, Correlation and Regression analysis in decision making.
		CO3	Interpret the trend analysis with different methods of time series analysis.
		CO4	Explain basic concepts of probability and perform probability theoretical distributions.
BSMC105	**Legal Aspects of Business**	CO1	Acquire a sound understanding of the legal aspects of the laws affecting businesses.
		CO2	Apply basic legal knowledge to business transactions.
		CO3	Communicate effectively using standard business and legal terminology.

		CO4	Analyze a given business context using basic understanding of the applicable Acts and develop a suitable operational framework.
Semester II			
BSMC201	**Management Accounting**	CO1	Understand the basic concepts of cost accounting and management accounting.
		CO2	Solve the problems related to managerial decisions using the techniques of management accounting.
		CO3	Use of various tools of management accounting for analyzing business situations and to take decision.
BSMC202	**Operations Research**	CO1	To explain the basic Operations Research concepts and terminologies.
		CO2	To identify operations research techniques for determining the optimal allocation of resources such as materials, machines, manpower etc.
		CO3	To interpret certain techniques of Operations Research in getting the best possible solution to a problem involving limited resources.
		CO4	To interpret most widely used O.R. techniques such as transportation, assignment, inventory control, simulation in decision making.
		CO5	To identify project goals, performance criteria and resource requirements in order to achieve project success.
BSMC203	**Marketing Management**	CO1	Understand strong conceptual knowledge in the functional area of marketing management.
		CO2	Develop marketing strategies based on segmentation, target marketing and positioning by examining consumer behavior.
		CO3	Evaluate the relevance of marketing concepts impact on environmental change while designing marketing plans, strategies and practices.
		CO4	Understand the product life cycle, product mix and branding.
		CO5	Explain factors influencing pricing decisions.
BSMC204	**Financial Management**	CO1	Understand the concept of time value of Money.
		CO2	To evaluate the various projects by different methods.
		CO3	Understand and compare the theories of dividend policy.
		CO4	To analyze and evaluate the various available financing options.
		CO5	Identify the major sources of short-term financing available to the firm.
BSMC205	**Human Resource Management**	CO1	To State the basic concept of Human Resource Management and role played by HR Manager.
		CO2	To explain the key issues related to administering the human elements such as recruitment, selection, motivation, placement, compensation, appraisal, career planning, diversity, ethics, and training.

		CO3	To schedule appropriate implementation, monitoring and assessment procedures of training.
		CO4	To interpret the significance of employee compensation benefits to both employers and employees.
		CO5	To value the concept of performance management and outline its role in contemporary organizations.
Semester-III			
BSMC301	**International Business**	CO1	To define the nature, scope, and role of international business & globalization.
		CO2	To discuss the theoretical aspects of international business and the functions of international organizations.
		CO3	To explain the concept of economic integration and international economic environment.
		CO4	To interpret the Organizational structure for international business operations.
		CO5	To examine the business implications of international economic environment.
BSMC302	**Research Methodology**	CO1	Explain the basic framework of research process involved in research.
		CO2	Construct the research proposal related to business or management problems.
		CO3	Interpret the importance of coding, editing, tabulation and analysis in doing research.
		CO4	Design the questionnaire related to primary data collection method.
		CO5	Operate the concept of statistical analysis which includes various tests like t-test, F Test, Z test, ANOVA and Chi Square test.
		CO6	Identify the mechanism and techniques of report writing.
BSMC303	**Security Analysis and Portfolio Management**	CO1	Analyze the environment of investment and risk return framework.
		CO2	Understand the value of assets and manage investment portfolio.
		CO3	Design, analyze, choose and evaluate portfolios along with a deep understanding of Capital market.
		CO4	Understand and create various investment strategies on the basis of various market conditions.
		CO5	Measure riskiness of a stock or a portfolio position.
BSMC304	**Financial Markets and Services**	CO1	To define the roles, structure, functioning and operations of Indian financial market;
		CO2	To explain the working of money market and capital market;
		CO3	To discuss the management of primary market and secondary market;
		CO4	To examine various financial services with their functions;

		CO5	To describe the legal and regulatory aspects and implications of Indian banking
Semester-IV			
BSMC401	**Entrepreneurship Development**	CO1	Explain the meaning and significance of entrepreneurship and understand the process of entrepreneurial action.
		CO2	To discuss the Theories of Entrepreneurship and analyze global impact of Entrepreneurship.
		CO3	To demonstrate & design the business plan.
		CO4	To evaluate the financial schemes offered by various financial institutions, like Commercial Banks, IDBI, ICICI, SIDBI, SFCs.
		CO5	To discuss and employ role of Central Government and State Government in promoting entrepreneurship with various incentives, subsidies, grants, etc.
BSMC402	**Corporate Social Responsibility & Corporate Governance**	CO1	To explain the concept of Corporate Social Responsibility and Corporate Governance.
		CO2	To describe the stakeholders related to corporate sustainability.
		CO3	To interpret the risk evaluation and risk management related to project.
BSMC403	**International Financial Management**	CO1	Understand international capital and foreign exchange market
		CO2	Understand the concept of balance of payments and how it helps to forecast exchange rates.
		CO3	Identify and appraise investment opportunities in the international environment
		CO4	Examine the risk relating to exchange rate fluctuations and develop strategies to deal with them
		CO5	Analyze the operations of international financial markets including past and present exchange rate systems.
		CO6	Explain the exposures of MNCs and non-MNCs in terms of operating, transaction and translation.
BSMC404	**Project Planning and Evaluation**	CO1	To explain the concept of Project Planning.
		CO2	To understand the planning and execution phases of a project.
		CO3	To describe the network techniques of project management.
		CO4	To compare and evaluate the techniques of capital budgeting.
		CO5	To understand the issues of public enterprise.

			management.

Bachelor of Commerce (Honors) B.Com.(H)

A. Programme Objectives:

1. To create highly innovative competent professionals in the field of commerce.
2. To impart industry, need skill, problem solving and decision-making competencies.
3. To Enrich students to adapt to an ever changing and dynamic business environment.
4. To make the students employable and self-employment oriented.
5. To make students conversant with the financial and economic business environment

B. Program Specific Outcomes (PSOs):

1. Develop conceptual understanding of the subject matter.
2. Ability to Relate and Apply concepts of commerce to Trade & Commerce.
3. Students will prove themselves in different professional exams like C.A., C S, CMA, MPSC, UPSC. As well as other coerces.
4. The students will acquire the knowledge, skill in different areas of communication, decision making, innovations and problem solving in day-to-day business activities.
5. Students will gain thorough systematic and subject skills within various disciplines of finance, auditing and taxation, accounting, management, communication, computer.
6. Students can also get the practical skills to work as accountant, audit assistant, tax consultant, and computer operator. As well as other financial supporting services.
7. Students will learn relevant Advanced accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.
8. Students develop understanding of Global Business Environment.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BSBC101	**Environmental Studies**	CO1	Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
		CO2	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
		CO3	Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners
		CO4	Understand the utility of environmental sources
		CO5	Analyze the ecosystem and able to understand the different types of pollutions in country

BSBC102	**Microeconomics**	CO1	To familiarize the students with the basic concept of microeconomics
		CO2	To make student understand the demand and supply analysis in business application
		CO3	To familiarize students with the production and cost structure under different stages of production
		CO4	To understand the pricing and output decisions under various market structure
BSBC103	**Financial Accounting**	CO1	Understand and apply accounting concepts, principles and conventions for their routine monetary transaction
		CO2	Recognize circumstances providing for increased exposure to fraud and define preventative internal control measures.
		CO3	Create and Prepare financial statements in accordance with Generally Accepted Accounting Principles
		CO4	Utilize the technology (such as computers, information databases) in facilitating and enhancing accounting and financial reporting processes
		CO5	Analyze, interpret and communicate the information contained in basic financial statements and explain the limitations of such statements.
BSBC104	**Management Practices & Applications**	CO1	Identify the key contributors and their contributions in the development of management thought.
		CO2	Assume the roles and responsibilities associated with managerial functions.
		CO3	Describe the four management functions of planning, organizing, leading, and controlling.
		CO4	Describe the Effective plans co-ordinate the organizational work and eliminate unproductive effort
		CO5	To find out good control system should be easily installed and economically maintained.
Semester II			
BSBC201	**Business Law**	CO1	Acquire a sound understanding of the legal aspects of the laws affecting businesses
		CO2	Apply basic legal knowledge to business transactions
		CO3	Communicate effectively using standard business and legal terminology
		CO4	Analyse a given business context using basic understanding of the applicable Acts and develop a suitable operational framework.
		CO5	Describe current law, rules, and regulations related to settling business disputes
BSBC202	**Business Communication**	CO1	Recognize the various elements of communication, channels of communication and barriers to effective communication.
		CO2	Express themselves effectively in routine and special real world business interactions.

		CO3	Take part in professional meetings, group discussions, telephonic calls, elementary interviews and public speaking activities.
		CO4	Create and Deliver effective business presentations, using appropriate technology tools, for common business situations
BSBC203	**Cost Accounting**	CO1	Explains cost accounting systems.
		CO2	Explains the purposes of cost accounting.
		CO3	Defines the concepts of cost, expense, loss and revenue.
		CO4	Explains the relationships between cost and financial accounting.
		CO5	Prepare production cost statement and cost of goods sold statement.
		CO6	Explains main manufacturing cost elements.
BSBC204	**Business Mathematics**	CO1	End of the course Students will
		CO2	Recall the matrix manipulation
		CO3	Classify the calculus theory with some new method
		CO4	Solve the example of partial differential equation
		CO5	Illustrate the mathematical finance with new techniques
		CO6	Formulate the linear programming problem and solve the example
Semester-III			
BSBC301	**Macroeconomics**	C01	Identify the various variables of macro economics.
		CO2	Interpret the monetary and fiscal policies in relation to Indian Economy.
		CO3	Identify the major causes of inflation in an economy.
		CO4	Appraise the flows of savings and investment in open economy.
		CO5	Explain the decisions related to exchange rates in open economy.
BSBC302	**Corporate Laws**	C01	Acquire a sound understanding of the legal aspects affecting company
		CO2	Apply basic legal knowledge in incorporation of company
		CO3	Communicate effectively about different documents used in companies
		CO4	Analyze a given business context using basic understanding of the applicable Acts and develop a suitable operational framework.
		CO5	Describe current law, rules, and regulations related to settling and winding up companies.
BSBC303	**Human Resource Management**	C01	Learn the qualities of human resource manager in an organization.
		CO2	Analysis the importance of different methods of training given to the employees in organization.
		CO3	Memorize the difference between on the job training and of the job training.
		CO4	Learn the participant of industrial relation and recruitment of good industrial relation programme.

BSBC304	**Computer Applications in Business**	C01	Gain familiarity with the concepts and terminology used in the development, implementation and operation of business application systems.
		CO2	Explore various methods that Information Technology can be used to support existing businesses and strategies.
		CO3	Investigate emerging technology in shaping new processes, strategies and business models.
		CO4	Achieve hands-on experience with productivity/application software to enhance business activities.
		CO5	Accomplish projects utilizing business theories, Internet resources and computer technology.
		CO6	CO6.Work with simple design and development tasks for the main types of business information systems.
BSBC305	**Income Tax & Practices**	CO1	Utilize the definitions of the various components of income tax law. Complete federal income tax returns, including schedules to the Form 1040, and be able to calculate the correct amount of federal income tax.
		CO2	Analyze simple fact situations and recognize income tax ramifications. Apply basic tax concepts to simple fact situations and communicate potential income tax ramifications in writing.
		CO3	Research basic questions of federal tax law. Apply an understanding of the different ways a case can progress from audit to court.
Semester-IV			
BSBC401	**Business Statistics**	C01	To describe basic concepts of business statistics.
		CO2	To interpret various measures of central tendency, Measures of Dispersion, Correlation and Regression analysis in decision making.
		CO3	To examine the trend analysis with different methods of time series analysis.
		CO4	To explain basic concepts of probability and perform probability theoretical distributions.
BSBC402	**Principles of Marketing**	C01	Define essential concepts and principles of marketing and highlight their value.
		CO2	Develop skills and pragmatic approaches in scanning the contemporary trends in the market place.
		CO3	Describe the elements of marketing mix.
		CO4	learn marketing theories, principles, strategies and concepts as applied.
BSBC403	**Indian Economy**	C01	Develop ideas of the basic characteristics of Indian economy, its potential on natural resources.
		CO2	Understand the importance, causes and impact of population growth and its distribution, translate and relate them with economic development.
		CO3	Students will able to understand the functioning of Indian Economy.

BSBC404	**E-Commerce**	C01	Understand the basic concepts and technologies used in the field of management information systems.
		CO2	Have the knowledge of the different types of management information systems
		CO3	Understand the processes of developing and implementing information systems
		CO4	Be aware of the ethical, social, and security issues of information systems
		CO5	Describe the concept of online shopping and models of Electronic market.
BSBC405	**Entrepreneurship**	C01	To define the concept and dimensions of entrepreneurship for solving the problems at work and society
		CO2	To discuss the role of business houses and family business in India, their conflict and its resolution
		CO3	To describe the roles and functions of business incubators, venture capital, private equity fund, and angel investors
		CO4	To design the business plan/ project proposals considering different aspects of project report
		CO5	To identify the resources for start ups, preliminary contract with vendors and suppliers.
Semester V			
BS451	**Fundamentals of Financial Management**	C01	Understand the concept of time value of Money.
		CO2	To evaluate the various projects by different methods.
		CO3	Understand and compare the theories of dividend policy.
		CO4	To analyze and evaluate the various available financing options.
		CO5	Identify the major sources of short-term financing available to the firm.
BS452	**Corporate Social Responsibility and Corporate Governance**	C01	To understand the Business Ethics and to provide best practices of business ethics.
		CO2	To learn the values and implement in their careers to become a good-managers.
		CO3	To develop various corporate social Responsibilities and practice in their professional life
		CO4	To imbibe the ethical issues in corporate governance and to adhere to the ethical codes.
BS4DS1	**Management Accounting**	C01	Understand the basic concepts of cost accounting and management accounting.
		CO2	Solve the problems related to managerial decisions using the techniques of management accounting.
		CO3	Use of various tools of management accounting for analyzing business situations and to take decision.
BS4DS2	**Advertising**	CO1	Understand a company and its advertising activities.

		CO2	Demonstrate a comprehensive understanding of Marketing Communication theories and Concepts.
		CO3	Develop an awareness of the connection between marketing advertising tools and how each can be used effectively-individually or in an integrated mix.
BS4DS3	**Financial Markets, Institutions & Financial Services**	C01	To define the roles, structure, functioning and operations of Indian financial system;
		CO2	To describe the instruments, participants and operation of the money market and Capital market.
		CO3	To discuss the role and management of commercials banks and financial institutions;
		CO4	To examine various financial services with their functions
BS4DS4	**Banking & Insurance**	C01	Understand the basic concepts of Banking.
		CO2	Understand features of cheque and concept of endorsement.
		CO3	Interpret various Principles of sound lending.
		CO4	Use of Internet Banking, Mobile banking.
		CO5	Interpret basic concepts of Insurance.
Semester-VI			
BS461	**Corporate Accounting**	C01	Explain the Issue and Redemption of shares and debentures.
		CO2	Discuss the Final Accounts of a Company.
		CO3	Discuss Valuation of goodwill and shares of a company
		CO4	Formulate accounts of holding companies/parent companies.
		CO5	Develop Cash Flow Statement
BS462	**Goods and Services Tax and Customs Law**	C01	To explain the basic concept of GST, Input Tax Credit constitutional framework of indirect tax before GST and custom law.
		CO2	To support GST over indirect taxes.
		CO3	To distinguish between direct tax and indirect tax and to examine the defects of indirect tax.
		CO4	To discuss the valuation of GST and Exemption from GST.
		CO5	To explain the provision of for registration of existing manufacturer and new manufacturer to GST.
BS4DS5	**Fundamentals of Investment**	C01	Understand the concept of investment, risk and return.
		CO2	Explain various fixed income securities.
		CO3	Understand various approaches to equity analysis.
		CO4	Explain financial derivatives.
		CO5	Analyze Investor Protection and Role of SEBI.
BS4DS5	**Fundamentals of Investment**	C01	Understand the concept of consumer affairs.
		CO2	Analyze the role of various agencies for consumer protection.
		CO3	Interpret the consumer complaint redressed mechanism.

BS4DS6	**Consumer Affairs and Customer Care**	C01	To discuss the theoretical aspects of international business and the functions of international organizations.
		CO2	To explain the concept of economic integration and international economic environment.
		CO3	To interpret the Organizational structure for international business operations.
BS4DS7	**International Business**	C01	To familiarize with the role of management and unions in the promotions of industrial relations.
		CO2	Examine the labor relation issues and its management
		CO3	To acquire skills in handling employer-employee relations.
BS4DS8	**Industrial Relations & Labor Laws**	C01	To study research papers for understanding of a new field, in the absence of a textbook, to summarize and review them.
		CO2	To impart skills in preparing detailed report describing the project and results
		CO3	To effectively communicate by making an oral presentation before an evaluation committee

Bachelor of Business Administration (B.B.A)

A. Program Objectives (POs)

1. To enrich the knowledge-base of management through applied and conceptual research.
2. To train the students in emerging as efficient managers equipped with innovation, rationality and application oriented decision-making in the context of the ever-changing business environment.
3. To achieve expertise in the area of leadership, interpersonal skills, entrepreneurship, and marketing.
4. To respond effectively in meeting the competitive business needs of the society and to nurture the spirit of Entrepreneurship.
5. To motivate students to bring out the best in them and foster creativity, innovation and effective team building and promote team spirit so that they can work effectively in a team in practical field.

B. Program Specific Outcomes (PSOs)

1. Analyze the theoretical knowledge with the practical aspects of Organizational setting and techniques or management.
2. Determine conceptual and analytical abilities required for effective decision making.
3. Understand the dynamic and complex working environment of Business.
4. Understand the problems faced by the business sector in the Current scenario.
5. Determine conceptual and analytical abilities required for effective decision making.
6. Analyze the various aspect of business research in the area of marketing, human resource and finance.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BSBB101	**Environmental Studies**	CO1	Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes
		CO2	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world
		CO3	Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.
		CO4	Understand the utility of environmental sources
		CO5	Analyze the ecosystem and able to understand the different types of pollutions in country
BSBB102	**Microeconomics**	CO1	To familiarize the students with the basic concept of microeconomics.
		CO2	To make student understand the demand and supply analysis in business application.
		CO3	To familiarize students with the production and cost structure under different stages of production.
		CO4	To understand the pricing and output decisions under various market structure.
		CO5	To help students understand and apply the various decisions tools to understand the market structure.
BSBB103	**Financial Accounting**	CO1	Understand and apply accounting concepts, principles and conventions for their routine monetary transaction
		CO2	Recognize circumstances providing for increased exposure to fraud and define preventative internal control measures.
		CO3	Create and Prepare financial statements in accordance with Generally Accepted Accounting Principles
		CO4	Utilize the technology (such as computers, information databases) in facilitating and enhancing accounting and financial reporting processes.

		CO5	Analyze, interpret and communicate the information contained in basic financial statements and explain the limitations of such statements
BSBB104	**Management Principles & Applications**	CO1	Identify the key contributors and their contributions in the development of management thought
		CO2	Assume the roles and responsibilities associated with managerial functions.
		CO3	Describe the four management functions of planning, organizing, leading, and controlling
		CO4	Describe the Effective plans co-ordinate the organizational work and eliminate unproductive effort
		CO5	To find out good control system should be easily installed and economically maintained
BSBB105	**Business Organisation**	CO1	Understanding of the main working aspects of organizations, not only from an economic point of view but also considering organizations as part of society
		CO2	Analysis of the economic environment of organizations by means of the development of conceptual areas such as industry, human resources and production
		CO3	Knowledge of a comprehensive glossary of economic terms widely used in the analysis and discussion of behavior organization.
		CO4	Interpreting the meaning of the information emerging from the organization, particularly with regard to the management of human resources and production.
Semester-II			
BSBB201	**Business Law**	CO1	Acquire a sound understanding of the legal aspects of the laws affecting businesses
		CO2	Apply basic legal knowledge to business transactions
		CO3	Communicate effectively using standard business and legal terminology
		CO4	Analyse a given business context using basic understanding of the applicable Acts and develop a suitable operational framework.
		CO5	Describe current law, rules, and regulations related to settling business disputes

BSBB202	**Business Communication**	CO1	Recognize the various elements of communication, channels of communication and barriers to effective communication.
		CO2	Express themselves effectively in routine and special real world business interactions
		CO3	Take part in professional meetings, group discussions, telephonic calls, elementary interviews and public speaking activities.
		CO4	Create and Deliver effective business presentations, using appropriate technology tools, for common business situations.
BSBB203	**Cost Accounting**	CO1	Explains cost accounting systems.
		CO2	Explains the purposes of cost accounting
		CO3	Define the concepts of cost, expense, loss and revenue.
		CO4	Explains the relationships between cost and financial accounting
		CO5	Prepare production cost statement and cost of goods sold statement
		CO6	Explains main manufacturing cost elements.
BSBB204	**Business Mathematics**	CO1	Recall the matrix manipulation
		CO2	Classify the calculus theory with some new method
		CO3	Solve the example of partial differential equation
		CO4	Illustrate the mathematical finance with new techniques
		CO5	Formulate the linear programming problem and solve the example
BSBB205	**Organizational Behavior**	CO1	To identify the concept of organizational behavior to understand the behavior of people in the organization.
		CO2	To demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
		CO3	To explain the complexities associated with management of the group behavior in the organization.
		CO4	To examine how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.

Semester-III			
BSBB301	**Macroeconomics**	CO1	Identify the various variables of macro economics
		CO2	Interpret the monetary and fiscal policies in relation to Indian Economy.
		CO3	Identify the major causes of inflation in an economy.
		CO4	Appraise the flows of savings and investment in open economy.
		CO5	Explain the decisions related to exchange rates in open economy
BSBB302	**Corporate Laws**	CO1	Acquire a sound understanding of the legal aspects affecting company
		CO2	Apply basic legal knowledge in incorporation of company
		CO3	Communicate effectively about different documents used in companies
		CO4	Analyze a given business context using basic understanding of the applicable Acts and develop a suitable operational framework
		CO5	Describe current law, rules, and regulations related to settling and winding up companies
BSBB303	**Human Resource Management**	CO1	Learn the qualities of human resource manager in an organization.
		CO2	Analysis the importance of different methods of training given to the employees in organization.
		CO3	Memorize the difference between on the job training and of the job training.
		CO4	Learn the participant of industrial relation and recruitment of good industrial relation programme.
BSBB304	**Computer Applications in Business**	CO1	Gain familiarity with the concepts and terminology used in the development, implementation and operation of business application systems
		CO2	Explore various methods that Information Technology can be used to support existing businesses and strategies.
		CO3	Investigate emerging technology in shaping new processes, strategies and business models.

		CO4	Achieve hands-on experience with productivity/application software to enhance business activities.
		CO5	Accomplish projects utilizing business theories, Internet resources and computer technology.
		CO6	Work with simple design and development tasks for the main types of business information systems
BSBB305	**Income Tax Law and Practice**	CO1	Utilize the definitions of the various components of income tax law. Complete federal income tax returns, including schedules to the Form 1040, and be able to calculate the correct amount of federal income tax.
		CO2	Analyze simple fact situations and recognize income tax ramifications. Apply basic tax concepts to simple fact situations and communicate potential income tax ramifications in writing
		CO3	Research basic questions of federal tax law. Apply an understanding of the different ways a case can progress from audit to court.
Semester-IV			
BSBB401	**Business Statistics**	CO1	To describe basic concepts of business statistics
		CO2	To interpret various measures of central tendency, Measures of Dispersion, Correlation and Regression analysis in decision making.
		CO3	To examine the trend analysis with different methods of time series analysis.
		CO4	To explain basic concepts of probability and perform probability theoretical distributions.
BSBB402	**Principles of Marketing**	CO1	Define essential concepts and principles of marketing and highlight their value.
		CO2	Develop skills and pragmatic approaches in scanning the contemporary trends in the market place.
		CO3	Describe the elements of marketing mix.
		CO4	Learn marketing theories, principles, strategies and concepts as applied.

BSBB403	**Indian Economy**	CO1	Develop ideas of the basic characteristics of Indian economy, its potential on natural resources.
		CO2	Understand the importance, causes and impact of population growth and its distribution, translate and relate them with economic development.
		CO3	Students will able to understand the functioning of Indian Economy.
BSBB404	**E-Commerce**	CO1	Understand the basic concepts and technologies used in th**e** field of management information systems.
		CO2	Have the knowledge of the different types of management information systems
		CO3	Understand the processes of developing and implementing information systems
		CO4	Be aware of the ethical, social, and security issues of information systems
		CO5	Describe the concept of online shopping and models of Electronic market.
BSBB405	**Entrepreneurship**	CO1	To define the concept and dimensions of entrepreneurship for solving the problems at work and society
		CO2	To discuss the role of business houses and family business in India, their conflict and its resolution
		CO3	To describe the roles and functions of business incubators, venture capital, private equity fund, and angel investors
		CO4	To design the business plan/ project proposals considering different aspects of project report
		CO5	To identify the resources for start ups, preliminary contract with vendors and suppliers
Semester-V			
BS351	**Fundamentals of Financial Management**	CO1	Understand the concept of time value of Money
		CO2	To evaluate the various projects by different methods.
		CO3	Understand and compare the theories of dividend policy
		CO4	To analyse and evaluate the various available financing options.
		CO5	Identify the major sources of short-term financing available to the firm

BS352	**Production & Operations Management**	CO1	To understand the basic concepts and theories of the production management
		CO2	To comprehend the operations management situations with greater confidence
		CO3	anticipate issues in production and operations processes they may face during their careers
		CO4	expand individual knowledge of operations management principles and practices
		CO5	To apply operations management concepts and their influence on business decisions
BS353	**Business Policy and Strategy**	CO1	Understand the strategic decisions that organisations make and have an ability to engage in strategic planning
		CO2	Explain the basic concepts, principles and practices associated with strategy formulation and implementation.
		CO3	Develop the ability to identify strategic issues and design appropriate courses of action
		CO4	Apply and comprehend how a firm behaves in competitive environment of national and international market
		CO5	Analyse the competitive situation and strategic dilemma in dealing with dynamic global business environment in terms of rapidly changing market trends and technological advancement
BS3F1	**Financial Markets, Institutions and Financial Services**	CO1	To define the roles, structure, functioning and operations of Indian financial system
		CO2	To describe the instruments, participants and operation of the money market and Capital market
		CO3	To discuss the role and management of commercials banks and financial institutions
		CO4	To examine various financial services with their functions
BS3F2	**Security Analysis and Portfolio Management**	CO1	To analyses the EIC frame work
		CO2	Understand the valuation of Fixed and variable Income securities
		CO3	Design, analyze, choose and evaluate portfolios along with a deep understanding of Capital market
		CO4	Explain the Efficient Market Hypothesis

		CO5	Measure riskiness of a stock or a portfolio position
BS3H1	**Industrial Relations and Labour Laws**	CO1	To define the nature, concept and role of Industrial relations in India
		CO2	To discuss the theoretical aspects, functions, and approaches of Industrial relations
		CO3	To explain the comprehensive perspective about the legal frame work stipulated under the Industrial Disputes Act, 1947
		CO4	To examine the structure of labour laws and enactments in labour legislations
		CO5	To explain the conceptual framework of workers participation and collective bargaining
BS3H2	**Human Resource Planning**	CO1	Analyze the theory and concepts of human resource planning
		CO2	Identify the evolution of human resource planning throughout the organization
		CO3	Relate and apply models and methods used in forecasting
		CO4	Describe the applications of human resource information system
		CO5	Evaluate the organization's planning program
BS3M1	**Advertising & Consumer Behaviour**	CO1	Articulate the factors that influence consumer decisions
		CO2	Articulate the key theories that explain consumers' behaviors
		CO3	Understand how to influence different stages of the consumer decision making process
		CO4	Design marketing strategy that takes into account consumer psychology
		CO5	Develop a skill set for outlining consumer segmentation and integrating this into marketing plans
		CO6	Understand how patterns of future sales depends on factors that impact consumer behavior
BS3M2	**Sales & Distribution**	CO1	Appraise the process involved in personnel selling and its management
		CO2	Explain the decisions involved in planning and organizing the sales efforts

Semester-VI			
BS361	**Corporate Accounting**	CO1	Explain the Issue and Redemption of shares and debentures
		CO2	Discuss the Final Accounts of a Company
		CO3	Discuss Valuation of goodwill and shares of a company
		CO4	Formulate accounts of holding companies/parent companies.
		CO5	Develop Cash Flow Statement
BS362	**Goods and Services Tax and Customs Law**	CO1	To explain the basic concept of GST, Input Tax Credit constitutional framework of indirect tax before GST and custom law
		CO2	To support GST over indirect taxes
		CO3	To distinguish between direct tax and indirect tax and to examine the defects of indirect tax.
		CO4	To discuss the valuation of GST and Exemption from GST
		CO5	To explain the provision of for registration of existing manufacturer and new manufacturer to GST
BS3F3	**Insurance and Risk Management**	CO1	To explain the concept of insurance and risk
		CO2	To identify and evaluate the risk
		CO3	To compare life insurance with other forms of insurance
		CO4	To understand the regulatory provisions under Insurance Act 1938 and IRDA Act 1999
BS3F4	**Banking Principles & Operations**	CO1	Understand the structure of Indian financial System.
		CO2	Interpret various functions of commercial banks.
		CO3	Apply the concept time value of money
		CO4	Explain Negotiable Instruments
		CO5	Interpret various types of securities and mode of creating charge
BS3H3	**Training & Development of Human Resources**	CO1	To Conduct a needs assessment to determine whether and what kind of training is necessary
		CO2	To Evaluate and create conditions to ensure employees' readiness for training
		CO3	To Design a training environment to maximize learning

		CO4	To Select appropriate training methods based on training objectives, trainee characteristics, and organizational constraints
BS3H4	**Compensation Management**	CO1	To learn basic compensation concepts and the context of compensation practice.
		CO2	To illustrate different ways to strengthen the pay-for-performance link.
		CO3	To learn the concepts of Payment and employee benefits issues for contingent workers
		CO4	To understand the Legally required employee benefits
		CO5	To learn some of the implications for strategic compensation and possible employer approaches to managing legally required benefits
BS3M3	**Retail Management**	CO1	Describe how technology (Ex customer database, integrated systems, and buying and sales forecasting systems) is used to support retail businesses
		CO2	Evaluate the effectiveness of merchandising decisions in the retail industry
		CO3	Explain the factors relating to visual merchandising, such as store layouts and presentations
		CO4	Compare the strategies that are used within the different stages of a product's life cycle
		CO5	Describe how he flow of goods and services in a retail environment (Ex inventory control, supply chain and risk management)
		CO6	Analyze how logistics and supply chain management achieve a sustainable competitive advantage
		CO7	Compare different customer service strategies that be used to improve the customer experience
BS3M4	**Marketing of Services**	CO1	To develop an understanding of the basic concepts and issues in service marketing
		CO2	To provide an understanding of how service customers determine value in a service exchange and how this translates into a satisfied customer base.
		CO3	Build an understanding and appreciation of the marketing challenges for service businesses and their similarity and differences from goods/ manufacturing businesses

		CO4	Understand the Gaps Model of Service Quality and how to apply it in your professional career

B.A.LL.B.

A. Programme Objectives:

1. Apply the knowledge of laws in practice. (Legal Knowledge)
2. Develop awareness about the socio-economic, political and cultural environment in the country. (Overall Awareness about the Country)
3. Appreciate how law affects and is affected by individuals, organizations, markets, societies and other disciplines. (Appreciation of Law)
4. Understand and respect law as a social institution in the context of a diverse state with a unique and complex history. (Significance of Law)
5. Demonstrate professional skills needed for competent and ethically upright legal profession; such as interviewing, counseling, and collaboration. (Professional Skills)
6. Demonstrate an advanced understanding of the conceptual foundations of law within the humanistic intellectual tradition. (Conceptual Clarity)
7. Apply the fundamental professional practices necessary to effectively participate and compete in the legal profession. (Competitive Competency)
8. Ability to work efficiently as an individual and in groups. (Individual and Team Work)
9. Demonstrate the communication skills for preparing case briefs and drafting complex legal documents. (Communication)
10. Apply analytical skills to independently interpret the existing law based on legislative texts and judicial pronouncements. (Problem Analysis)

B. Program Specific Outcomes (PSOs):

1. Will derive dual benefit of exposure to the concepts of humanities together with knowledge of law.
2. Will be enriched with comprehensive theoretical and practical knowledge in indigenous as well as foreign legal traditions, lawyering skills, and research to meet the contemporary challenges.
3. Will develop a sense of responsibility to serve the society through their professional skills in advocacy, judicial and other legal services.
4. Will be prepared as lawyers of tomorrow for handling legal issues that are not only restricted to the national boundaries, but also cutting across complex cross-border transactions, by developing legal skills in core areas, such as Civil Laws, Criminal Laws, and Business Laws.
5. Will be able to develop a base of legal excellence with international and indigenous understanding.
6. Will be prepared to contribute effectively in the fields of constitutional law, civil law, criminal law, labour law, and environmental law, besides humanities.
7. Will be able to critically analyse all the existing laws and apply the acquired skills to excel in their respective professions.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BLW 111	**English-I**	**CO1**	Understand the essentials of effective oral communication and power point presentation skills and do it in a more professional way.
		CO2	Apply analytical and critical thinking skills while reading long passages.
		CO3	Writing answers to questions in a systematic way.
		CO4	Contribute creative thoughts and ideas on issues evolving through readings in class.
		CO5	Construct meaningful paragraphs adhering to the rules of grammar.
BWL 112	**History-I**	**CO1**	Describe Prehistory and Protohistory
		CO2	Classify urbanisation in the gangetic Basin
		CO3	Classification of Buddhism and Jainism
		CO4	Acquire knowledge about Early Tamilakam
		CO5	Identify Early Indian Maps
BLW 113	**Political Science-I**	**CO1**	Comprehend key ideas of all major political thinkers, both western and Indian.
		CO2	Establish connection between law and philosophy
		CO3	Articulate their ideas clearly and concisely with a marked change in their analytical capabilities.
		CO4	To increase knowledge of the history of classical and modern political thought; of the fundamental values and ethical issues contested in politics over time
		CO5	To increase recognition of the major problems, the leading policies, and the legal issues confronting contemporary political systems
BLW 114	**Micro Economics-I**	**CO1**	Define and describe the fundamental principles and concept of Economics
		CO2	Apply the analytical tools of Economics used in legal analysis
		CO3	To evaluate the importance of economic analysis in policy making and advisory functions
		CO4	Understanding of the basic concepts, tools of analysis and terminologies used in Economics, which will facilitate their understanding of various legal phenomena and their economic implications
		CO5	To integrate the concept of price and output decisions of firms under various market structure.
BLW 115	**Legal Method**	**CO1**	Learning where and how to find the law is as important as the substantive study of various laws.
		CO2	Understand the meaning of research and the steps involved in legal research.
		CO3	They will also apply some basic statistical methods to

			analyse data.
		CO4	The understanding of facts is critical to the process of identifying favourable precedents and distinguishing the case at hand from other authoritative rulings, which are not in direct support of one's proposition.
		CO5	Describe different sources of law and their relationship inter se
BLW 116	**Law of Torts Including M. V. Act & Consumer Protection Laws**	**CO1**	Understand the constituents of tort and general principles
		CO2	Provide an in-depth clarity about various defences available against tortious liability
		CO3	Enhance the clarity in understanding the concept of locus standi for actions in tort
		CO4	Acquaint with principle of tortious liability for torts committed by others, principle of respondent superior, and the principles of unintentional tort of negligence.
		CO5	Understand the fundamental notions of consumerism, rights of consumers, and dispute resolution mechanism on the one hand, and the relevance of the MV Act on the other.
Semester II			
BLW 121	**English-II**	**CO1**	Understand the essentials of effective oral communication and power point presentation skills and do it in a more professional way.
		CO2	Apply analytical and critical thinking skills while reading long passages.
		CO3	Writing answers to questions in a systematic way.
		CO4	Contribute creative thoughts and ideas on issues evolving through readings in class.
		CO5	Construct meaningful paragraphs adhering to the rules of grammar.
BLW 122	**History-II**	**CO1**	Focus on how people and their institutions are shaped by events to a focus on how underlying forces and movements shape events and then to looking at how abstract, impersonal forces shape history
		CO2	Focus on what happened during a specific time period to a focus on putting that period into its broader, dynamic context and then to considering how we use the past to help make sense of the present
		CO3	Looking at how people's perspectives on an event in its historical context differs from looking at how people have since come to interpret events in the past and then to examining disputes over the nature and extent of the underlying forces.
		CO4	Gained an understanding of the development of the academic study of history
		CO5	Gained insight into how historical arguments have been and are made
BLW 123	**Political Science-II**	**CO1**	Comprehend key ideas of all major political thinkers, both western and Indian.

		CO2	Establish connection between law and philosophy
		CO3	Articulate their ideas clearly and concisely with a marked change in their analytical capabilities.
		CO4	To increase knowledge of the history of classical and modern political thought; of the fundamental values and ethical issues contested in politics over time
		CO5	To increase recognition of the major problems, the leading policies, and the legal issues confronting contemporary political systems
BLW 124	**Micro Economics-II**	**CO1**	Define and describe the fundamental principles and concept of Economics
		CO2	Apply the analytical tools of Economics used in legal analysis
		CO3	To evaluate the importance of economic analysis in policy making and advisory functions
		CO4	Understanding of the basic concepts, tools of analysis and terminologies used in Economics, which will facilitate their understanding of various legal phenomena and their economic implications
		CO5	To integrate the concept of price and output decisions of firms under various market structure.
BLW 125	**Law of Contract-I**	**CO1**	Developing understanding about the Basic business law.
		CO2	How Contracts are made legally.
		CO3	Practical applicability of law in day to day dealings related to legal relationships.
		CO4	How contracts are performed and discharged
		CO5	When and how specific relief can be claimed in case of breach of contract.
BLW 126	**Legal History**	**CO1**	Outlines the modes of winding up of company and distribution of assets in the event of winding up.
		CO2	Discusses the constitutional history along with the history of the general legal system.
		CO3	Knowledge about the historical developments that led to the enactment of the constitution.
		CO4	Analyse the British periods (1600-1947) and able to understand how laws were made and what paved the way for modern day legislations in India.
		CO5	Knowledge about the emergence of British Legislative system and growth of formalized court system in India.
Semester-III			
BLW 211	**Basics of Sociology-I**	**CO1**	Students will study the basics of Constitutional Law and the salient features of the Constitution of India.
		CO2	Students will be familiarized with the leading case laws and legislative changes to the provisions of the Constitution
		CO3	Students will learn the diverse principles of judicial interpretation that constructs notions of 'state', law' and 'law in force'.
		CO4	Students will understand the nature and scope the rights to freedom, life, personal liberty and due process.

		CO5	Students will learn the applicability of the directive principles of state policy.
BLW 212	**Fundamentals of Computer**	**CO1**	Know about the operating system.
		CO2	Understanding word processing system and its practical use.
		CO3	Making small presentation for developing the skills used in business.
		CO4	Knowledge about the internet, WWW and web browser
		CO5	Knowing about the financial literacy for banking scheme and application.
BLW 213	**Law of Contract-II**	**CO1**	Developing understanding about the special contracts should initiate the students to different kinds of contracts with emphasis on the intricacies therein.
		CO2	Understanding about the essential elements of this special contract.
		CO3	Understanding standing about the Bailment and Pledge discussing the elements of bailment contract
		CO4	Developing understanding about the Partnership Law giving an overview of Partnership Act and Limited Liability Partnership Act
		CO5	Understanding about the Sale of Goods Act is discussed covering essential elements of a contract of sale of goods how contracts are performed and discharged
BLW 214	**Constitutional Law-I**	**CO1**	Students will study the basics of Constitutional Law and the salient features of the Constitution of India.
		CO2	Students will be familiarized with the leading case laws and legislative changes to the provisions of the Constitution
		CO3	Students will learn the diverse principles of judicial interpretation that constructs notions of 'state', law' and 'law in force'.
		CO4	Students will understand the nature and scope the rights to freedom, life, personal liberty and due process.
		CO5	Students will learn the applicability of the directive principles of state policy.
BLW 215	**Criminal Law I (IPC)**	**CO1**	Identify the elements of each and every offence along with their respective punishment mentioned in the Indian Penal Code.
		CO2	Explain the Evolution of Indian Penal Code over the period of time from its enactment along with major amendments.
		CO3	Apply the principles discussed in Indian Penal Code in various cases.
		CO4	Frame arguments on the basis of nature of offences, elements of offences along with various landmark case laws.
		CO5	List out the various issues in criminal law and frame research problem and apply empirical research method

			to reach conclusion with suggestions.
BLW 216	**Basics of Moot Court**	**CO1**	Able to appreciate the research, oratorical and articulation required by the lawyer.
		CO2	Be able to comprehend the practicability of the justice system and the role of the Court in dispensation of justice.
		CO3	Developed a knowledge and understanding of the basic principles and policies
		CO4	Developed the skills of written advocacy
		CO5	Developed the skills of oral advocacy
Semester-IV			
BLW 221	**Sociology-II**	**CO1**	Explain the nature of the Constitution
		CO2	Analyse and sort out the diverse judicial tests used to determine the constitutionality of state action
		CO3	Compare the constitutional relationship between the rights enumerated under Articles 14, 19 and 21 of the Constitution of India
		CO4	Evaluate the idea of welfare state by amalgamating the harmonious impact of Fundamental Rights and Directive Principles of State Policy.
		CO5	Analyse and sort out the applicability of the directive principles of state policy
BLW 222	**Microeconomics-III***	**CO1**	Define and describe the fundamental principles and concept of Economics
		CO2	Apply the analytical tools of Economics used in legal analysis
		CO3	To evaluate the importance of economic analysis in policy making and advisory functions
		CO4	Understanding of the basic concepts, tools of analysis and terminologies used in Economics, which will facilitate their understanding of various legal phenomena and their economic implications
		CO5	To integrate the concept of price and output decisions of firms under various market structure.
BLW 224	**Constitutional Law – II**	**CO1**	Explain the nature of the Constitution
		CO2	Analyse and sort out the diverse judicial tests used to determine the constitutionality of state action
		CO3	Compare the constitutional relationship between the rights enumerated under Articles 14, 19 and 21 of the Constitution of India
		CO4	Evaluate the idea of welfare state by amalgamating the harmonious impact of Fundamental Rights and Directive Principles of State Policy.
		CO5	Analyse and sort out the applicability of the directive principles of state policy
BLW 225	**Criminal Law II (CrPC)**	**CO1**	Explain the scope and applicability of the Code
		CO2	Evaluate the role played by the functionaries of the government.
		CO3	Analyze the right the victims are entitled to and suggest appropriate remedies in case of breaches.

		CO4	Deal with the basic procedural aspects with regard to criminal law in action.
		CO5	Analyse the hierarchy of criminal courts.
BLW 226	**Family Law-I (Hindu Law)**	**CO1**	To provide the basic understanding of personal laws relating to family matter.
		CO2	Understand the core concepts of adoption laws and to analyse it from sociological perspective in the society
		CO3	To enable students to identify relevant legislations and case laws relating to family law.
		CO4	To inculcate basic research skills as a part of learning
		CO5	Aims to explore critical principles relating to contemporary issues and nurture within the students the ability to draft on family law matters
Semester-V			
BLW 311	**Hindi-I**	**CO1**	Understanding the origin of Hindi language and its literature.
		CO2	Identifying the dialects of Hindi language family.
		CO3	Understanding the concept of history of literature.
		CO4	Understanding the importance and basis of the names given to each period of Hindi literature.
		CO5	Identifying the eminent Hindi writers of each period.
BLW 313	**Family Law-II (Muslim Law)**	**CO1**	Students should be able to identify and describe the various sources and schools of different personal laws.
		CO2	Students will be able to identify research areas, frame research questions and utilize the available on-line data basis.
		CO3	Students should be able to understand the core concepts of adoption laws and to analyze it from sociological perspective in the society.
		CO4	Students should be able to examine and analyze the concept of marriage and relate it to the changing nature of marriage and matrimonial remedies.
		CO5	To enable students to identify relevant legislations and case laws relating to family law.
BLW 314	**Jurisprudence**	**CO1**	Explain the differences between the different schools of jurisprudence concerning the nature of law.
		CO2	Identify the major and minor premises of legal arguments and analyze legal debates using appropriate rhetorical vocabulary
		CO3	Invent and defend arguments about the requirements of justice in legal disputes that reference and extend the themes of the course.
		CO4	Devise a correct way of handling the legal problem
		CO5	To provide students with an opportunity to think carefully about the values that ought to underpin a country's legal system.
BLW 315	**Civil Procedure Code and Law of**	**CO1**	Identify the jurisdiction of the civil court wherein a matter will lie.
		CO2	Use correct legal terminologies.

	Limitation	**CO3**	Describe the rules of pleadings and apply them correctly.
		CO4	File execution proceedings in the civil courts.
		CO5	Apply the provisions of Limitation Act appropriately.
BLW 316	**Law of Property**	**CO1**	Identify and describe the scope and ambit of the property laws in India.
		CO2	To trace out and understand the theoretical foundation related to property.
		CO3	To analyse and understand the interpretation clauses along with the principals involved in the subject.
		CO4	To enlist the significant legal provisions relating to transfer of property.
		CO5	Analyse the relevant case laws pertaining to the concepts discussed.
Semester-VI			
BLW 321	**Hindi II**	**CO1**	Understanding the origin of Hindi language and its literature.
		CO2	Identifying the dialects of Hindi language family.
		CO3	Understanding the concept of history of literature.
		CO4	Understanding the importance and basis of the names given to each period of Hindi literature.
		CO5	Identifying the eminent Hindi writers of each period.
BLW 322	**Law of Evidence**	**CO1**	To understand and apply the rules of evidence.
		CO2	To learn associated trial and lawyering skills.
		CO3	To be able to synthesize the rules and use them in the context of a trial or other Proceedings
		CO4	To be able to apply the rules of evidence to a wide variety of fact situations
		CO5	To develop competent advocacy skills relating to evidence issues.
BLW 323	**Public International Law**	**CO1**	Critically analyse various theories of International Law and sources of International Law.
		CO2	Critically analyse and interpret various Articles in Vienna Convention on Law of Treaties.
		CO3	Find out various complex issues in the International sphere and apply International Law principles to study such problems.
		CO4	Analyse various pacific dispute settlement mechanisms.
		CO5	Critically analyse the role of International Court of Justice in settling the disputes between nations amicably.
BLW 324	**Law of Taxation**	**CO1**	Describe the basic concepts relating to Income Tax Act, 1961
		CO2	Explain different types of incomes, their taxability, expenses and deductibility
		CO3	Interpret the provisions and cases relating to tax laws
		CO4	Learn various direct tax and their implication in practical situations
		CO5	Enhancing the skills of interpretation and the

			application of the traditionally established principles of law in taxation
BLW 325	**English and Legal Language**	**CO1**	Communicate clearly and effectively using proper legal terminologies.
		CO2	Explain the meanings of Latin maxims, elucidate fundamental legal concepts and principles through them, as also use them in advocacy.
		CO3	Draft legal notice and pleadings.
		CO4	Use legal terms, distinguish their meanings in different contexts, and apply them in legal communication.
		CO5	Read and dissect, analytically, decisions of courts, while also culling out their facts and principles in order to establish what rule of law they (the judgements) stand for.
BLW 326	**Company Law**	**CO1**	Explain the process of formation of different kinds of companies and commencement of business.
		CO2	Describe the methods of giving security for repayment of loan or other liabilities of a company.
		CO3	Explain the legal issues in the administration and management of a registered company.
		CO4	Elucidate how winding up is done in a company.
		CO5	Introduced to the basic power and structure in a company and the law relating to appointment of directors, director's duty, and matters governing board meetings.
Semester VII			
BLW 412	**Labour Law – I**	**CO1**	Have a nice the undercurrent of the social security constitutional provisions and development at the international level.
		CO2	Behind the constitutional and statutory provisions relating to minimum wages.
		CO3	Apply the legal provisions in the contemporary debate on employee provident fund and workers vulnerability in India.
		CO4	Provisions relating to the compensation for industrial accident for answering problem-based question are especially concerning the time any place.
		CO5	Provisions relating to the compensation for industrial accident for answering problem-based question are especially concerning the time any place.
BLW413	**Intellectual Property Rights-I**	**CO1**	Apply the provisions of Information Technology Act
		CO2	Identify the need for regulation of Information technology and various regulatory models
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology.
		CO4	Analyses the laws related to Intellectual Property Right and Technology Law
		CO5	List out the legal challenges of the information society and the different forms of cybercrimes.

BLW414	**Human Rights Law**	**CO1**	Identify the fundamental philosophy and policies concerning human rights.
		CO2	Summarize the legal effects of international treaties and conventions on the national human rights jurisprudence.
		CO3	Relate to the on-going debates and current or future challenges concerning human rights.
		CO4	Critically analyse the Human rights protection mechanism, nationally and internationally concerning human rights.
		CO5	Formulate the role of state actors for the protection of human rights.
BLW 415	**Administrative Law**	**CO1**	Explain the differences between the different schools of jurisprudence concerning the nature of law.
		CO2	Identify the major and minor premises of legal arguments and analyse legal debates using appropriate rhetorical vocabulary
		CO3	Invent and defend arguments about the requirements of justice in legal disputes that reference and extend the themes of the course.
		CO4	Devise a correct way of handling the legal problem
		CO5	To give students an opportunity to think carefully about the values that ought to underpin a country's legal system.
BLW 416	**Professional Ethics and Professional Accounting System**	**CO1**	Conduct themselves according to the ethical rules that guide advocate's practice.
		CO2	Critically analyze the ethical rules and law of contempt of the court.
		CO3	Students will be able to identify ethical issues and dilemmas in realistic scenario as to propose well reason and articulated resolution to do issues and dilemmas.
		CO4	Students will come to know their role and responsibilities as professionals.
		CO5	Appreciating the duties of Advocates as well as the Bar Bench relation
Semester VIII			
BLW 421	**Labour Law – II**	**CO1**	Have a nice the undercurrent of the social security constitutional provisions and development at the international level.
		CO2	Behind the constitutional and statutory provisions relating to minimum wages.
		CO3	Apply the legal provisions in the contemporary debate on employee provident fund and workers vulnerability in India.
		CO4	Provisions relating to the compensation for industrial accident for answering problem-based question are especially concerning the time any place.
		CO5	Provisions relating to the compensation for industrial accident for answering problem-based question are especially concerning the time any place.
		CO1	Identify the different forms of intellectual property and

BLW 422	**Intellectual Property Rights-II**		describe the importance of protection of IP.
		CO2	List out the criteria/essential requirements of IP protection, duration, rights conferred and remedies provided.
		CO3	Apply the principles of IP protection to legal problems correctly.
		CO4	Analyses the issues related to infringement of IPR.
		CO5	Evaluate as against other the international legal framework related to IP protection and articulate the problem areas for the deficiency.
BLW 423	**U.P. Land Laws**	**CO1**	Analyze the Zamindari and Land reform Act in the State of Uttar Pradesh.
		CO2	Apply the rule of succession for female.
		CO3	Understand the rule of ejectment for tenant holder and bhumidhar.
		CO4	Know the authorities under Land Revenue Act and apply the procedure of collecting Land Revenue
		CO5	To understand the concept of ejectment, mutation, and lease.
BLW 424	**Interpretation of Statutes**	**CO1**	Demonstrate an understanding of the principles and process of statutory interpretation
		CO2	Formulation and development of arguments in support or against given interpretations
		CO3	Compare, contrast and reflect on theoretical concepts underlying the interpretation
		CO4	Apply a range of legal principles and methods to interpret legal instruments
		CO5	To ascertain the principles, presumptions and canons of construction and to learn their method of operation in varied case laws and interpretation of statutes.
BLW 425	**Alternative Dispute Resolution**	**CO1**	Analyse various legal frameworks on arbitration, mediation, conciliation and negotiation.
		CO2	Understand and analyse the international legal framework on arbitration and conciliation.
		CO3	Learn the process of arbitration, mediation and conciliation and its practical applicability.
		CO4	Learn the skills how to do arbitration, mediation and conciliation in different type of matters.
		CO5	To understand the Indian legal framework related to arbitration, mediation, conciliation and negotiation.
Semester IX			
BLW 511	**Environmental Law**	**CO1**	Explain the constitutional foundation of environmental law
		CO2	Apply the principles of sustainable development in environmental law.
		CO3	Analyse the issues related to environmental conservation and biodiversity before the green tribunal.
		CO4	Apply the National Green Tribunal Act, 2010 and approach NGT where there is environmental matters
		CO5	Knowing about importance of public participation

			through Right to information, Public Interest Litigation and other remedies in preserving and protecting environment.
BLW 512	**Information Technology Law**	**CO1**	Apply the provisions of Information Technology Act
		CO2	Identify the need for regulation of Information technology and various regulatory models
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology.
		CO4	Analyses the laws related to Intellectual Property Right and Technology Law
		CO5	List out the legal challenges of the information society and the different forms of cybercrimes.
BLW 513	**Pleading, Drafting and Conveyancing**	**CO1**	Draft the legal deeds/documents/pleadings flawlessly.
		CO2	Appreciate the abstract concepts and put forth an effective argument.
		CO3	Identify the issues involved, collect appropriate evidence, get true and correct information.
		CO4	Draft the legal deeds and documents with precision by following the appropriate legal format
		CO5	Scrutinize the legal documents and deeds.
BLW 514	**Law of Banking and Negotiable Instruments Act**	**CO1**	Explain the basic principles of insurance law and banking laws.
		CO2	Demonstrate knowledge of insurance contracts and provisions, and law relating to life, health, fire, marine and other types of insurance.
		CO3	Apply the operation of insurance law in a practical context
		CO4	The course largely focuses on the fundamental principles which govern the law of insurance and law of banking.
		CO5	Understanding the theories on which insurance depends upon.
Elective Groups (Choose any one from the following)			
BLW 515	**Law Relating to Women**	**CO1**	Identify the major social reforms during the 19th century in India for the uplifting women.
		CO2	List out the loopholes in law enforcement agencies in securing access to justice to women.
		CO3	Apply the different legislations enacted for women development and empowerment.
		CO4	Analyse the issues related to violence against women under the Protection of Women from Domestic Violence Act, 2005.
		CO5	Evaluate as against other the impact of specific laws enacted to secure justice to women against dowry related harassments, dowry deaths, molestation, sexual abuse, marital rape and rape.
BLW 516	**Criminology, Penology and**	**CO1**	The scientific study of criminology and concept of law relating to it and concept of law relating to it. Apart from these general principles in Criminology equally

	Victimology		important place of criminal law in criminal science, nature and functions of criminal law.
		CO2	The behaviour of the juveniles involved in crimes for and the law which govern them in a better manner.
		CO3	The clarity about logical structure of crime prevention and its implementation with judicial pronouncements.
		CO4	The administration of criminal justice system in India with critical analysis of legislative provisions along with its practical implementation.
		CO5	The importance of the victim for an investigation and why they are important in the overall scheme of the crime. The reasons for slow development of victim scheme since its inception from 2010 in the Criminal Procedure Code-1973.
BLW 517	**Gender Justice and Feminine Jurisprudence**	**CO1**	Equipped to need and importance of gender justice and feminist jurisprudence in the current world context.
		CO2	Able appreciate the evolution of the Indian Women's Movement and understand the importance of Feminism in an Indian context.
		CO3	Able understand the role of the State in the Feminist's goal of achieving social, political and economic equality, social and moral connotations of law and sexuality and the feminist views on it.
		CO4	Enables the students to understand the evolution of Feminism and appreciate the difference in approach between the two schools.
		CO5	Able to analyse the nitty-gritty of the Sameness and Difference approach taken by the different schools of Feminism.
Semester X			
BLW 522	**Moot Court, Observation of Trial, Pre-Trial Preparation and Internship**	**CO1**	Able to appreciate the research, oratorical and articulation required by the lawyer.
		CO2	Be able to comprehend the practicability of the justice system and the role of the Court in dispensation of justice.
		CO3	Developed a knowledge and understanding of the basic principles and policies
		CO4	Developed the skills of written advocacy
		CO5	Developed the skills of oral advocacy
BLW 523	**Internship (Under Law firms, Lawyers, NGO & other Legal Functionaries etc.)**	**CO1**	Enhance analytical as well as critical thinking of Students over interesting and contemporary legal issues,
		CO2	Demonstrate a thorough and contextual knowledge of the various laws particularly in its application to real and hypothetical legal problems.
		CO3	Acquire skill in advocacy, legal research and writing skills
		CO4	Gain interest in advocacy and competence as an advocate.
		CO5	Develop the self-confidence that every advocate should

			possess

B.B.A.LL.B. (Honours)

A. Programme Objectives:

1. Express the deep knowledge of law in a variety of legal & business contexts and engage with the role of law in managerial practice and display their ability to deal with different types of legal issues and business. (Multi-disciplinary Skills)
2. Develop and demonstrate strong soft-skills for making them industry-ready, when they complete the programme. (Soft-Skills)
3. Develop analytical skills and widen the understanding of macro environmental issues by applying the knowledge of macroeconomic policies and their impact on business organisation and strategy. (Analytical Skills)
4. Understand and demonstrate expertise in marketing operations and managing complexities in practical business situations. (Conceptual Clarity)
5. Develop and demonstrate the understanding of management concepts, philosophies and historical background and build up the entrepreneurship skills which help in establishing a successful business. (Entrepreneurial Skills)
6. Ability to apply business communication strategies and principles in effective communication for domestic and international business situations. (Communication Skills)
7. Identify and resolve ethical, legal, cultural, and global issues affecting business communication. (Ethics)
8. Appreciate the historical background and fundamentals of management thoughts vital for understanding the conceptual framework of management as a discipline and familiarise with the theoretical and practical literature relating to organisational behaviour. (Subject Expertise)
9. Develop the responsibility as an employer and understand the legal system to manage employment issues. (Leadership Skills)
10. Understand the business and related factors; and business' dependency on different environmental variables. (Inter-disciplinary Skills)

B. Program Specific Outcomes (PSOs):

1. Will acquire an integrated understanding of law, financial, business, and other managerial ecosystems.
2. Will be equipped with vast domain knowledge of the contemporary areas of managerial relevance and provide them with an opportunity to focus on strategies to manage business, with a strong emphasis on entrepreneurship, the impact of technology on commerce, managing the emerging markets and other global issues.
3. Will be able to conduct theoretical as well as applied research.
4. Will be able to analyze and understand changes in regard to rule of law, economic reforms, human rights, women's rights, rights of children, elderly, sick and disadvantaged segments of the population.
5. Will be equipped to apply critical and contextual approaches across a wide variety of subject matter.
6. Will develop broader thinking, expertise and a foundation for professional practice.
7. Be equipped with the intellectual skills, including Communication Skills, Environment & Disaster Management, Computer Lab, Innovation and Inventions in Laws and creative thinking.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BBW-111	**English-I**	**CO1**	Facilitate the students in enhancing their reading, writing, comprehension and oral communication skills.
		CO2	Help the students in having a sound grasp over the language and to clearly and effectively communicate using the written language.
		CO3	The oral skills of students too get honed, as they get trained in making power point presentations in a professional way.
		CO4	Reading exercises and discussions will facilitate in developing their analytical and critical thinking skills.
		CO5	Apply analytical and critical thinking skills while reading long passages.
BBW 112	**Financial Accounting**	**CO1**	Introduce the basic theory, concepts and practice of financial accounting. and
		CO2	To enable students to understand information contained in the published financial statements of companies and other organizations.
		CO3	It includes the preparation of accounting statements, but their uses and limitations will also be emphasized.
		CO4	Recognize circumstances providing for increased exposure to fraud and define preventative internal control measures
		CO5	Utilize the technology (such as computers, information databases) in facilitating and enhancing accounting and financial reporting processes.
BBW 113	**Management Principles & Applications**	**CO1**	Provide fundamental knowledge & exposure to the concepts, theories & practices in the field of management.
		CO2	Investigates the way that managers get things done in an organization relying on the dynamic processes of strategic planning.
		CO3	Study the business development, budgeting and operations to know about the organizations.
		CO4	Identify the key contributors and their contributions in the development of management thought.
		CO5	Learn different type of communication process.
BBW 114	**Microeconomics**	**CO1**	To acquaint the students with the concepts of microeconomics dealing with consumer behaviour.
		CO2	Understand the supply side of the market through the production and cost behavior affirms.

		CO3	Understand the pricing and output decisions under various market structure.
		CO4	Understand the demand and supply analysis in business application
		CO5	Interpreting the meaning of the information emerging from the organization
BBW 115	**Legal Method**	**CO1**	Learning where and how to find the law is as important as the substantive study of various laws.
		CO2	Understand the meaning of research and the steps involved in legal research.
		CO3	They will also apply some basic statistical methods to analyse data.
		CO4	The understanding of facts is critical to the process of identifying favourable precedents and distinguishing the case at hand from other authoritative rulings, which are not in direct support of one's proposition.
		CO5	Describe different sources of law and their relationship inter se
BBW 116	**Law of Torts Including M. V. Act & Consumer Protection Laws**	**CO1**	Understand the constituents of tort and general principles
		CO2	Provide an in-depth clarity about various defences available against tortious liability
		CO3	Enhance the clarity in understanding the concept of locus standi for actions in tort
		CO4	Acquaint with principle of tortious liability for torts committed by others, principle of respondent superior, and the principles of unintentional tort of negligence.
		CO5	Understand the fundamental notions of consumerism, rights of consumers, and dispute resolution mechanism on the one hand, and the relevance of the MV Act on the other.
Semester II			
BBW 121	**English II**	**CO1**	Apply the rules of punctuation correctly, while writing.
		CO2	Draft letters, write essays and Research papers (at a very basic level), adhering to the rules of academic writing.
		CO3	Apply the rules of grammar, while constructing sentences and paragraphs.
		CO4	Communicate orally in a more effective way and do power point presentations in a professional way.
		CO5	Apply analytical and critical thinking skills while reading long passages
BBW 122	**Business Communication**	**CO1**	Enable the students become aware of the importance of business communication.
		CO2	Enable to do mastery in communication skills in order to successfully function in their day-to-day work
		CO3	Build up their self-confidence by giving them a true

			picture of themselves as well as of their organization
		CO4	Learn to project the image in business firm according to their understandings
		CO5	Express themselves effectively in routine and special real-world business interactions
BBW 123	**Cost Accounting**	**CO1**	To acquaint the students with the basic concepts used in cost accounting
		CO2	Learn the concept of revenue, loss, cost and expense
		CO3	Knowledge of management accounting its various methods involved in cost ascertainment and
		CO4	Knowledge of cost accounting and book keeping systems.
		CO5	Explains main manufacturing cost elements
BBW 124	**Organisational Behaviour**	**CO1**	To help the students to develop cognizance of the importance of human behaviour.
		CO2	To provide the students to analyse specific strategic human resources demands for future action.
		CO3	To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behaviour.
		CO4	To enable students to describe how people behave under different conditions and understand why people behave as they do.
BBW 125	**Law of Contract-I**	**CO1**	Developing understanding about the Basic business law.
		CO2	How Contracts are made legally.
		CO3	Practical applicability of law in day to day dealings related to legal relationships.
		CO4	How contracts are performed and discharged
		CO5	When and how specific relief can be claimed in case of breach of contract.
BBW 125	**Legal History**	**CO1**	Outlines the modes of winding up of company and distribution of assets in the event of winding up.
		CO2	Discusses the constitutional history along with the history of the general legal system.
		CO3	Knowledge about the historical developments that led to the enactment of the constitution.
		CO4	Analyse the British periods (1600-1947) and able to understand how laws were made and what paved the way for modern day legislations in India.
		CO5	Knowledge about the emergence of British Legislative system and growth of formalized court system in India.
Semester-III			
BBW 211	**Human Resource Management**	**CO1**	Knowledge about the importance of human resources management in an organisation.

		CO2	Understand the concept of recruitment, selection, training and various theories of wages.
		CO3	Scope of human resource management.
		CO4	Learn the qualities of human resource manager in an organization.
		CO5	Understanding the difference between on the job training and of the job training.
BBW 212	**Computer Applications in Business**	**CO1**	Discussing computer terminology, hardware, software, operating systems, and information systems relating to the business environment will be covered.
		CO2	Business applications of software, including word processing, spreadsheets, databases, presentation graphics, and business-oriented utilization of the Internet.
		CO3	Laboratory experience includes word processing, spreadsheets, presentation software and databases.
		CO4	Explore various methods that Information Technology can be used to support existing businesses and strategies
		CO5	Work with simple design and development tasks for the main types of business information systems
BBW 213	**Law of Contract-II**	**CO1**	Developing understanding about the special contracts should initiate the students to different kinds of contracts with emphasis on the intricacies therein.
		CO2	Understanding about the essential elements of this special contract.
		CO3	Understanding standing about the Bailment and Pledge discussing the elements of bailment contract
		CO4	Developing understanding about the Partnership Law giving an overview of Partnership Act and Limited Liability Partnership Act
		CO5	Understanding about the Sale of Goods Act is discussed covering essential elements of a contract of sale of goods how contracts are performed and discharged
BBW 214	**Constitutional law-I**	**CO1**	Basics of Constitutional Law and the salient features of the Constitution of India.
		CO2	Familiarized with the leading case laws and legislative changes to the provisions of the Constitution
		CO3	Learn the diverse principles of judicial interpretation that constructs notions of State, law and law in force
		CO4	Understand the nature and scope the rights to freedom, life, and personal liberty, due process.
		CO5	Learn the applicability of the directive principles of state policy.
BBW 215	**Law of Crimes (I.P.C.)**	**CO1**	Identify the elements of each and every offence along with their respective punishment mentioned in the

			Indian Penal Code.
		CO2	Explain the Evolution of Indian Penal Code over the period of time from its enactment along with major amendments.
		CO3	Apply the principles discussed in Indian Penal Code in various cases.
		CO4	Frame arguments on the basis of nature of offences, elements of offences along with various landmark case laws.
		CO5	List out the various issues in criminal law and frame research problem and apply empirical research method to reach conclusion with suggestions.
BBW 216	**Basics of Moot Court**	**CO1**	Able to appreciate the research, oratorical and articulation required by the lawyer.
		CO2	Be able to comprehend the practicability of the justice system and the role of the Court in dispensation of justice.
		CO3	Developed a knowledge and understanding of the basic principles and policies
		CO4	Developed the skills of written advocacy
		CO5	Developed the skills of oral advocacy
Semester-IV			
BBW 221	**Principles of Marketing**	**CO1**	Knowledge about the objectives and scope of marketing
		CO2	Understanding the marketing strategies.
		CO3	Knowledge about the pricing methods and how it is done.
		CO4	Understand the methods of determine motion fix.
		CO5	Knowledge about green marketing and its significance in the market.
BBW 222	**Business Environment**	**CO1**	Apply systems concepts and methodologies to analyse and understand interactions between social and economic environment.
		CO2	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
		CO3	Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.
		CO4	Understand the utility of natural and technological environmental.
		CO5	Analyse and able to understand the different types of demographical environment
BBW 223	**E-Commerce**	**CO1**	Understand the main activities of E-Commerce.
		CO2	Learn about the various components of E-Commerce.
		CO3	Overview of concept of online shopping.
		CO4	Models of Electronic market with the knowledge of

			instant messaging and Electronic Data Exchange.
		CO5	Have the knowledge of the different types of management information systems
BBW 224	**Constitutional Law – II**	**CO1**	To bring out the importance of the system of Governance and the role of the executive in the Indian Constitution.
		CO2	To understand the role of Supreme Court as a Court of Justice.
		CO3	To describe the composition of the Parliament and the members therein.
		CO4	To brief about the Centre-State financial relations and specific to GST.
		CO5	To give an overview about the role of Governments in entering into Contracts and the application of Doctrine of Pleasure.
BBW 225	**Criminal Law II (CrPC)**	**CO1**	Explain the scope and applicability of the Code
		CO2	Evaluate the role played by the functionaries of the government.
		CO3	Analyse the right the victims are entitled to and suggest appropriate remedies in case of breaches.
		CO4	Deal with the basic procedural aspects with regard to criminal law in action.
		CO5	Analyse the hierarchy of criminal courts.
BBW 226	**Family Law I (Hindu Law)**	**CO1**	Students should be able to identify and describe the various sources and schools of different personal laws.
		CO2	Students will be able to identify research areas, frame research questions and utilize the available on-line data basis.
		CO3	Students should be able to understand the core concepts of adoption laws and to analyze it from sociological perspective in the society.
		CO4	Students should be able to examine and analyse the concept of marriage and relate it to the changing nature of marriage and matrimonial remedies.
		CO5	This course aims to explore critical principles relating to contemporary issues and nurture within the students the ability to draft on family law matters.
Semester-V			
BBW 311	**Business Ethics**	**CO1**	endeavours to provide a background to ethics as a prelude to learn the skills of ethical decision-making and, then, to The course
		CO2	Apply business ethics skills to the real and current challenges of the information professions.
		CO3	Provide basic idea about corporate governance and its implications on society.
		CO4	Aims to know the legal system and also about the business ethics and its relevance.
		CO5	Analyse the issues related to the functioning of the corporate system as a mode of business organization

BBW 312	**Compensation Management**	**CO1**	Clarify the principles and basic concepts of compensation management in organizations.
		CO2	Explain the role of human resources management in dealing with employees, and methods used to provide compensation.
		CO3	Highlights the importance of maintaining the capable education qualification, the value of developing their skills, and the significance of providing the appropriate atmosphere for them.
		CO4	To familiarize students about concepts of performance and compensation management
		CO5	Understand the challenges faced for attracting, retaining and motivating employees to high performance
BBW 313	**Family law II (Muslim Law)**	**CO1**	Students should be able to identify and describe the various sources and schools of different personal laws.
		CO2	Students will be able to identify research areas, frame research questions and utilize the available on-line data basis.
		CO3	Students should be able to understand the core concepts of adoption laws and to analyze it from sociological perspective in the society.
		CO4	Students should be able to examine and analyze the concept of marriage and relate it to the changing nature of marriage and matrimonial remedies.
		CO5	To enable students to identify relevant legislations and case laws relating to family law.
BBW 314	**Jurisprudence**	**CO1**	Explain the differences between the different schools of jurisprudence concerning the nature of law.
		CO2	Identify the major and minor premises of legal arguments and analyze legal debates using appropriate rhetorical vocabulary
		CO3	Invent and defend arguments about the requirements of justice in legal disputes that reference and extend the themes of the course.
		CO4	Devise a correct way of handling the legal problem
		CO5	To provide students with an opportunity to think carefully about the values that ought to underpin a country's legal system.
BBW 315	**Civil Procedure Code and Law of Limitation**	**CO1**	Identify the jurisdiction of the civil court wherein a matter will lie.
		CO2	Use correct legal terminologies.
		CO3	Describe the rules of pleadings and apply them correctly.
		CO4	File execution proceedings in the civil courts.
		CO5	Apply the provisions of Limitation Act appropriately.
BBW 316	**Law of Property**	**CO1**	Identify and describe the scope and ambit of the property laws in India.
		CO2	To trace out and understand the theoretical foundation

			related to property.
		CO3	To analyze and understand the interpretation clauses along with the principles involved in the subject.
		CO4	To enlist the significant legal provisions relating to transfer of property.
		CO5	Analyze the relevant case laws pertaining to the concepts discussed.
Semester-VI			
BBW 321	**Business Policy and Strategy**	**CO1**	Acquaint the students with the nature, scope and dimensions of Business Policy.
		CO2	Knowledge about Strategy Management Process.
		CO3	Know about the approaches to the strategy management
		CO4	Understanding the concept of SWOT analysis.
		CO5	Know about the importance of value chain analysis
BBW 322	**Law of Evidence**	**CO1**	To understand and apply the rules of evidence.
		CO2	To learn associated trial and lawyering skills.
		CO3	To be able to synthesize the rules and use them in the context of a trial or other Proceedings
		CO4	To be able to apply the rules of evidence to a wide variety of fact situations
		CO5	To develop competent advocacy skills relating to evidence issues.
BBW 323	**Public International Law**	**CO1**	Critically analyse various theories of International Law and sources of International Law.
		CO2	Critically analyse and interpret various Articles in Vienna Convention on Law of Treaties.
		CO3	Find out various complex issues in the International sphere and apply International Law principles to study such problems.
		CO4	Analyse various pacific dispute settlement mechanisms.
		CO5	Critically analyse the role of International Court of Justice in settling the disputes between nations amicably.
BBW 324	**Law of Taxation**	**CO1**	Describe the basic concepts relating to Income Tax Act, 1961
		CO2	Explain different types of incomes, their taxability, expenses and deductibility
		CO3	Interpret the provisions and cases relating to tax laws
		CO4	Learn various direct tax and their implication in practical situations
		CO5	Enhancing the skills of interpretation and the application of the traditionally established principles of law in taxation
BBW 325	**English and Legal Language**	**CO1**	Communicate clearly and effectively using proper legal terminologies.
		CO2	Explain the meanings of Latin maxims, elucidate fundamental legal concepts and principles through

			them, as also use them in advocacy.
		CO3	Draft legal notice and pleadings.
		CO4	Use legal terms, distinguish their meanings in different contexts, and apply them in legal communication.
		CO5	Read and dissect, analytically, decisions of courts, while also culling out their facts and principles in order to establish what rule of law they (the judgements) stand for.
BBW 326	**Company Law**	**CO1**	Explain the process of formation of different kinds of companies and commencement of business.
		CO2	Describe the methods of giving security for repayment of loan or other liabilities of a company.
		CO3	Explain the legal issues in the administration and management of a registered company.
		CO4	Elucidate how winding up is done in a company.
		CO5	Introduced to the basic power and structure in a company and the law relating to appointment of directors, director's duty, and matters governing board meetings.
Semester-VII			
BBW 411	**Hindi**	**CO1**	Understanding the origin of Hindi language and its literature.
		CO2	Identifying the dialects of Hindi language family.
		CO3	Understanding the concept of history of literature.
		CO4	Understanding the importance and basis of the names given to each period of Hindi literature.
		CO5	Identifying the eminent Hindi writers of each period.
BBW 412	**Labour Law-I**	**CO1**	Explain the evaluation of industrial jurisprudence and the role played by yellow in this regard.
		CO2	Identify and appreciate the need for a law relating to resolution of industrial dispute in India
		CO3	Explain the paramount of standing orders and domestic enquiry which is guided by the principle of natural justice as an effective tool of insurance working as wellbeing and smooth functioning of industrial undertaking.
		CO4	Significance of trade union in the present-day society and the crucial role played in collective bargaining for maintaining industrial peace and well-being of the workmen.
		CO5	To acquaint the student with the conceptual and operational parameters of the various issues related to the industrial relation between employer and employee and its impact on the labour relation in India.
BBW 413	**Intellectual Property Law-I**	**CO1**	Identify the different forms of intellectual property and describe the importance of protection of IP.
		CO2	List out the criteria/essential requirements of IP

			protection, duration, rights conferred and remedies provided.
		CO3	Apply the principles of IP protection to legal problems correctly.
		CO4	Analyses the issues related to infringement of IPR.
		CO5	Evaluate as against other the international legal framework related to IP protection and articulate the problem areas for the deficiency.
BBW 414	**Human Rights Law**	**CO1**	Identify the fundamental philosophy and policies concerning human rights.
		CO2	Summarize the legal effects of international treaties and conventions on the national human rights jurisprudence.
		CO3	Relate to the on-going debates and current or future challenges concerning human rights.
		CO4	Critically analyze the Human rights protection mechanism, nationally and internationally concerning human rights.
		CO5	Formulate the role of state actors for the protection of human rights.
BBW 415	**Alternative Dispute Resolution**	**CO1**	Analyse various legal frameworks on arbitration, mediation, conciliation and negotiation.
		CO2	Understand and analyse the international legal framework on arbitration and conciliation.
		CO3	Learn the process of arbitration, mediation and conciliation and its practical applicability.
		CO4	Learn the skills how to do arbitration, mediation and conciliation in different type of matters.
		CO5	To understand the Indian legal framework related to arbitration, mediation, conciliation and negotiation.
BBW 416	**Drafting, Pleading and Conveyancing**	**CO1**	Draft the legal deeds/documents/pleadings flawlessly.
		CO2	Appreciate the abstract concepts and put forth an effective argument.
		CO3	Identify the issues involved, collect appropriate evidence, get true and correct information.
		CO4	Draft the legal deeds and documents with precision by following the appropriate legal format
		CO5	Scrutinize the legal documents and deeds.
Semester- VIII			
BBW 421	**Labour Law – II**	**CO1**	Have a nice the undercurrent of the social security constitutional provisions and development at the international level.
		CO2	Behind the constitutional and statutory provisions relating to minimum wages.
		CO3	Apply the legal provisions in the contemporary debate on employee provident fund and workers vulnerability in India.
		CO4	Provisions relating to the compensation for industrial accident for answering problem-based question are especially concerning the time any place.

		CO5	Provisions relating to the compensation for industrial accident for answering problem-based question are especially concerning the time any place.
BBW 422	**Intellectual Property Law-II**	**CO1**	Apply the provisions of Information Technology Act
		CO2	Identify the need for regulation of Information technology and various regulatory models
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology.
		CO4	Analyses the laws related to Intellectual Property Right and Technology Law
		CO5	List out the legal challenges of the information society and the different forms of cybercrimes.
BBW 423	**U.P. Land Laws**	**CO1**	Analyze the Zamindari and Land reform Act in the State of Uttar Pradesh.
		CO2	Apply the rule of succession for female.
		CO3	Understand the rule of ejectment for tenant holder and bhumidhar.
		CO4	Know the authorities under Land Revenue Act and apply the procedure of collecting Land Revenue
		CO5	To understand the concept of ejectment, mutation, and lease.
BBW 424	**Interpretation of Statutes**	**CO1**	Demonstrate an understanding of the principles and process of statutory interpretation
		CO2	Formulation and development of arguments in support or against given interpretations
		CO3	Compare, contrast and reflect on theoretical concepts underlying the interpretation
		CO4	Apply a range of legal principles and methods to interpret legal instruments
		CO5	To ascertain the principles, presumptions and canons of construction and to learn their method of operation in varied case laws and interpretation of statutes.
BBW 425	**Information Technology Law**	**CO1**	Apply the provisions of Information Technology Act
		CO2	Identify the need for regulation of Information technology and various regulatory models
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology.
		CO4	Analyses the laws related to Intellectual Property Right and Technology Law
		CO5	List out the legal challenges of the information society and the different forms of cybercrimes.
BBW 426	**Professional Ethics and Professional Accounting System**	**CO1**	Conduct themselves according to the ethical rules that guide advocate's practice.
		CO2	Designed to be taught with the assistance of practitioners, it will impart the students their role and responsibilities as professionals.
		CO3	Critically analyse the ethical rules and law of contempt of the court.

		CO4	Students will be able to identify ethical issues and dilemmas in realistic scenario as to propose well reason and articulated resolution to do issues and dilemmas.
		CO5	Understand the relation of Law with accounting
Semester-IX			
BBW 511	**Environmental Law**	**CO1**	Explain the constitutional foundation of environmental law
		CO2	Apply the principles of sustainable development in environmental law.
		CO3	Analyse the issues related to environmental conservation and biodiversity before the green tribunal.
		CO4	Apply the National Green Tribunal Act, 2010 and approach NGT where there is environmental matters
		CO5	Knowing about importance of public participation through Right to information, Public Interest Litigation and other remedies in preserving and protecting environment.
BBW 512	**Administrative Law**	**CO1**	Explain the differences between the different schools of jurisprudence concerning the nature of law.
		CO2	Identify the major and minor premises of legal arguments and analyse legal debates using appropriate rhetorical vocabulary
		CO3	Invent and defend arguments about the requirements of justice in legal disputes that reference and extend the themes of the course.
		CO4	Devise a correct way of handling the legal problem
		CO5	To give students an opportunity to think carefully about the values that ought to underpin a country's legal system.
Elective Groups (Choose any one group from the following)			
Group-I (Constitutional Law Group)			
BBW 513	**Indian Federalism**	**CO1**	Discuss the different forms of government and explain the features and the distinction between them.
		CO2	Trace the historical background of federalism in India and nature of Indian federalism.
		CO3	To discuss the Legislative relations, Administrative and financial relations between the Centre and the States.
		CO4	To understand the principles of interpretation of lists.
		CO5	To explain and discuss the freedom of inter-state trade and commerce & Services under the Union and the States.
BBW 514	**Comparative Constitution**	**CO1**	Explain the significance of comparative constitutional law study.
		CO2	Compare and evaluate the Indian constitutional law with three major constitutional democracies.
		CO3	Compare the working of the judiciary and judicial process in India with three major democracies.

		CO4	Explain and compare the law making process in India.
		CO5	Analyse the constitutional foundation of functioning of the government in major democracies and Demonstrate an understanding of the growth of the concept of 'Right' across democracies.
BBW 515	**Gender Justice and Feminine Jurisprudence**	**CO1**	Equipped to need and importance of gender justice and feminist jurisprudence in the current world context.
		CO2	Able appreciate the evolution of the Indian Women's Movement and understand the importance of Feminism in an Indian context.
		CO3	Able understand the role of the State in the Feminist's goal of achieving social, political and economic equality, social and moral connotations of law and sexuality and the feminist views on it.
		CO4	Enables the students to understand the evolution of Feminism and appreciate the difference in approach between the two schools.
		CO5	Able to analyse the nitty-gritty of the Sameness and Difference approach taken by the different schools of Feminism.
Group-II (Criminal Law Group)			
BBW 516	**Criminal Sociology**	**CO1**	Acquire a broad understanding of the theoretical and empirical approaches taken to understand the relationship between criminal behaviour and social, cultural, and institutional forces.
		CO2	Participating in in-depth weekly discussions of assigned readings
		CO3	Identify significant new research questions related to the study of crime in society. Several methods will be used in this class to measure achievement of these objectives:
		CO4	Critically analyse the conceptual and empirical underpinning of research on the above topics.
		CO5	Learn about the current state of knowledge regarding social variation crime and reactions to crime and the social consequences of this variation
BBW 517	**Criminal Psychology**	**CO1**	Understand the complex and complicated interaction between nature and nurture that leads to criminal behaviour.
		CO2	Be able to apply a variety of explanations and theoretical perspectives on developmental and social factors as key foundations for understanding and explaining criminality.
		CO3	Understand the complex and complicated interaction between nature and nurture that leads to criminal behaviour.
		CO4	Be able to describe and identify the overall relationship between mental disorders, behavioural disorders and criminal conduct.

		CO5	Be able to reflect upon and think critically about standard explanations of criminal behaviour provided in the media.
BBW 518	**History and Principles of Criminal Law**	**CO1**	Identify the elements of each and every offence along with their respective punishment mentioned in the Indian Penal Code.
		CO2	Knowledge about different types of punishment.
		CO3	Explain the Evolution of Indian Penal Code over the period of time from its enactment along with major amendments.
		CO4	Apply the principles discussed in Indian Penal Code in various cases.
		CO5	List out the various issues in criminal law and frame research problem and apply empirical research method to reach conclusion with suggestions.
Group 3 – Business Law Group			
BBW 519	**Banking and Insurance Law**	**CO1**	Explain the basic principles of insurance law and banking laws.
		CO2	Demonstrate knowledge of insurance contracts and provisions, and law relating to life, health, fire, marine and other types of insurance.
		CO3	Apply the operation of insurance law in a practical context
		CO4	The course largely focuses on the fundamental principles which govern the law of insurance and law of banking.
		CO5	Understanding the theories on which insurance depends upon.
BBW 520	**Financial Market Regulation**	**CO1**	Introducing the principles and concepts of marketing.
		CO2	Relating the concepts to day to day applications and practices in marketing.
		CO3	Examining the environmental factors that shape an organisation's activities.
		CO4	To familiarize with the activities of segmenting, targeting and positioning.
		CO5	To have an efficient marketing team with accurate implementation.
BBW 521	**Competition Law**	**CO1**	On the competition of this course the students will have clarity about evolution, object and functions of Competition law.
		CO2	The students will have clarity about the types of anti-competitive agreements and testing its validity; the practices covered by abuse of dominant position; practices in connection with combinations.
		CO3	The students will be familiarised with an understanding about the role of the CCI.
		CO4	Students will have a clear understanding about the conflicting issues regarding the IPR and competition laws, the investment issues under the competition laws and also the different modern dimensions of

			competition law.
		CO5	Understand the study of developments of the policy of free and fair competition in India.
Semester-X			
Elective Groups (Choose any one group from the following)			
Elective Group 1 – Constitutional Law			
BBW 522	**Judicial Process and Judicial Review**	**CO1**	Explain the significance of Judicial Review and Judicial Process.
		CO2	Understand the Indian constitutional law and its implementation through the courts of law.
		CO3	Compare the working of the judiciary and judicial process in India with three major constitutional democracies;
		CO4	Analyze the concept of Dharma and relation of law with the society
		CO5	Demonstrate an understanding of the growth justice.
BBW 523	**Right to Information**	**CO1**	Understanding the history about the Right to Information
		CO2	Knowledge about which offices comes under the preview of right to information.
		CO3	Know about the process how to file RTI.
		CO4	Different cases of RTI which has exposed the government failure.
		CO5	Analyse the importance of RTI in India .
BBW 524	**Health Law**	**CO1**	Understand the basics of medical jurisprudence related to health laws.
		CO2	Knowledge about the consumer protection in Health Laws
		CO3	Analyse the different types of Health Laws and their importance
		CO4	Analyse how medical insurance is granted in case of health Law related subjects.
		CO5	Discuss the Contemporary challenges in health law
BBW 525	**Media & Law**	**CO1**	Basic understating of the evolution and existence of various facets of media.
		CO2	Analyse the legal nitty-gritty of media and how their activities can result in a breach of privacy in its various hues.
		CO3	Equipped to appreciate the philosophical justification for the protection of free speech right.
		CO4	Enable the students to understand the fundamental aspects of protection of reputation.
		CO5	Understand the requisite conceptual as well as statutory provisions pertaining to media, ethics and adjudication
BBW 526	**Air & Space Law**	**CO1**	To appreciate the philosophical justification for the protection of free speech right.
		CO2	To enable the students to understand the fundamental aspects of protection of reputation, to analyze the

			legal nitty-gritty of media and how their activities can result in a breach of privacy in its various hues.
		CO3	To make the students understand the requisite conceptual as well as statutory provisions pertaining to media, ethics and adjudication.
		CO4	To provide basic understating of the evolution and existence of various facets of media and the legal regime in place to regulate its content and matters incidental to it.
		CO5	To provide a basic understanding of the legal regime governing outer.
Elective Group 2 – Criminal Law Group			
BBW 527	**Criminology and Penology**	**CO1**	The scientific study of criminology and concept of law relating to it and concept of law relating to it. Apart from these general principles in Criminology equally important place of criminal law in criminal science, nature and functions of criminal law.
		CO2	The behaviour of the juveniles involved in crimes for and the law which govern them in a better manner.
		CO3	The clarity about logical structure of crime prevention and its implementation with judicial pronouncements.
		CO4	The administration of criminal justice system in India with critical analysis of legislative provisions along with its practical implementation.
		CO5	The importance of the victim for an investigation and why they are important in the overall scheme of the crime. The reasons for slow development of victim scheme since its inception from 2010 in the Criminal Procedure Code-1973.
BBW 528	**Forensic Sciences and Law**	**CO1**	Get the idea of the origin of the concept of forensic sciences and how these techniques are being used for the evidences across various courts in India.
		CO2	Know about the various forensic tools available for forensic investigation and how these techniques are used in the criminal investigation. It will also contain case studies as to how these investigations are carried out by the Police and Forensic investigators.
		CO3	Able to relate the various forensic techniques used in crime scene investigation, how the samples are collected and how these tools and techniques of forensic science has helped in solving high profile cases.
		CO4	Know about the various techniques of interrogation used by the forensic experts as traditional third degree methods are old school and how the new techniques are being used for resolving disputes.
		CO5	Able to appreciate the tools which had been used by the doctors for medicinal purposes can be also used in the Investigations of the crimes and how this particular branch of forensic law has been an

			important instrument in dealing with various crime investigations.
BBW 529	**International Criminal Law**	**CO1**	Have a clear understanding of the development of and importance of international criminal.
		CO2	Able to theoretically perceive the evolution and development of the concept of individual criminal responsible
		CO3	Able to identify the sources of international criminal law.
		CO4	Able to enumerate and describe in detail the defences to liability under international criminal law
		CO5	Have comprehensive understanding of the crimes of Genocide, Crimes against humanity, War crimes and aggression and The student will have an understanding of the procedures of the ICC
BBW 530	**IT Offences**	**CO1**	Apply the provisions of Information Technology Act.
		CO2	Identify the need for regulation of Information technology and various regulatory models.
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology
		CO4	Analyses the laws related to Cyber offences under various laws
		CO5	List out the legal challenges of the information society and the different forms of cyber crimes
BBW 531	**Comparative Criminal Procedure**	**CO1**	Understand the organisation of Court and Prosecuting agencies in different countries.
		CO2	Analyse the difference in trial and pre-trial process in India and other countries.
		CO3	Able to understand the accusatory system of trial and the inquisitorial system of trial.
		CO4	Able to understand the role of Indian court in Correctional Programme.
		CO5	Able to understand the how and when to file Public Interest Litigation application
Elective Group 3 – Business Law Group			
BBW 532	**Insurance Law**	**CO1**	Understand the basics of insurance
		CO2	Analyse the theories of insurance and principle of insurance.
		CO3	Able to understand the accusatory system of trial and the inquisitorial system of trial.
		CO4	Able to understand the Function and Powers of Insurance Regulatory and Development Authority.
		CO5	Able to understand different types of insurance.
BBW 533	**Corporate Governance**	**CO1**	Identify the salient features of corporate governance mechanism.
		CO2	List out the important aspects with regard to auditors and other statutory compliances that companies have to follow.
		CO3	Apply various legal and regulatory restrictions and

			obligations vis-à-vis the Board and the individual directors.
		CO4	Analyse the issues related to the functioning of the corporate system as a mode of business organization.
		CO5	Evaluate as against other the OECD principles.
BBW 534	**Merger and Acquisition**	**CO1**	Basics about the merger and acquisition
		CO2	Knowledge about the different types of merger and acquisition
		CO3	Analyse the role of different persons of company in merger and acquisition.
		CO4	Analyse how customer can be benefited from merger of one company to another.
		CO5	Case Study of Vodafone Idea merger and its benefit
BBW 535	**Investment Law**	**CO1**	Apply the provisions of Information Technology Act
		CO2	Identify the need for regulation of Information technology and various regulatory models
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology.
		CO4	Analyses the laws related to Intellectual Property Right and Technology Law
		CO5	List out the legal challenges of the information society and the different forms of cybercrimes.
BBW 536	**International Trade Law**	**CO1**	Know about the origin and Evolution of GAATs and WTO
		CO2	Know about the principle of non-discrimination in GAATs and WTO
		CO3	Knowledge about the dispute settlement process of WTO and GAATs
		CO4	Knowledge about Agreement on dumping and anti-dumping duties.
		CO5	Knowledge about the Significance of international trade law

B.Com.LL.B. (Honours)

Programme Objectives:

1. Demonstrate the analytical skills and widen the understanding of macro environmental issues by applying the knowledge of macroeconomic policies and their impact on business organization and strategy. (Analytical Skills)
2. Understand the political, economic, legal, technological, social and international environment with focus on their impact on business. (Significance of Multiple Disciplines in Law)
3. Appreciate the business environment prevailing in India and in the world, and understand its implications on the business. (Business Understanding)
4. Appreciate and evaluate how the law affects and is affected by individuals, organizations, markets, societies and other disciplines. (Inter-disciplinary Understanding)
5. Apply business communication strategies and principles for effective communication in domestic and international business situations. (Communication Skills)
6. Demonstrate the ability to initiate an own start-up and effectively manage their business. (Practical Application)
7. Ability to pursue higher studies in law, commerce, management or any other related field. (Higher Education)
8. Demonstrate the grasp over finer nuances of law, which will ultimately assist in interpreting the rules, regulations, laws and byelaws. (Interpretative Skills)
9. Apply the experiential learning lessons and excel in their chosen area of profession. (Experiential Learning)
10. Demonstrate the soft-skills in becoming industry-ready and thereby, gain decisive edge over their counterparts amidst the cutthroat competition. (Soft-Skills)

Program Specific Outcomes (PSOs):

1. Will understand the background in fundamental areas of Business/Organisation and its relationship with Law.
2. Will be equipped with the breadth, expertise and a foundation for professional practice.
3. Will gain in-depth knowledge and understanding of: the principles, concepts, values, substantive rules and development of the Indian legal system and core areas of commercial law.
4. Will develop intellectual rigour as well as more general transferable intellectual skills, which are of value in the practice of law and wide range of careers.
5. Will be equipped with self-confidence, knowledge, understanding and skills that will provide added benefit to excel in legal profession and to become a responsible member of the society.
6. Will be prepared to exhibit in depth knowledge of law in a variety of legal & business contexts.
7. Will be able to appreciate the role of law in managerial practice and display their ability to deal with different types of legal issues in a business set-up.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
BCW 111	**English-I**	**CO1**	Understand the essentials of effective oral communication and power point presentation skills and do it in a more professional way.
		CO2	Apply analytical and critical thinking skills while reading long passages.
		CO3	Writing answers to questions in a systematic way.
		CO4	Contribute creative thoughts and ideas on issues evolving through readings in class.
		CO5	Construct meaningful paragraphs adhering to the rules of grammar.
BCW 112	**Financial Accounting**	**CO1**	Introduce the basic theory, concepts and practice of financial accounting. And
		CO2	To enable students to understand information contained in the published financial statements of companies and other organizations.
		CO3	It includes the preparation of accounting statements, but their uses and limitations will also be emphasized.
		CO4	Recognize circumstances providing for increased exposure to fraud and define preventative internal control measures
		CO5	Utilize the technology (such as computers, information databases) in facilitating and enhancing accounting and financial reporting processes.
BCW 113	**Management Principles & Applications**	**CO1**	Provide fundamental knowledge & exposure to the concepts, theories & practices in the field of management.
		CO2	Investigates the way that managers get things done in an organization relying on the dynamic processes of strategic planning.
		CO3	Study the business development, budgeting and operations to know about the organizations.
		CO4	Identify the key contributors and their contributions in the development of management thought.
		CO5	Learn different type of communication process.
BCW 114	**Microeconomics**	**CO1**	To acquaint the students with the concepts of microeconomics dealing with consumer behaviour.
		CO2	Understand the supply side of the market through the production and cost behavior affirms.
		CO3	Understand the pricing and output decisions under various market structure.

		CO4	Understand the demand and supply analysis in business application
		CO5	Interpreting the meaning of the information emerging from the organization
BCW 115	**Legal Method**	**CO1**	Learning where and how to find the law is as important as the substantive study of various laws.
		CO2	Understand the meaning of research and the steps involved in legal research.
		CO3	They will also apply some basic statistical methods to analyse data.
		CO4	The understanding of facts is critical to the process of identifying favourable precedents and distinguishing the case at hand from other authoritative rulings, which are not in direct support of one's proposition.
		CO5	Describe different sources of law and their relationship inter se
BCW 116	**Law of Torts Including M. V. Act & Consumer Protection Laws**	**CO1**	Understand the constituents of tort and general principles
		CO2	Provide an in-depth clarity about various defences available against tortious liability
		CO3	Enhance the clarity in understanding the concept of locus standi for actions in tort
		CO4	Acquaint with principle of tortious liability for torts committed by others, principle of respondent superior, and the principles of unintentional tort of negligence.
		CO5	Understand the fundamental notions of consumerism, rights of consumers, and dispute resolution mechanism on the one hand, and the relevance of the MV Act on the other.
Semester II			
BCW 121	**English II**	**CO1**	Apply the rules of punctuation correctly, while writing.
		CO2	Draft letters, write essays and Research papers (at a very basic level), adhering to the rules of academic writing.
		CO3	Apply the rules of grammar, while constructing sentences and paragraphs.
		CO4	Communicate orally in a more effective way and do power point presentations in a professional way.
		CO5	Apply analytical and critical thinking skills while reading long passages
BCW 122	**Business Communication**	**CO1**	Enable the students become aware of the importance of business communication.
		CO2	Enable to do mastery in communication skills in order to successfully function in their day-to-day work
		CO3	Build up their self-confidence by giving them a true

			picture of themselves as well as of their organization
		CO4	Learn to project the image in business firm according to their understandings
		CO5	Express themselves effectively in routine and special real-world business interactions
BCW 123	**Cost Accounting**	**CO1**	To acquaint the students with the basic concepts used in cost accounting
		CO2	Learn the concept of revenue, loss, cost and expense
		CO3	Knowledge of management accounting its various methods involved in cost ascertainment and
		CO4	Knowledge of cost accounting and book keeping systems.
		CO5	Explains main manufacturing cost elements
BCW 124	**Business Statistics**	**CO1**	Describe basic concepts of business statistics.
		CO2	Interpret various measures of central tendency, Measures of Dispersion, Correlation and Regression analysis in decision making.
		CO3	To examine the trend analysis with different methods of time series analysis.
		CO4	Knowledge about the basic statistical tools used for managerial decision-making.
BCW 125	**Law of Contract-I**	**CO1**	To explain basic concepts of probability and perform probability theoretical distributions.
		CO2	How Contracts are made legally.
		CO3	Practical applicability of law in day to day dealings related to legal relationships.
		CO4	How contracts are performed and discharged
		CO5	When and how specific relief can be claimed in case of breach of contract.
BCW 126	**Legal History**	**CO1**	Outlines the modes of winding up of company and distribution of assets in the event of winding up.
		CO2	Discusses the constitutional history along with the history of the general legal system.
		CO3	Knowledge about the historical developments that led to the enactment of the constitution.
		CO4	Analyse the British periods (1600-1947) and able to understand how laws were made and what paved the way for modern day legislations in India.
		CO5	Knowledge about the emergence of British Legislative system and growth of formalized court system in India.
Semester-III			
BCW 211	**Human Resource Management**	**CO1**	Knowledge about the importance of human resources management in an organisation.
		CO2	Understand the concept of recruitment, selection, training and various theories of wages.
		CO3	Scope of human resource management.
		CO4	Learn the qualities of human resource manager in an

			organization.
		CO5	Understanding the difference between on the job training and of the job training.
BCW 212	**Computer Applications in Business**	**CO1**	Discussing computer terminology, hardware, software, operating systems, and information systems relating to the business environment will be covered.
		CO2	Business applications of software, including word processing, spreadsheets, databases, presentation graphics, and business-oriented utilization of the Internet.
		CO3	Laboratory experience includes word processing, spreadsheets, presentation software and databases.
		CO4	Explore various methods that Information Technology can be used to support existing businesses and strategies
		CO5	Work with simple design and development tasks for the main types of business information systems
BCW 213	**Law of Contract-II**	**CO1**	Developing understanding about the special contracts should initiate the students to different kinds of contracts with emphasis on the intricacies therein.
		CO2	Understanding about the essential elements of this special contract.
		CO3	Understanding standing about the Bailment and Pledge discussing the elements of bailment contract
		CO4	Developing understanding about the Partnership Law giving an overview of Partnership Act and Limited Liability Partnership Act
		CO5	Understanding about the Sale of Goods Act is discussed covering essential elements of a contract of sale of goods how contracts are performed and discharged
BCW 214	**Constitutional law-I**	**CO1**	Basics of Constitutional Law and the salient features of the Constitution of India.
		CO2	Familiarized with the leading case laws and legislative changes to the provisions of the Constitution
		CO3	Learn the diverse principles of judicial interpretation that constructs notions of State, law and law in force
		CO4	Understand the nature and scope the rights to freedom, life, and personal liberty, due process.
		CO5	Learn the applicability of the directive principles of state policy.
BCW 215	**Law of Crimes (I.P.C.)**	**CO1**	Identify the elements of each and every offence along with their respective punishment mentioned in the Indian Penal Code.
		CO2	Explain the Evolution of Indian Penal Code over the period of time from its enactment along with major

			amendments.
		CO3	Apply the principles discussed in Indian Penal Code in various cases.
		CO4	Frame arguments on the basis of nature of offences, elements of offences along with various landmark case laws.
		CO5	List out the various issues in criminal law and frame research problem and apply empirical research method to reach conclusion with suggestions.
BCW 216	**Basics of Moot Court**	**CO1**	Able to appreciate the research, oratorical and articulation required by the lawyer.
		CO2	Be able to comprehend the practicability of the justice system and the role of the Court in dispensation of justice.
		CO3	Developed a knowledge and understanding of the basic principles and policies
		CO4	Developed the skills of written advocacy
		CO5	Developed the skills of oral advocacy
Semester-IV			
BCW 221	**Indian Economy**	**CO1**	Develop ideas of the basic characteristics of Indian economy, its potential on natural resources.
		CO2	Understand the importance, causes and impact of population growth and its distribution, translate and relate them with economic development
		CO3	Grasp the importance of planning undertaken by the government of India, have knowledge on the various objectives, failures and achievements as the foundation of the ongoing planning and economic reforms taken by the government.
		CO4	Understand agriculture as the foundation of economic growth and development, analyse the progress and changing nature of agricultural sector and its contribution to the economy as a whole
		CO5	Not only be aware of the economy as a whole, they would understand the basic features of Mizoram's economy, sources of revenue, how the state government finance its programmes and projects.
BCW 222	**GST and Custom Laws**	**CO1**	Student will be equipped with the knowledge of basic concepts of goods and service tax, CGST, SGCT, IGST, classification of goods and valuation rules..
		CO2	Student will learn the basic procedures under GST incorporating the registration, filing of returns and payment of tax.
		CO3	Student will be equipped with the knowledge of composition scheme under GST, Exemptions under GST, concept of supply of goods, nature of supply.
		CO4	Students will also learn about the customs law, valuation and baggage rules.
		CO5	Prepare production cost statement and cost of goods sold statement.

BCW 223	**E-Commerce**	**CO1**	Understand the main activities of E-Commerce.
		CO2	Learn about the various components of E-Commerce.
		CO3	Overview of concept of online shopping.
		CO4	Models of Electronic market with the knowledge of instant messaging and Electronic Data Exchange.
		CO5	Have the knowledge of the different types of management information systems
BCW 224	**Constitutional Law – II**	**CO1**	To bring out the importance of the system of Governance and the role of the executive in the Indian Constitution.
		CO2	To understand the role of Supreme Court as a Court of Justice.
		CO3	To describe the composition of the Parliament and the members therein.
		CO4	To brief about the Centre-State financial relations and specific to GST.
		CO5	To give an overview about the role of Governments in entering into Contracts and the application of Doctrine of Pleasure.
BCW 225	**Criminal Law II (CrPC)**	**CO1**	Explain the scope and applicability of the Code
		CO2	Evaluate the role played by the functionaries of the government.
		CO3	Analyse the right the victims are entitled to and suggest appropriate remedies in case of breaches.
		CO4	Deal with the basic procedural aspects with regard to criminal law in action.
		CO5	Analyse the hierarchy of criminal courts.
BCW 226	**Family Law I (Hindu Law)**	**CO1**	Students should be able to identify and describe the various sources and schools of different personal laws.
		CO2	Students will be able to identify research areas, frame research questions and utilize the available on-line data basis.
		CO3	Students should be able to understand the core concepts of adoption laws and to analyze it from sociological perspective in the society.
		CO4	Students should be able to examine and analyse the concept of marriage and relate it to the changing nature of marriage and matrimonial remedies.
		CO5	This course aims to explore critical principles relating to contemporary issues and nurture within the students the ability to draft on family law matters.
Semester-V			
BCW 311	**Fundamentals of Financial Management**	**CO1**	Students who complete this course will be able understand the use of finance for decision making
		CO2	By the end of the course students will able to describe time value of money, how a project is made and appraised.
		CO3	Students of the course will able to differentiate between the various sources of finance and their pros

			& cons.
		CO4	Students who complete this course will be able to outline capital requirements for starting a business & management of working capital.
		CO5	Students of the course will able to recommend whether and why an investment should be accepted or rejected.
BCW 312	**Corporate Tax Planning**	**CO1**	Students who complete this course will be able identify the difference between tax evasion and tax planning.
		CO2	By the end of the course students will able to describe how the provisions in the corporate tax laws can be used for tax planning.
		CO3	Students of the course will able to explain different types of incomes and their taxability and expenses and their deductibility.
		CO4	Students who complete this course will be able to outline the corporate tax laws.
		CO5	Students of the course will able to state the use of deductions of expenses to reduce the taxable income.
BCW 313	**Family law II (Muslim Law)**	**CO1**	Students should be able to identify and describe the various sources and schools of different personal laws.
		CO2	Students will be able to identify research areas, frame research questions and utilize the available on-line data basis.
		CO3	Students should be able to understand the core concepts of adoption laws and to analyze it from sociological perspective in the society.
		CO4	Students should be able to examine and analyze the concept of marriage and relate it to the changing nature of marriage and matrimonial remedies.
		CO5	To enable students to identify relevant legislations and case laws relating to family law.
BCW 314	**Jurisprudence**	**CO1**	Explain the differences between the different schools of jurisprudence concerning the nature of law.
		CO2	Identify the major and minor premises of legal arguments and analyze legal debates using appropriate rhetorical vocabulary
		CO3	Invent and defend arguments about the requirements of justice in legal disputes that reference and extend the themes of the course.
		CO4	Devise a correct way of handling the legal problem
		CO5	To provide students with an opportunity to think carefully about the values that ought to underpin a country's legal system.
BCW 315	**Civil Procedure Code and Law of Limitation**	**CO1**	Identify the jurisdiction of the civil court wherein a matter will lie.
		CO2	Use correct legal terminologies.
		CO3	Describe the rules of pleadings and apply them

			correctly.
		CO4	File execution proceedings in the civil courts.
		CO5	Apply the provisions of Limitation Act appropriately.
BCW 316	**Law of Property**	**CO1**	Identify and describe the scope and ambit of the property laws in India.
		CO2	To trace out and understand the theoretical foundation related to property.
		CO3	To analyze and understand the interpretation clauses along with the principles involved in the subject.
		CO4	To enlist the significant legal provisions relating to transfer of property.
		CO5	Analyze the relevant case laws pertaining to the concepts discussed.
Semester-VI			
BCW 321	**Income – Tax Practices**	**CO1**	To understand business and its role in society
		CO2	To understand Business ethics and CSR
		CO3	To comprehend the business environment and various dimensions
		CO4	To familiarise Technology integration in business
		CO5	To introduce the importance and fundamentals of business research
BCW 322	**Law of Evidence**	**CO1**	To understand and apply the rules of evidence.
		CO2	To learn associated trial and lawyering skills.
		CO3	To be able to synthesize the rules and use them in the context of a trial or other Proceedings
		CO4	To be able to apply the rules of evidence to a wide variety of fact situations
		CO5	To develop competent advocacy skills relating to evidence issues.
BCW 323	**Public International Law**	**CO1**	Critically analyse various theories of International Law and sources of International Law.
		CO2	Critically analyse and interpret various Articles in Vienna Convention on Law of Treaties.
		CO3	Find out various complex issues in the International sphere and apply International Law principles to study such problems.
		CO4	Analyse various pacific dispute settlement mechanisms.
		CO5	Critically analyse the role of International Court of Justice in settling the disputes between nations amicably.
BCW 324	**Law of Taxation**	**CO1**	Describe the basic concepts relating to Income Tax Act, 1961
		CO2	Explain different types of incomes, their taxability, expenses and deductibility
		CO3	Interpret the provisions and cases relating to tax laws
		CO4	Learn various direct tax and their implication in practical situations
		CO5	Enhancing the skills of interpretation and the

			application of the traditionally established principles of law in taxation
BCW 325	**English and Legal Language**	**CO1**	Communicate clearly and effectively using proper legal terminologies.
		CO2	Explain the meanings of Latin maxims, elucidate fundamental legal concepts and principles through them, as also use them in advocacy.
		CO3	Draft legal notice and pleadings.
		CO4	Use legal terms, distinguish their meanings in different contexts, and apply them in legal communication.
		CO5	Read and dissect, analytically, decisions of courts, while also culling out their facts and principles in order to establish what rule of law they (the judgements) stand for.
BCW 326	**Company Law**	**CO1**	Explain the process of formation of different kinds of companies and commencement of business.
		CO2	Describe the methods of giving security for repayment of loan or other liabilities of a company.
		CO3	Explain the legal issues in the administration and management of a registered company.
		CO4	Elucidate how winding up is done in a company.
		CO5	Introduced to the basic power and structure in a company and the law relating to appointment of directors, director's duty, and matters governing board meetings.
Semester-VII			
BCW 411	**Hindi**	**CO1**	Understanding the origin of Hindi language and its literature.
		CO2	Identifying the dialects of Hindi language family.
		CO3	Understanding the concept of history of literature.
		CO4	Understanding the importance and basis of the names given to each period of Hindi literature.
		CO5	Identifying the eminent Hindi writers of each period.
BCW 412	**Labour Law-I**	**CO1**	Explain the evaluation of industrial jurisprudence and the role played by yellow in this regard.
		CO2	Identify and appreciate the need for a law relating to resolution of industrial dispute in India
		CO3	Explain the paramount of standing orders and domestic enquiry which is guided by the principle of natural justice as an effective tool of insurance working as wellbeing and smooth functioning of industrial undertaking.
		CO4	Significance of trade union in the present-day society and the crucial role played in collective bargaining for maintaining industrial peace and well-being of the workmen.
		CO5	To acquaint the student with the conceptual and operational parameters of the various issues related to the industrial relation between employer and

			employee and its impact on the labour relation in India.
BCW 413	**Intellectual Property Law-I**	**CO1**	Identify the different forms of intellectual property and describe the importance of protection of IP.
		CO2	List out the criteria/essential requirements of IP protection, duration, rights conferred and remedies provided.
		CO3	Apply the principles of IP protection to legal problems correctly.
		CO4	Analyses the issues related to infringement of IPR.
		CO5	Evaluate as against other the international legal framework related to IP protection and articulate the problem areas for the deficiency.
BCW 414	**Human Rights Law**	**CO1**	Identify the fundamental philosophy and policies concerning human rights.
		CO2	Summarize the legal effects of international treaties and conventions on the national human rights jurisprudence.
		CO3	Relate to the on-going debates and current or future challenges concerning human rights.
		CO4	Critically analyze the Human rights protection mechanism, nationally and internationally concerning human rights.
		CO5	Formulate the role of state actors for the protection of human rights.
BCW 415	**Alternative Dispute Resolution**	**CO1**	Analyse various legal frameworks on arbitration, mediation, conciliation and negotiation.
		CO2	Understand and analyse the international legal framework on arbitration and conciliation.
		CO3	Learn the process of arbitration, mediation and conciliation and its practical applicability.
		CO4	Learn the skills how to do arbitration, mediation and conciliation in different type of matters.
		CO5	To understand the Indian legal framework related to arbitration, mediation, conciliation and negotiation.
BCW 416	**Drafting, Pleading and Conveyancing**	**CO1**	Draft the legal deeds/documents/pleadings flawlessly.
		CO2	Appreciate the abstract concepts and put forth an effective argument.
		CO3	Identify the issues involved, collect appropriate evidence, get true and correct information.
		CO4	Draft the legal deeds and documents with precision by following the appropriate legal format
		CO5	Scrutinize the legal documents and deeds.
Semester- VIII			
BCW 421	**Labour Law – II**	**CO1**	Have a nice the undercurrent of the social security constitutional provisions and development at the international level.
		CO2	Behind the constitutional and statutory provisions relating to minimum wages.
		CO3	Apply the legal provisions in the contemporary debate

			on employee provident fund and workers vulnerability in India.
		CO4	Provisions relating to the compensation for industrial accident for answering problem-based question are especially concerning the time any place.
		CO5	Provisions relating to the compensation for industrial accident for answering problem-based question are especially concerning the time any place.
BCW 422	**Intellectual Property Law-II**	**CO1**	Apply the provisions of Information Technology Act
		CO2	Identify the need for regulation of Information technology and various regulatory models
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology.
		CO4	Analyses the laws related to Intellectual Property Right and Technology Law
		CO5	List out the legal challenges of the information society and the different forms of cybercrimes.
BCW 423	**U.P. Land Laws**	**CO1**	Analyze the Zamindari and Land reform Act in the State of Uttar Pradesh.
		CO2	Apply the rule of succession for female.
		CO3	Understand the rule of ejectment for tenant holder and bhumidhar.
		CO4	Know the authorities under Land Revenue Act and apply the procedure of collecting Land Revenue
		CO5	To understand the concept of ejectment, mutation, and lease.
BCW 424	**Interpretation of Statutes**	**CO1**	Demonstrate an understanding of the principles and process of statutory interpretation
		CO2	Formulation and development of arguments in support or against given interpretations
		CO3	Compare, contrast and reflect on theoretical concepts underlying the interpretation
		CO4	Apply a range of legal principles and methods to interpret legal instruments
		CO5	To ascertain the principles, presumptions and canons of construction and to learn their method of operation in varied case laws and interpretation of statutes.
BCW 425	**Information Technology Law**	**CO1**	Apply the provisions of Information Technology Act
		CO2	Identify the need for regulation of Information technology and various regulatory models
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology.
		CO4	Analyses the laws related to Intellectual Property Right and Technology Law
		CO5	List out the legal challenges of the information society and the different forms of cybercrimes.
BCW 426	**Professional**	**CO1**	Conduct themselves according to the ethical rules that guide advocate's practice.

	Ethics and Professional Accounting System	**CO2**	Designed to be taught with the assistance of practitioners, it will impart the students their role and responsibilities as professionals.
		CO3	Critically analyse the ethical rules and law of contempt of the court.
		CO4	Students will be able to identify ethical issues and dilemmas in realistic scenario as to propose well reason and articulated resolution to do issues and dilemmas.
		CO5	Understand the relation of Law with accounting
Semester-IX			
BCW 511	**Environmental Law**	**CO1**	Explain the constitutional foundation of environmental law
		CO2	Apply the principles of sustainable development in environmental law.
		CO3	Analyse the issues related to environmental conservation and biodiversity before the green tribunal.
		CO4	Apply the National Green Tribunal Act, 2010 and approach NGT where there is environmental matters
		CO5	Knowing about importance of public participation through Right to information, Public Interest Litigation and other remedies in preserving and protecting environment.
BCW 512	**Administrative Law**	**CO1**	Explain the differences between the different schools of jurisprudence concerning the nature of law.
		CO2	Identify the major and minor premises of legal arguments and analyse legal debates using appropriate rhetorical vocabulary
		CO3	Invent and defend arguments about the requirements of justice in legal disputes that reference and extend the themes of the course.
		CO4	Devise a correct way of handling the legal problem
		CO5	To give students an opportunity to think carefully about the values that ought to underpin a country's legal system.
Elective Groups (Choose any one group from the following)			
Group-I (Constitutional Law Group)			
BCW 513	**Indian Federalism**	**CO1**	Discuss the different forms of government and explain the features and the distinction between them.
		CO2	Trace the historical background of federalism in India and nature of Indian federalism.
		CO3	To discuss the Legislative relations, Administrative and financial relations between the Centre and the States.
		CO4	To understand the principles of interpretation of lists.
		CO5	To explain and discuss the freedom of inter-state trade and commerce & Services under the Union and the States.
		CO1	Explain the significance of comparative constitutional

BCW 514	**Comparative Constitution**		law study.
		CO2	Compare and evaluate the Indian constitutional law with three major constitutional democracies.
		CO3	Compare the working of the judiciary and judicial process in India with three major democracies.
		CO4	Explain and compare the law making process in India.
		CO5	Analyse the constitutional foundation of functioning of the government in major democracies and Demonstrate an understanding of the growth of the concept of 'Right' across democracies.
BCW 515	**Gender Justice and Feminine Jurisprudence**	**CO1**	Equipped to need and importance of gender justice and feminist jurisprudence in the current world context.
		CO2	Able appreciate the evolution of the Indian Women's Movement and understand the importance of Feminism in an Indian context.
		CO3	Able understand the role of the State in the Feminist's goal of achieving social, political and economic equality, social and moral connotations of law and sexuality and the feminist views on it.
		CO4	Enables the students to understand the evolution of Feminism and appreciate the difference in approach between the two schools.
		CO5	Able to analyse the nitty-gritty of the Sameness and Difference approach taken by the different schools of Feminism.
Group-II (Criminal Law Group)			
BCW 516	**Criminal Sociology**	**CO1**	Acquire a broad understanding of the theoretical and empirical approaches taken to understand the relationship between criminal behaviour and social, cultural, and institutional forces.
		CO2	Participating in in-depth weekly discussions of assigned readings
		CO3	Identify significant new research questions related to the study of crime in society. Several methods will be used in this class to measure achievement of these objectives:
		CO4	Critically analyse the conceptual and empirical underpinning of research on the above topics.
		CO5	Learn about the current state of knowledge regarding social variation crime and reactions to crime and the social consequences of this variation
BCW 517	**Criminal Psychology**	**CO1**	Understand the complex and complicated interaction between nature and nurture that leads to criminal behaviour.
		CO2	Be able to apply a variety of explanations and theoretical perspectives on developmental and social factors as key foundations for understanding and explaining criminality.
		CO3	Understand the complex and complicated interaction

			between nature and nurture that leads to criminal behaviour.
		CO4	Be able to describe and identify the overall relationship between mental disorders, behavioural disorders and criminal conduct.
		CO5	Be able to reflect upon and think critically about standard explanations of criminal behaviour provided in the media.
BCW 518	**History and Principles of Criminal Law**	**CO1**	Identify the elements of each and every offence along with their respective punishment mentioned in the Indian Penal Code.
		CO2	Knowledge about different types of punishment.
		CO3	Explain the Evolution of Indian Penal Code over the period of time from its enactment along with major amendments.
		CO4	Apply the principles discussed in Indian Penal Code in various cases.
		CO5	List out the various issues in criminal law and frame research problem and apply empirical research method to reach conclusion with suggestions.
Group 3 – Business Law Group			
BCW 519	**Banking Law**	**CO1**	Explain the basic principles of insurance law and banking laws.
		CO2	Demonstrate knowledge of insurance contracts and provisions, and law relating to life, health, fire, marine and other types of insurance.
		CO3	Apply the operation of insurance law in a practical context
		CO4	The course largely focuses on the fundamental principles which govern the law of insurance and law of banking.
		CO5	Understanding the theories on which insurance depends upon.
BCW 520	**Financial Market Regulation**	**CO1**	Introducing the principles and concepts of marketing.
		CO2	Relating the concepts to day to day applications and practices in marketing.
		CO3	Examining the environmental factors that shape an organisation's activities.
		CO4	To familiarize with the activities of segmenting, targeting and positioning.
		CO5	To have an efficient marketing team with accurate implementation.
BCW 521	**Competition Law**	**CO1**	On the competition of this course the students will have clarity about evolution, object and functions of Competition law.
		CO2	The students will have clarity about the types of anti-competitive agreements and testing its validity; the practices covered by abuse of dominant position; practices in connection with combinations.
		CO3	The students will be familiarised with an

			understanding about the role of the CCI.
		CO4	Students will have a clear understanding about the conflicting issues regarding the IPR and competition laws, the investment issues under the competition laws and also the different modern dimensions of competition law.
		CO5	Understand the study of developments of the policy of free and fair competition in India.
Semester-X			
Elective Groups (Choose any one group from the following)			
Elective Group 1 – Constitutional Law			
BCW 522	**Judicial Process & Judicial Review**	**CO1**	Explain the significance of Judicial Review and Judicial Process.
		CO2	Understand the Indian constitutional law and its implementation through the courts of law.
		CO3	Compare the working of the judiciary and judicial process in India with three major constitutional democracies;
		CO4	Analyze the concept of Dharma and relation of law with the society
		CO5	Demonstrate an understanding of the growth justice.
BCW 523	**Right to Information**	**CO1**	Understanding the history about the Right to Information
		CO2	Knowledge about which offices comes under the preview of right to information.
		CO3	Know about the process how to file RTI.
		CO4	Different cases of RTI which has exposed the government failure.
		CO5	Analyse the importance of RTI in India .
BCW 524	**Health Law**	**CO1**	Understand the basics of medical jurisprudence related to health laws.
		CO2	Knowledge about the consumer protection in Health Laws
		CO3	Analyse the different types of Health Laws and their importance
		CO4	Analyse how medical insurance is granted in case of health Law related subjects.
		CO5	Discuss the Contemporary challenges in health law
BCW 525	**Media & Law**	**CO1**	Basic understating of the evolution and existence of various facets of media.
		CO2	Analyse the legal nitty-gritty of media and how their activities can result in a breach of privacy in its various hues.
		CO3	Equipped to appreciate the philosophical justification for the protection of free speech right.
		CO4	Enable the students to understand the fundamental aspects of protection of reputation.
		CO5	Understand the requisite conceptual as well as statutory provisions pertaining to media, ethics and

			adjudication
BCW 526	**Air & Space Law**	**CO1**	To appreciate the philosophical justification for the protection of free speech right.
		CO2	To enable the students to understand the fundamental aspects of protection of reputation, to analyze the legal nitty-gritty of media and how their activities can result in a breach of privacy in its various hues.
		CO3	To make the students understand the requisite conceptual as well as statutory provisions pertaining to media, ethics and adjudication.
		CO4	To provide basic understating of the evolution and existence of various facets of media and the legal regime in place to regulate its content and matters incidental to it.
		CO5	To provide a basic understanding of the legal regime governing outer.
Elective Group 2 – Criminal Law Group			
BCW 527	**Criminology and Penology**	**CO1**	The scientific study of criminology and concept of law relating to it and concept of law relating to it. Apart from these general principles in Criminology equally important place of criminal law in criminal science, nature and functions of criminal law.
		CO2	The behaviour of the juveniles involved in crimes for and the law which govern them in a better manner.
		CO3	The clarity about logical structure of crime prevention and its implementation with judicial pronouncements.
		CO4	The administration of criminal justice system in India with critical analysis of legislative provisions along with its practical implementation.
		CO5	The importance of the victim for an investigation and why they are important in the overall scheme of the crime. The reasons for slow development of victim scheme since its inception from 2010 in the Criminal Procedure Code-1973.
BCW 528	**Forensic Sciences**	**CO1**	Get the idea of the origin of the concept of forensic sciences and how these techniques are being used for the evidences across various courts in India.
		CO2	Know about the various forensic tools available for forensic investigation and how these techniques are used in the criminal investigation. It will also contain case studies as to how these investigations are carried out by the Police and Forensic investigators.
		CO3	Able to relate the various forensic techniques used in crime scene investigation, how the samples are collected and how these tools and techniques of forensic science has helped in solving high profile cases.
		CO4	Know about the various techniques of interrogation used by the forensic experts as traditional third degree methods are old school and how the new techniques

			are being used for resolving disputes.
		CO5	Able to appreciate the tools which had been used by the doctors for medicinal purposes can be also used in the Investigations of the crimes and how this particular branch of forensic law has been an important instrument in dealing with various crime investigations.
BCW 529	**International Criminal Law**	**CO1**	Have a clear understanding of the development of and importance of international criminal.
		CO2	Able to theoretically perceive the evolution and development of the concept of individual criminal responsible
		CO3	Able to identify the sources of international criminal law.
		CO4	Able to enumerate and describe in detail the defences to liability under international criminal law
		CO5	Have comprehensive understanding of the crimes of Genocide, Crimes against humanity, War crimes and aggression and The student will have an understanding of the procedures of the ICC
BCW 530	**IT Offences**	**CO1**	Apply the provisions of Information Technology Act.
		CO2	Identify the need for regulation of Information technology and various regulatory models.
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology
		CO4	Analyses the laws related to Cyber offences under various laws
		CO5	List out the legal challenges of the information society and the different forms of cyber crimes
BCW 531	**Comparative Criminal Procedure**	**CO1**	Understand the organisation of Court and Prosecuting agencies in different countries.
		CO2	Analyse the difference in trial and pre-trial process in India and other countries.
		CO3	Able to understand the accusatory system of trial and the inquisitorial system of trial.
		CO4	Able to understand the role of Indian court in Correctional Programme.
		CO5	Able to understand the how and when to file Public Interest Litigation application
Elective Group 3 – Business Law Group			
BCW 532	**Insurance Law**	**CO1**	Understand the basics of insurance
		CO2	Analyse the theories of insurance and principle of insurance.
		CO3	Able to understand the accusatory system of trial and the inquisitorial system of trial.
		CO4	Able to understand the Function and Powers of Insurance Regulatory and Development Authority.
		CO5	Able to understand different types of insurance.
BCW 533	**Corporate**	**CO1**	Identify the salient features of corporate governance

	Governance		mechanism.
		CO2	List out the important aspects with regard to auditors and other statutory compliances that companies have to follow.
		CO3	Apply various legal and regulatory restrictions and obligations vis-à-vis the Board and the individual directors.
		CO4	Analyse the issues related to the functioning of the corporate system as a mode of business organization.
		CO5	Evaluate as against other the OECD principles.
BCW 534	**Merger and Acquisition**	**CO1**	Basics about the merger and acquisition
		CO2	Knowledge about the different types of merger and acquisition
		CO3	Analyse the role of different persons of company in merger and acquisition.
		CO4	Analyse how customer can be benefited from merger of one company to another.
		CO5	Case Study of Vodafone Idea merger and its benefit
BCW 535	**Investment Law**	**CO1**	Apply the provisions of Information Technology Act
		CO2	Identify the need for regulation of Information technology and various regulatory models
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology.
		CO4	Analyses the laws related to Intellectual Property Right and Technology Law
		CO5	List out the legal challenges of the information society and the different forms of cybercrimes.
BCW 536	**International Trade Law**	**CO1**	Know about the origin and Evolution of GAATs and WTO
		CO2	Know about the principle of non-discrimination in GAATs and WTO
		CO3	Knowledge about the dispute settlement process of WTO and GAATs
		CO4	Knowledge about Agreement on dumping and anti-dumping duties.
		CO5	Knowledge about the Significance of international trade law.

Bachelor of Laws (LL.B.)

Programme Objectives:

1. Grasp and apply theoretical and practical legal knowledge in the profession. *(Legal Knowledge)*
2. Conduct research on legal topics and questions using legal resources, like statutes, case laws, journal articles, etc. *(Research Ability)*
3. Demonstrate thorough knowledge of crime scene investigation, FIR, enforcement agencies used in criminal investigation, and thorough knowledge of procedures of civil suits and limitation for filing various suits. *(Knowledge of Procedural Laws)*
4. Apply the understanding of Public International Law in analysing the geo-politico-environmental issues. *(Analytical Ability)*
5. Demonstrate knowledge of specific aspects of Intellectual Property Law that is relevant to the modern corporate jurisprudence. *(Industry Ready)*
6. Understand the impact of legal actions in the societal and environmental contexts, and demonstrate the knowledge of, and the need for, sustainable developments. *(Environment and sustainability)*
7. Develop a sense of social responsibility and commitment, and work on various socio-legal issues. *(Social Responsibility)*
8. Apply the diverse knowledge of law to prepare for higher research degree with clarity of purpose. *(Higher Education)*
9. Demonstrate ethical principles and commit to professional ethics and responsibilities and contribute towards setting the higher norms of legal practice. *(Ethics)*
10. Develop and demonstrate legal reasoning skills and apply them during the programme & in legal practice. *(Reasoning Skills)*

Program Specific Outcomes (PSOs):

1. Will be able to demonstrate the quality legal education, training and knowledgeable resources in their chosen area of practice.
2. Will be able to apply the practical knowledge of law in developing and nurturing their leadership capabilities.
3. Will be provided with the breadth, expertise and a foundation for professional practice.
4. Will be able to develop fundamental in-depth knowledge and understanding of: the principles, concepts, values, substantive rules and development of the Indian legal system and core areas of law.
5. Will gain self-confidence, knowledge, understanding and skills that will provide them an added benefit as individuals, to the legal profession and to society as a whole.
6. Will be prepared to contribute effectively in the areas of constitutional law, civil law, criminal law, international law, corporate law, labour law and environmental law.
7. Will be inculcated traits of analytical thinking, lifelong learning, human values and professional ethics.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
LLB 101	**Law of Contract I**	CO1	Distinguish tort from crime, breach of contract
		CO2	Identify the requisites for a wrongful act to be classified as a tort
		CO3	Identify the situations when employer, principal, State are liable for torts committed by employee, agent or public officer
		CO4	Appraise real-world problems and determine whether defendant can justify the tortious act on grounds of defence
		CO5	Analyze set of circumstances and determine who can sue and who can be sued in tortious actions
LLB 102	**Family Law I (Hindu Law)**	CO1	Students should be able to identify and describe the various sources and schools of different personal laws.
		CO2	Students will be able to identify research areas, frame research questions and utilize the available on-line data basis.
		CO3	Students should be able to understand the core concepts of adoption laws and to analyze it from sociological perspective in the society.
		CO4	Students should be able to examine and analyse the concept of marriage and relate it to the changing nature of marriage and matrimonial remedies.
		CO5	This course aims to explore critical principles relating to contemporary issues and nurture within the students the ability to draft on family law matters.
LLB 103	**Constitutional Law I**	CO1	Students will study the basics of Constitutional Law and the salient features of the Constitution of India.
		CO2	Students will be familiarized with the leading case laws and legislative changes to the provisions of the Constitution
		CO3	Students will learn the diverse principles of judicial interpretation that constructs notions of 'state', law' and 'law in force'.
		CO4	Students will understand the nature and scope the rights to freedom, life, personal liberty and due process.
		CO5	Students will learn the applicability of the directive principles of state policy.
LLB 104	**Law of Torts Including M.V. Act & Consumer Protection Laws**	CO1	Understand the constituents of tort and general principles.
		CO2	Provide an in-depth clarity about various defences available against tortious liability
		CO3	Enhance the clarity in understanding the concept of locus standi for actions in tort
		CO4	Acquaint with principle of tortious liability for torts

			committed by others, principle of respondent superior, and the principles of unintentional tort of negligence.
		CO5	Understand the fundamental notions of consumerism, rights of consumers, and dispute resolution mechanism on the one hand, and the relevance of the MV Act on the other.
LLB 105	**Environmental Law**	CO1	Explain the constitutional foundation of environmental law
		CO2	Apply the principles of sustainable development in environmental law.
		CO3	Analyze the issues related to environmental conservation and biodiversity before the green tribunal.
		CO4	Apply the National Green Tribunal Act, 2010 and approach NGT where there is environmental matters
		CO2	Knowing about importance of public participation through Right to information, Public Interest Litigation and other remedies in preserving and protecting environment.
Semester II			
LLB 201	**Law of Contract II**	CO1	Developing understanding about the special contracts should initiate the students to different kinds of contracts with emphasis on the intricacies therein.
		CO2	Understanding about the essential elements of this special contract.
		CO3	Understanding standing about the Bailment and Pledge discussing the elements of bailment contract
		CO4	Developing understanding about the Partnership Law giving an overview of Partnership Act and Limited Liability Partnership Act
		CO5	Understanding about the Sale of Goods Act is discussed covering essential elements of a contract of sale of goods how contracts are performed and discharged
LLB 202	**Family law II (Muslim Law)**	CO1	Students should be able to identify and describe the various sources and schools of different personal laws.
		CO2	Students will be able to identify research areas, frame research questions and utilize the available on-line data basis.
		CO3	Students should be able to understand the core concepts of adoption laws and to analyze it from sociological perspective in the society.
		CO4	Students should be able to examine and analyze the concept of marriage and relate it to the changing nature of marriage and matrimonial remedies.
		CO5	To enable students to identify relevant legislations and case laws relating to family law.
LLB 203	**Constitutional Law II**	CO1	Explain the nature of the Constitution
		CO2	Analyse and sort out the diverse judicial tests used to determine the constitutionality of state action
		CO3	Compare the constitutional relationship between the

			rights enumerated under Articles 14, 19 and 21 of the Constitution of India
		CO4	Evaluate the idea of welfare state by amalgamating the harmonious impact of Fundamental Rights and Directive Principles of State Policy.
		CO5	Analyse and sort out the applicability of the directive principles of state policy
LLB 204	**Law of Crimes (I.P.C.)**	CO1	Identify the elements of each and every offence along with their respective punishment mentioned in the Indian Penal Code.
		CO2	Explain the Evolution of Indian Penal Code over the period of time from its enactment along with major amendments.
		CO3	Apply the principles discussed in Indian Penal Code in various cases.
		CO4	Frame arguments on the basis of nature of offences, elements of offences along with various landmark case laws.
		CO5	List out the various issues in criminal law and frame research problem and apply empirical research method to reach conclusion with suggestions.
LLB 205	**Law of Evidence**	CO1	Elucidate the elementary principle of the Law of Evidence.
		CO2	Explain the important provisions of the Indian Evidence Act, 1872.
		CO3	Analyse between opinions, witnesses, and expert testimony and hearsay evidences.
		CO4	Apply illegally obtained evidence, burden of proof & privileges
		CO5	Make an argument for or against the admissibility of evidence including that which has been unlawfully obtained, that which may be more prejudicial than probative, previous sexual history, bad character, hearsay evidence, expert evidence and eyewitness identification evidence.
Semester-III			
LLB 301	**Jurisprudence**	CO1	Explain the differences between the different schools of jurisprudence concerning the nature of law.
		CO2	Identify the major and minor premises of legal arguments and analyze legal debates using appropriate rhetorical vocabulary
		CO3	Invent and defend arguments about the requirements of justice in legal disputes that reference and extend the themes of the course.
		CO4	Devise a correct way of handling the legal problem
		CO5	To provide students with an opportunity to think carefully about the values that ought to underpin a country's legal system.
LLB 302	**Law of Property**	CO1	Identify and describe the scope and ambit of the property laws in India.

		CO2	To trace out and understand the theoretical foundation related to property.
		CO3	To analyze and understand the interpretation clauses along with the principles involved in the subject.
		CO4	To enlist the significant legal provisions relating to transfer of property.
		CO5	Analyze the relevant case laws pertaining to the concepts discussed.
LLB 303	**Administrative law**	CO1	Explain the differences between the different schools of jurisprudence concerning the nature of law.
		CO2	Identify the major and minor premises of legal arguments and analyse legal debates using appropriate rhetorical vocabulary
		CO3	Invent and defend arguments about the requirements of justice in legal disputes that reference and extend the themes of the course.
		CO4	Devise a correct way of handling the legal problem
		CO5	To give students an opportunity to think carefully about the values that ought to underpin a country's legal system.
LLB 304	**Company law**	CO1	Explain the process of formation of different kinds of companies and commencement of business.
		CO2	Describe the methods of giving security for repayment of loan or other liabilities of a company.
		CO3	Explain the legal issues in the administration and management of a registered company.
		CO4	Elucidate how winding up is done in a company.
		CO5	Introduced to the basic power and structure in a company and the law relating to appointment of directors, director's duty, and matters governing board meetings.
LLB 305	**Labour Law I**	CO1	Explain the evaluation of industrial jurisprudence and the role played by yellow in this regard.
		CO2	Identify and appreciate the need for a law relating to resolution of industrial dispute in India
		CO3	Explain the paramount of standing orders and domestic enquiry which is guided by the principle of natural justice as an effective tool of insurance working as wellbeing and smooth functioning of industrial undertaking.
		CO4	Significance of trade union in the present-day society and the crucial role played in collective bargaining for maintaining industrial peace and well-being of the workmen.
		CO5	To acquaint the student with the conceptual and operational parameters of the various issues related to the industrial relation between employer and employee and its impact on the labour relation in India.
Semester-IV			
LLB 401	**Labour Law II**	CO1	Have a nice the undercurrent of the social security

			constitutional provisions and development at the international level.
		CO2	Behind the constitutional and statutory provisions relating to minimum wages.
		CO3	Apply the legal provisions in the contemporary debate on employee provident fund and workers vulnerability in India.
		CO4	Provisions relating to the compensation for industrial accident for answering problem-based question are especially concerning the time any place.
		CO5	Provisions relating to the compensation for industrial accident for answering problem-based question are especially concerning the time any place.
LLB 402	**Public International Law**	CO1	Critically analyse various theories of International Law and sources of International Law.
		CO2	Critically analyse and interpret various Articles in Vienna Convention on Law of Treaties.
		CO3	Find out various complex issues in the International sphere and apply International Law principles to study such problems.
		CO4	Analyse various pacific dispute settlement mechanisms.
		CO5	Critically analyse the role of International Court of Justice in settling the disputes between nations amicably.
LLB 403	**Interpretation of Statutes**	CO1	Demonstrate an understanding of the principles and process of statutory interpretation
		CO2	Formulation and development of arguments in support or against given interpretations
		CO3	Compare, contrast and reflect on theoretical concepts underlying the interpretation
		CO4	Apply a range of legal principles and methods to interpret legal instruments
		CO5	To ascertain the principles, presumptions and canons of construction and to learn their method of operation in varied case laws and interpretation of statutes.
LLB 404	**U.P. Land laws**	CO1	Analyze the Zamindari and Land reform Act in the State of Uttar Pradesh.
		CO2	Apply the rule of succession for female.
		CO3	Understand the rule of ejectment for tenant holder and bhumidhar.
		CO4	Know the authorities under Land Revenue Act and apply the procedure of collecting Land Revenue
		CO5	To understand the concept of ejectment, mutation, and lease.
LLB 405	**Intellectual Property Law**	CO1	Identify the different forms of intellectual property and describe the importance of protection of IP.
		CO2	List out the criteria/essential requirements of IP protection, duration, rights conferred and remedies provided.
		CO3	Apply the principles of IP protection to legal problems

			correctly.
		CO4	Analyses the issues related to infringement of IPR.
		CO5	Evaluate as against other the international legal framework related to IP protection and articulate the problem areas for the deficiency.
Semester-V			
LLB 501	**Civil Procedure Code and Law of Limitation**	CO1	Identify the jurisdiction of the civil court wherein a matter will lie.
		CO2	Use correct legal terminologies.
		CO3	Describe the rules of pleadings and apply them correctly.
		CO4	File execution proceedings in the civil courts.
		CO5	Apply the provisions of Limitation Act appropriately.
LLB 502	**Criminal Procedure Code and Law of Juvenile Justice and Probation of Offenders**	CO1	Explain the scope and applicability of the Code
		CO2	Evaluate the role played by the functionaries of the government.
		CO3	Analyze the right the victims are entitled to and suggest appropriate remedies in case of breaches.
		CO4	Deal with the basic procedural aspects with regard to criminal law in action.
		CO5	Analyse the hierarchy of criminal courts.
LLB 503	**Law of banking and Negotiable Instruments**	CO1	Draft arguments for and against Banking and Non-Banking Financial Companies
		CO2	Undertaking Research Projects related to Banking related law and policies
		CO3	Draft arguments in matters covering technology related legal issues
		CO4	Drafting policies related to banking sector.
		CO5	Dealing with the cheque bouncing cases.
LLB 504	**Alternate Dispute Resolution**	CO1	Analyze various legal frameworks on arbitration, mediation, conciliation and negotiation.
		CO2	Understand and analyze the international legal framework on arbitration and conciliation.
		CO3	Learn the process of arbitration, mediation and conciliation and its practical applicability.
		CO4	Learn the skills how to do arbitration, mediation and conciliation in different type of matters.
		CO5	To understand the Indian legal framework related to arbitration, mediation, conciliation and negotiation.
LLB 505	**Professional Ethics and Professional Accounting System**	CO1	Conduct themselves according to the ethical rules that guide advocate's practice.
		CO2	Critically analyze the ethical rules and law of contempt of the court.
		CO3	Students will be able to identify ethical issues and dilemmas in realistic scenario as to propose well reason and articulated resolution to do issues and dilemmas.
		CO4	Students will come to know their role and responsibilities as professionals.
		CO5	Appreciating the duties of Advocates as well as the Bar Bench relation

Semester-VI			
LLB 601	**English and Legal Language**	CO1	Communicate clearly and effectively using proper legal terminologies.
		CO2	Explain the meanings of Latin maxims, elucidate fundamental legal concepts and principles through them, as also use them in advocacy.
		CO3	Draft legal notice and pleadings.
		CO4	Use legal terms, distinguish their meanings in different contexts, and apply them in legal communication.
		CO5	Read and dissect, analytically, decisions of courts, while also culling out their facts and principles in order to establish what rule of law they (the judgements) stand for.
LLB 602	**Information Technology Law**	CO1	Apply the provisions of Information Technology Act
		CO2	Identify the need for regulation of Information technology and various regulatory models
		CO3	Evaluate as against others the interface between different human rights instruments and challenges faced by information technology.
		CO4	Analyses the laws related to Intellectual Property Right and Technology Law
		CO5	List out the legal challenges of the information society and the different forms of cybercrimes.
LLB 603	**Optional (Choose any one from the following) –** **Law Relating to Women**	CO1	Identify the major social reforms during the 19th century in India for the uplifting women.
		CO2	List out the loopholes in law enforcement agencies in securing access to justice to women.
		CO3	Apply the different legislations enacted for women development and empowerment.
		CO4	Analyse the issues related to violence against women under the Protection of Women from Domestic Violence Act, 2005.
		CO5	Evaluate as against other the impact of specific laws enacted to secure justice to women against dowry related harassments, dowry deaths, molestation, sexual abuse, marital rape and rape.
LLB 604	**Human Rights Law**	CO1	Identify the fundamental philosophy and policies concerning human rights.
		CO2	Summarize the legal effects of international treaties and conventions on the national human rights jurisprudence.
		CO3	Relate to the on-going debates and current or future challenges concerning human rights.
		CO4	Critically analyze the Human rights protection mechanism, nationally and internationally concerning human rights.
		CO5	Formulate the role of state actors for the protection of human rights.
LLB 605	**Law of Investment**	CO1	Identify and execute the procedures necessary for public issues, rights issues, and preferential issues

	and Securities	CO2	SEBI's operation and role as the primary capital market regulator
		CO3	Drafting prospectus and offering documents in cases of public offering of securities by a company
		CO4	Understanding the role of lawyers, accountants, analysts, investment bankers, rating agencies and financial intermediaries in various capital raising modes
		CO5	Understanding the laws and regulations to manage business operations and transactions in the securities industries.
LLB 606	**Drafting Pleading and Conveyancing**	CO1	Draft the legal deeds/documents/pleadings flawlessly.
		CO2	Appreciate the abstract concepts and put forth an effective argument.
		CO3	Identify the issues involved, collect appropriate evidence, get true and correct information.
		CO4	Draft the legal deeds and documents with precision by following the appropriate legal format
		CO5	Scrutinize the legal documents and deeds.
LLB 607	**Moot Court, Observation of trial, Pre – Trial preparation and Internship**	CO1	Able to appreciate the research, oratorical and articulation required by the lawyer.
		CO2	Be able to comprehend the practicability of the justice system and the role of the Court in dispensation of justice.
		CO3	Developed a knowledge and understanding of the basic principles and policies
		CO4	Developed the skills of written advocacy
		CO5	Developed the skills of oral advocacy

Master of Laws (LL.M.)

Programme Objectives:

1. Conduct independent research on diverse legal topics and questions using knowledge of primary as well as secondary data. (Legal Knowledge)
2. Develop and demonstrate analytical skills to interpret various judgments of domestic and international courts of law and different provisions of law; and re-interpret the opinions and submissions of learned jurists and academicians. (Analytical Skills)
3. Demonstrate an understanding of substantive and/or procedural aspects of their chosen area of specialisation, and offer solutions based on such understanding. (Problem Solving)
4. Independently write research articles and undertake research studies on different topics. (Research Skills)
5. Develop a sense of social responsibility and commitment, and work on various socio-legal issues. (Social Responsibility)
6. Establish as a competent professional in a highly competitive world with cutting-edge legal education tools. (Competitive Skills)
7. Apply the diverse knowledge to prepare for higher research degree with clarity of purpose (Higher Education).
8. Ability to translate ideas into words, and words into practical solutions, which is reflective of their critical thinking (Critical Thinking).
9. Apply ethical principles and commit to professional ethics and responsibilities and norms of legal practice (Ethics).
10. Communicate effectively on complex legal activities with the legal community and with the society at large; thus, giving and imparting clear instructions (Communication).

Program Specific Outcomes (PSOs):

1. Will be able to demonstrate critical thinking in their chosen area of specialisation leading to a successful career.
2. Will be able to develop their researching skills and progress towards pursuing Doctoral studies.
3. Will be active members ready to serve the society through their teaching skills.
4. Will be equipped with enhanced legal insights that will lend them a cutting edge over ordinary law graduates in the judicial profession.
5. Will have leadership skills with high level of integrity and also have the ability to function professionally with ethical responsibility as an individual as well as in multidisciplinary team with positive attitude.
6. Will be prepared to offer specialised expertise in the field of corporate law; benefitting the corporations at large and contributing to the growth of business sector as a whole.
7. Will be able to appreciate the significance of traditional legal areas, like Constitutional Law and Criminal Law, in the society, and demonstrate their research capabilities in contributing towards the growth of these broader disciplines of law.
8. Will be inculcated traits of critical thinking required for an expert in international law, and to use their analytical skills while undertaking any research in the legal field.

C. Course outcome (COs):

Course Code	Course name	Course outcomes	
Semester I			
MLC-101	**Law and Social Transformation**	CO1	Relate clearly the different concepts of legal issues related to societal aspects.
		CO2	Formulate and develop arguments in support or against the different social issues in the society
		CO3	Critically analyze and examine theoretical concepts of the Subject
		CO4	Apply a range of legal principles and analyze the concepts and issues logically.
		CO5	Educates them about the background of various issues of vital social significance and sensitizes them towards the same.
MLC-103	**Indian Constitutional law: The New Challenges**	CO1	. Explain the nature of the Constitution along with the federal characteristics of the constitution.
		CO2	Analyse and sort out the diverse judicial tests used to determine the constitutionality of state action
		CO3	Compare the constitutional relationship between the rights enumerated under part 3 and 4 of the Constitution of India
		CO4	Evaluate the idea of welfare state by amalgamating the harmonious impacting of Fundamental Rights and Directive Principles of State Policy
		CO5	Understanding the nature and scope of the nexus between constitutional organs.
MLE-105	**Optional Group – A (Criminal Law) Comparative Criminal Procedure**	CO1	Explain the scope and applicability of the Code of Criminal Procedure
		CO2	Evaluate the role played by the functionaries of the government in criminal justice administration.
		CO3	Analyse the right the victims are entitled to and suggest appropriate remedies in case of breaches.
		CO4	Understand the Criminal Procedures implemented in various countries
		CO5	Learn the effective implementation of criminal law
MLE-107	**Treatment of Offenders and Victimology**	CO1	The scientific study of criminology and concept of law relating to it and concept of law relating to it. Apart from these general principles in Criminology equally important place of criminal law in criminal science, nature and functions of criminal law.
		CO2	. The behaviour of the juveniles involved in crimes for and the law which govern them in a better manner.
		CO3	The clarity about logical structure of crime prevention and its implementation with judicial pronouncements.
		CO4	The administration of criminal justice system in

			India with critical analysis of legislative provisions along with its practical implementation
		CO5	The importance of the victim for an investigation and why they are important in the overall scheme of the crime. The reasons for slow development of victim scheme since its inception from 2010 in the Criminal Procedure Code-1973.
MLE-109	**Optional Group – B (Corporate Law) Law of Corporate Management and Governance**	CO1	. Identify the salient features of corporate governance mechanism.
		CO2	List out the important aspects with regard to auditors and other statutory compliances that companies have to follow.
		CO3	Apply various legal and regulatory restrictions and obligations vis-à-vis the Board and the individual directors.
		CO4	Analyse the issues related to the functioning of the corporate system as a mode of business organization.
		CO5	Evaluate as against other the OECD principles.
MLE-111	**Competition and Consumer Protection Laws**	CO1	On the competition of this course the students will have clarity about evolution, object and functions of Competition law.
		CO2	The students will have clarity about the types of anti-competitive agreements and testing its validity; the practices covered by abuse of dominant position; practices in connection with combinations.
		CO3	The students will be familiarised with an understanding about the role of the CCI.
		CO4	Students will have a clear understanding about the conflicting issues regarding the IPR and competition laws, the investment issues under the competition laws and also the different modern dimensions of competition law.
		CO5	Understand the study of developments of the policy of free and fair competition in India.
MLE-113	**Optional Group – C (Constitutional Law) Constitutionalism**	CO1	Students will study the basics of Constitutional Law and Constitutionalism
		CO2	Students will be familiarized with the leading case laws and legislative changes to the provisions of the Constitution
		CO3	Students will learn the diverse principles of judicial interpretation that constructs notions of 'state', law' and 'law in force'.
		CO4	. Students will understand the nature and scope the federal features of the Constitution
		CO5	Students will learn the applicability of the Constitution through PIL and Justice Administration.
MLE-115	**Comparative**	CO1	Explain the nature of the Constitution and can

	Constitutional Law		compare it with the Constitution of other countries
		CO2	Analyse and sort out the diverse judicial tests used to determine the constitutionality of state action
		CO3	Compare the constitutional relationship between the rights enumerated under Articles 14, 19 and 21 of the Constitution of India
		CO4	Evaluate the idea of welfare state by amalgamating the harmonious impact of Fundamental Rights and Directive Principles of State Policy
		CO5	Students will learn the applicability of the right to freedom of religion in India and other countries.
MLE-117	**Optional Group – D (IPR) Nature, Emergence and Development of IPRs**	CO1	Identify the different forms of intellectual property and describe the importance of protection of IP.
		CO2	List out the criteria/essential requirements of IP protection, duration, rights conferred and remedies provided.
		CO3	Apply the principles of IP protection to legal problems correctly.
		CO4	Analyse the issues related to infringement of IP.
		CO5	Evaluate as against other the international legal framework related to IP protection and articulate the problem areas for the deficiency.
MLE-119	**Copyright Law & Neighbouring Rights**	CO1	Get an overview regarding the basics of copyright law, its philosophical perspectives as well as will be able to trace the historical evolution of copyright law.
		CO2	Comprehend the various issues related to ownership of copyrighted materials; how the rights are transmitted and also the modes in which copyrighted materials are licensed.
		CO3	Identify the key copyright issues in the recording industry and also how the copyright is collectively administered within the industry.
		CO4	Acquainted with the key provisions in law related to copyright infringement and the types of liability.
		CO5	Reflect on how the recent changes, posed by technology, are addressed by copyright law as well as how copyright issues are dealt in digital world. And will be well versed with different type of remedies provided under copyright law for copyright violation.
Semester II			
MLC-202	**Compulsory Paper Judicial Process**	CO1	Explain the significance of Judicial Review and Judicial Process.
		CO2	Understand the Indian constitutional law and its implementation through the courts of law.
		CO3	Compare the working of the judiciary and judicial process in India with three major constitutional democracies;

		CO4	Analyze the concept of Dharma and relation of law with the society
		CO5	Demonstrate an understanding of the growth justice.
MLC-204	**Legal Education & Research Methodology**	CO1	Formulate a research problem and identify research questions.
		CO2	List out the different types of legal research.
		CO3	Analyse the issues related to applicability of scientific methods in legal research.
		CO4	Apply appropriate research method.
		CO5	Evaluate as against other the different forms of research designs. And draw appropriate suggestions and conclusions based on logical legal reasoning.
Optional Group – A (Criminal Law)			
MLE-206	**Drug Addiction, Criminal Justice and Human Rights**	CO1	Understand the legal framework related to drug abuse and penal provisions under NDPS Act and Indian Penal Code
		CO2	Describe the existing policy of the government regarding drugs
		CO3	Identify the fundamental causes of drug addiction
		CO4	Summarize the legal effects of international treaties and conventions on combating the problems of drug addiction.
		CO5	Critically Analyse the protective mechanism, nationally and internationally concerning Drug abuse.
MLE-208	**Privileged Class Deviance**	CO1	Familiarized with the core perspectives in this particular area.
		CO2	Explain the various types of deviance viz. police, professional and official
		CO3	Understand the legal discourse with a critical outlook.
		CO4	Analyze the broader meanings of hegemonic legal perspectives.
		CO5	Understanding on conceptual and praxeological gap in the context of legal discourse.
Optional Group – B (Corporate Law)			
MLE-210	**Intellectual Property Rights**	CO1	Identify the different forms of intellectual property and describe the importance of protection of IP.
		CO2	List out the criteria/essential requirements of IP protection, duration, rights conferred and remedies provided.
		CO3	Apply the principles of IP protection to legal problems correctly.
		CO4	Analyse the issues related to infringement of IP.
		CO5	Evaluate as against other the international legal framework related to IP protection and articulate the problem areas for the deficiency.
MLE-212	**Corporate Taxation**	CO1	Analyse the concepts relating to tax avoidance agreements and tax treaties.

		CO2	Identify, describe and analyse the law of international taxation and its development towards international harmonization.
		CO3	. Evaluate and critically assess the impact of international tax principles on individuals and businesses.
		CO4	. To introduce global tax challenges and emerging issues of international tax regulations.
		CO5	To apply case studies and adopt the comparative analysis of other jurisdictions in understanding the existing legal framework.
Optional Group – C (Constitutional Law			
MLE-214	**Constitutionalism: Power of Judicial Review**	CO1	Have an analytical understanding of the concept of constitutionalism.
		CO2	Understand how states have developed their administrative structure and how they solve the conflicts between State and citizens.
		CO3	Understand the application of constitutional principles in global era.
		CO4	Have a comparative analysis by understanding the similarities and differences between various legal systems.
		CO5	Have jurisprudential knowledge of different political systems of the world.
MLE-216	**Federalism: Union –State Relations**	CO1	Understand the simple and complex aspects of Federalism
		CO2	Analyze and evaluate the different kinds of Union State relations and their importance in governance.
		CO3	Evaluate critically the different types of emergencies in the Indian Constitution their necessity in the current system
		CO4	Develop the alternative model after understanding the provisions relating to the composition, powers and functions of Union Legislature as well as of State Legislatures.
		CO5	Understanding and critically Evaluate the Different Kind of Emergencies.
Optional Group – D (IPR)			
MLE-218	**Patents Law**	CO1	Identify the scope of patent theory, Antitrust and IP relationship and the specific issues in Technology market.
		CO2	Explain and critically analyse the patent law in US, EU and India.
		CO3	Analyse the interplay between patent law and competition law and the underlying philosophies of patent and antitrust law
		CO4	Analyze the concepts of patent hold-up and misuse and the agreements concerning patented technology.
		CO5	Understanding of the philosophies of Patent law and

			the patent-competition law interplay
MLE-220	**Law Relating to Trademarks**	CO1	Identify and describe the basic requirement of trademarks protection
		CO2	List out the rights enjoyed by trademarks owners.
		CO3	Apply the principles of trademarks protection to legal problems correctly.
		CO4	Analyse the principles related to infringement of trademarks and passing off.
		CO5	Evaluate as against other the international legal framework related to trademarks protection and articulate the problem areas for the deficiency.
Semester-III			
MLC-301	**Compulsory Paper Seminar in Contemporary Issue**	CO1	Undertake a literature review on a chosen educational topic
		CO2	Weigh and synthesise arguments in the literature to develop a position statement
		CO3	Evaluate and use evidence and argument to support or refute relevant arguments
		CO4	Defend their position via an oral presentation and in writing
		CO5	Respond to questions and counter arguments.
Optional Group – A (Criminal Law)			
MLE-303	**Juvenile Delinquency**	CO1	The scientific study of criminology and concept of law relating to it and concept of law relating to it. Apart from these general principles in Criminology equally important place of criminal law in criminal science, nature and functions of criminal law.
		CO2	The behaviour of the juveniles involved in crimes for and the law which govern them in a better manner.
		CO3	. The clarity about logical structure of crime prevention and its implementation with judicial pronouncements.
		CO4	. The administration of criminal justice system in India with critical analysis of legislative provisions along with its practical implementation.
		CO5	The importance of the victim for an investigation and why they are important in the overall scheme of the crime. The reasons for slow development of victim scheme since its inception from 2010 in the Criminal Procedure Code-1973.
MLE-305	**Collective Violence and Criminal Justice System**	CO1	familiarized with the core perspectives in this particular area.
		CO2	Explain the various types of deviance viz. police, professional and official
		CO3	Understand the legal discourse with a critical outlook.
		CO4	Analyze the broader meanings of hegemonic legal perspectives.
		CO5	It provides refined understanding on conceptual and

			praxeological gap in the context of legal discourse.
Optional Group – B (Corporate Law)			
MLE-307	**Banking and Insurance Law**	CO1	Understand the Banking structure in India which would assist them in.
		CO2	Draft arguments for and against Banking and Non-Banking Financial Companies
		CO3	. Undertaking Research Projects related to Banking and insurance related law and policies
		CO4	Draft arguments in matters covering technology related legal issues and Drafting policies related to banking and Insurance sector.
		CO5	Demonstrate knowledge of insurance contracts and provisions, and law relating to life, health, fire, marine and other types of insurance.
MLE-309	**The Law of Corporate Finance and Securities Regulations**	CO1	Identify and execute the procedures necessary for public issues, rights issues, and preferential issues
		CO2	SEBI's operation and role as the primary capital market regulator
		CO3	Drafting prospectus and offering documents in cases of public offering of securities by a company
		CO4	Understanding the role of lawyers, accountants, analysts, investment bankers, rating agencies and financial intermediaries in various capital raising modes
		CO5	Understanding the laws and regulations to manage business operations and transactions in the securities industries.
Optional Group – C (Constitutional Law)			
MLE-311	**Human Rights: Constitution of India**	CO1	Identify the fundamental philosophy and policies concerning human rights.
		CO2	Summarize the legal effects of international treaties and conventions on the national human rights jurisprudence.
		CO3	Relate to the on-going debates and current or future challenges concerning human rights.
		CO4	Critically Analyse the Human rights protection mechanism, nationally and internationally concerning human rights.
		CO5	Formulate the role of state actors for the protection of human rights.
MLE-313	**Constitutional Pluralism: Protection of Special National Interest**	CO1	To bring out the importance of the system of Governance and the role of the executive in the Indian Constitution.
		CO2	To brief about the Centre-State financial relations and specific to GST.
		CO3	To demonstrate about the different types of emergency and the consequences of imposing it.
		CO4	Demonstrate an idea about the unification of Tax in a federal state.
		CO5	Evaluate the verdict in the ADM Jabalpur v Shiv

			Kant Shukla case.,(1976) 2 SCC 521
Optional Group – D (IPR)			
MLE-315	**Law Relating to Designs & Geographical Indication**	CO1	Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
		CO2	Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
		CO3	Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautious steps to be taken to prevent infringement of proprietary rights in products and technology development.
		CO4	Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.
		CO5	Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing
MLE-317	**Teaching and Research in IPRs**	CO1	Identify the different forms of intellectual property and describe the importance of protection of IP.
		CO2	List out the criteria/essential requirements of IP protection, duration, rights conferred and remedies provided.
		CO3	Apply the principles of IP protection to legal problems correctly.
		CO4	Analyse the issues related to infringement of IP.
		CO5	Evaluate as against other the international legal framework related to IP protection and articulate the problem areas for the deficiency.
Semester-IV			
MLC-402	**Dissertation**	CO1	Acquisition of detailed knowledge in a particular topic
		CO2	Development of critical understanding of a particular topic
		CO3	Development of the capacity to plan and carry out independent research work
		CO4	The dissertation entails that the student will develop and demonstrate their analytic, argumentative, writing and presentation skills.
		CO5	Dissertation is expected to be bibliographic, on the basis of library, internet and archival research.