Deccan Education Society's
Fergusson College (Autonomous), Pune

Program Specific Outcomes(PSOs) and Course Outcomes (COs) 2019-20

Department of Mathematics
Programme: M.Sc. Industrial Mathematics with Computer Applications

PSO No.	Program Specific Outcomes(PSOs) Upon completion of this programme the student will be able to
PSO1	**Academic competence** (i)Understand basic facts about Mathematics -annotations, terminology, geometrical figures, graphical displays and its major subfields (Analysis, Algebra, Applied Mathematics and Statistics). (ii) Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, IoT and data analytics. (iii) Demonstrate unifying structures of Mathematics and the basic constructs of several programming languages and their application areas.
PSO2	**Personal and Professional Competence** (i) Apply mathematical solutions in a variety of contexts related to science, technology, business and industry, and carry out hands-on activities on several programming technologies as well as academic projects. (ii) Analyse the data by selecting and using appropriate mathematical formulae or techniques/programming technology stack in order to draw the relevant conclusion. (iii) Execute the problem solving skills, equip with Mathematical modelling abilities and develop competent professionals who will be able to address challenges in the field of IT at global level.
PSO3	**Research Competence** (i) Apply advanced knowledge on topics in pure Mathematics and impart analytical skills to develop initiatives and come up with innovative ideas for R&D in various fields. (ii) Integrate the knowledge of Computer Science and Mathematics to solve and authenticate real-time data from various fields.
PSO4	**Entrepreneurial and Social competence** (i) Develop analytical skills required to get distinguishing employment opportunities in several fields including IT, Research and Development, teaching field and gain understanding about the ethical issues related to protection of intellectual property - copyrights, trademarks, and patents. (ii) Execute social competence including communication and effective interaction with others, listening, speaking, observational skills and presenting skills.

F.Y. M.Sc. Semester I		
Title of the Course and Course Code	**Real Analysis (MTS4101)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Retrieve basic concepts in Metric Topology.	1
CO2	Interpret properties of continuous and differentiable functions.	2
CO3	Implement Mean Value Theorems to real life problems and discuss its use.	3
CO4	Identify series expansions for general category of continuously differentiable functions for computational needs.	4
CO5	Evaluate Riemann Integration to generalise the theory of Integration over Euclidean Spaces.	5
CO6	Formulate the Fundamental Theory of Integral Calculus, support the theory with examples and create counter examples wherever needed.	6
Title of the Course and Course Code	**Applied Linear Algebra (MTS4102)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe key concepts associated with Vector spaces.	1
CO2	Illustrate various mathematical properties of inner products and solve examples to justify the properties.	2
CO3	Apply the concept of orthogonality to find an orthogonal basis using the Gram Schmidt process. Compute Eigen values and Eigenvectors for a given matrix	3
CO4	Identify the role of Eigen values and Eigenvectors in Matrix decompositions.	4
CO5	Determine the concept of Linear Transformations to solve real life problems.	5
CO6	Formulate the concept of matrix decompositions to discuss problems in Engineering and Data Science	6

Title of the Course and Course Code	**Discrete Mathematics I (MTS4103)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the propositional equivalences, quantifiers, predicates and different types of proofs	1
CO2	Articulate basic concepts of Logic	2
CO3	Apply basic graph theory, minimal weighted spanning tree algorithms, graph colouring algorithms	3
CO4	Compare different types of graphs and operations on graphs.	4
CO5	Determine algorithms of fusion, matching algorithms, shortest path algorithms Formulate	5
CO6	Formulate Matrix representation of graphs, shortest paths for various graphs	6
Title of the Course and Course Code	**Software Engineering (MTS4104)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall facts about software engineering.	1
CO2	Articulate the key concepts, characteristics, objectives and applications of software engineering.	2
CO3	Apply the concepts of software requirements in the software requirement engineering process ,design techniques, testing strategies.	3
CO4	Analyze different life cycle models, structures through different tools such as data flow diagrams, structure charts, decision tables and decision trees based on their strengths and weaknesses	4
CO5	Discriminate different life cycle models, Test and maintenance techniques	5
CO6	Build the foundation for requirement analysis with the use of software requirement engineering concepts	6

Title of the Course and Course Code	**Experimental Training Course on C Programming(MTS4105)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall the basic concepts of the C programming language.	1
CO2	Discuss basic concepts of computers, algorithms and algorithmic thinking.	2
CO3	Apply stack for implementation of function calls and parameter passing mechanisms.	3
CO4	Analyze and compare usage of arrays, strings, structures and files.	4
CO5	Determine the solution for a given problem by distinguishing various memory allocation methods.	5
CO6	Write C programs to validate the specifications.	6
F.Y. M.Sc. Semester II		
Title of the Course and Course Code	**Advanced Calculus (MTS4201)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe basic concepts related to sequences and series of functions.	1
CO2	Discuss various properties related to sequence and series of functions and illustrate it with suitable examples.	2
CO3	Demonstrate the concept of Integral of a k-form considered over a boundary and generalise it to arbitrary spaces. Apply the calculus concepts and solve the problems.	3
CO4	Explain various properties of elementary functions to solve problems in science and engineering applications.	4
CO4	Evaluate derivatives of scalar, vector valued functions to determine maxima, minima and saddle points.	5
CO6	Develop the Stoke Theorem to structure the concept of Integration to be stated by a single formula.	6

Title of the Course and Course Code	**Abstract Algebra (MTS4202)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define basic concepts of Group theory with focus on axiomatic theory and key concepts associated with graphs. State	1
CO2	Articulate the fundamental concepts of abstract algebra such as groups and rings and their role in modern Mathematics and applied contexts.	2
CO3	Demonstrate capacity for mathematical reasoning through analyzing, proving, and explaining concepts from abstract algebra. Describe the structure of certain finite groups using Sylow's theorems.	3
CO4	Compare different types of groups and rings. Explain the notion of rings, ideals.	4
CO5	Justify theorems based on group theory, ring theory and articulate problem-solving techniques based on them.	5
CO6	Construct the structure of finite fields.	6

Title of the Course and Course Code	**Discrete Mathematics II (MTS4203)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	State counting principles.	1
CO2	Articulate counting principles, recurrence relations.	2
CO3	Apply fundamental notions of Lattice theory ,properties of Lattices and basics of Boolean axioms	3
CO4	Explain fundamental operations on Boolean expressions.	4
CO5	Conclude application areas of Discrete Mathematics	5

CO6	Develop an ability to solve individually and creatively advanced problems connected with its applications to Mathematics.	6
Title of the Course and Course Code	**Probability and Statistics (MTS4204)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	State basic concepts related to Probability Theory and solve examples.	1
CO2	Discuss various properties related to mean and variance.	2
CO3	Apply the concept of discrete and continuous distributions to a given model or a given data.	3
CO4	Analyze the concept of Correlation and Regression for a given data.	4
CO4	Determine the statistical significance of null hypothesis with inference based tests to various problems.	5
CO6	Create a Regression Model on a given random dataset to find out the statistical significance of various models and verify the assumptions.	6
Title of the Course and Course Code	**Experimental Training Course on C++ (MTS4205)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe the features of Object-Oriented Programming using C++.	1
CO2	Explain containment and inheritance to promote code reuse in C++.	2
CO3	Implement file handling operations using C++ programming.	3
CO4	Analyze the strengths of C++ programming.	4
CO5	Test and validate C++ applications using exception handling mechanism.	5
CO6	Write object-oriented applications using C++.	6

Title of the Course and Course Code	**Experimental Training Course on DBMS (MTS4205)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe major components of DBMS.	1
CO2	Interpret a problem and to recognize the computing requirements appropriate to its solution	2
CO3	Implement appropriate database for computer-based systems according to the user requirements, appropriate syntax to write SQL commands to perform various RDBMS operations.	3
CO4	Analyze a problem to found out the computing requirements appropriate to its solution.	4
CO5	Discuss the purpose of query processing for optimized solution.	5
CO6	Design data requirements of an application with the help of conceptual modelling tools.	6
S.Y. M.Sc. Semester III		
Title of the Course and Course Code	**Digital Image Processing (MTS5301)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	State basic concepts related to mathematics behind digital image processing, different causes for image degradation.	1
CO2	Discuss different feature extraction and segmentation techniques.	2
CO3	Apply different techniques employed for the enhancement of images, various techniques of image enhancement and compression. Demonstrate and execute morphological image processing on various image formats.	3
CO4	Explain the need for image compression and apply.	4
CO5	Compare spatial transforms and intensity transforms ,different techniques used in feature extraction in images.	5
CO6	Reconstruct the images using various reconstruction models.	6

Title of the Course and Course Code	**Statistical Inference (MTS5302)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define key concepts of statistical inference.	1
CO2	Illustrate the process of Hypothesis testing for practical applications.	2
CO3	Implement the process of Hypothesis testing for practical applications.	3
CO4	Analyze the process of Estimation and Testing of Hypothesis. Identify the key concepts in estimation of parameter estimation.	4
CO5	Justify hypothesis testing techniques to solve various problems on data and different techniques that leads to the best performance among the choices	5
CO6	Generate a model on a random dataset and interpret the inference.	6
Title of the Course and Course Code	**Complex Analysis (MTS5303)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define key concepts of Complex analysis.	1
CO2	Explain definitions, properties, examples of Analytic functions and harmonic functions, Cauchy-Riemann equations, elementary functionsState, explain and apply.	2
CO3	Illustrate elementary functions, logarithmic, exponential functions, Cauchy-Riemann equations, accurate and efficient use of complex integration.	3
CO 4	Compare elementary functions, logarithmic, exponential functions	4
CO5	Evaluate residues and poles in various complex integrations.	5
CO6	Develop problem-solving techniques applicable for diverse situations in physics, engineering and other mathematical contexts using complex analysis.	6

Title of the Course and Course Code	**Financial Mathematics (MTS5304)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify basic terms in Finance and Mathematical Statistics.	1
CO2	Interpret the concept of Present value and Interest rates.	2
CO3	Apply the options Pricing techniques for the best output in a given situation.	3
CO4	Analyze the option Pricing Model in a discrete and continuous time case for the best outcome.	4
CO5	Evaluate complex options with dividends on a security for the returns.	5
CO6	Design a scenario for pricing option pricing using utility for the returns in the case.	6
Title of the Course and Course Code	**Coding Theory (MTS5305)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe knowledge of basic concepts and principles related to finite fields.	1
CO2	Explain error detection, coding and decoding techniques, basic principles and theory of linear codes, cyclic codes	2
CO3	Compute encoding and decoding of linear code, cyclic codes.	3
CO4	Explain special types of Cyclic Codes	4
CO5	Evaluate hamming distance.	5
CO6	Specify distance of a code, binary hamming codes , linear codes.	6

Title of the Course and Course Code	**Operating Systems (MTS5306)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify the different types of an operating system and their responsibilities	1
CO2	Explain issues in different file systems ,various access methods, basics of the Linux system.	2
CO3	Solve problems on CPU scheduling, disk scheduling, memory management	3
CO4	Differentiate between process and threads.	4
CO5	Determine the concurrency conditions, critical section problems.	5
CO6	Write C programs on various concepts of Operating systems. Perform administrative tasks based on basics of the Linux System	6
Title of the Course and Course Code	**Computer Networks (MTS5307)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define components of a data communication system ,basics of computer network technology.	1
CO2	Discuss the layers of the OSI, TCP/IP models and the function(s) of each layer.	2
CO3	Apply the various error detection, correction techniques , methods to achieve network layer addressing	3
CO4	Compare different protocols of different layers	4
CO5	Compare various routing algorithms.	5
CO6	Build the view towards current trends such as virtualization and quantum computing.	6

Title of the Course and Course Code	**Experiential Training Course on Data Structures using C (MTS5308)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify fundamental data structures.	1
CO2	Illustrate fundamental data structures, their uses, strengths, and weaknesses.	2
CO3	Compute the time complexity of various data structures algorithms.	3
CO4	Explain the memory representations of several data structures.	4
CO5	Determine appropriate data structures as per the specified problem definitions.	5
CO6	Design and implement various data structure algorithms. Write C programs to implement Operating Systems algorithms using data structures.	6
S.Y. M.Sc. Semester IV		
Title of the Course and Course Code	**Design and Analysis of Algorithms(MTS5401)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe basic concepts of algorithm designs.	1
CO2	Illustrate the concept of recurrences, hash tables to run complex functions.	2
CO3	Solve the problems based on Polynomial time and Non-Polynomial time approaches.	3
CO4	Analyze the concept of dynamic programming, greedy and graph theoretic algorithms.	4
CO5	Evaluate and compare performance analysis of various algorithm designs.	5
CO6	Develop algorithms based on design techniques, get the Asymptotic notations.	6

Title of the Course and Course Code	**Cryptography(MTS5402)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe key notions and principles related to basic Cryptography.	1
CO2	Discuss the notion of classical cryptography, basic principles, theory of public key cryptography, key exchange algorithm.	2
CO3	Implement basic symmetric key algorithms and public key algorithms using programming language.	3
CO4	Explain different cryptographic algorithms.	4
CO5	Justify different cryptographic algorithms to obtain security and to encrypt, decrypt data, different types of attacks on data.	5
CO6	Integrate basic algorithms on elliptic curves and its use in cryptography.	6
Title of the Course and Course Code	**Applied Geometry for Computer Graphics using CAD (MTS5403)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Outline the basic principles and theory of homogeneous coordinates and transformations in plane and space, different types of projections on an object.	1
CO2	Explain the knowledge of basic concepts and principles related to transformations in plane.	2
CO3	Implement knowledge of basic concepts and principles related to transformations in plane, viewing pipeline, different types of projections on an object, standard 2D and 3D transformation algorithms	3
CO4	Explain points on standard curves, Bezier curve.	4
CO5	Evaluate points on standard curves, Bezier curve and on B-Spline using computations.	5

CO6	Create different projections and transformations based on basic 2D and 3D transformations.	6
Title of the Course and Course Code	**Dynamical Systems(MTS5404)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall basic concepts with dynamical systems and basic example solving.	1
CO2	Interpret physical problems with differential equations using initial conditions for Mathematical analysis.	2
CO3	Solve dynamical systems using the standard methods available for planar systems by analyzing them.	3
CO4	Explain Geometry of dynamical systems.	4
CO5	Evaluate key concepts related to limit cycles and visualise bifurcation diagrams for a given dynamical system.	5
CO6	Develop the codes to visualise a dynamical system and identify its features. Formulate a dynamical system for a given physical problem and identify the key aspects related to it.	6
Title of the Course and Course Code	**Machine Learning(MTS5405)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	List basic concepts in Machine Learning related to Regression and Classification.	1
CO2	Discuss and summarize numerical techniques required for Machine Learning.	2
CO3	Compute the performance, evaluations and verify assumptions for several algorithms.	3
CO4	Analyze the mathematical and statistical aspects of algorithms based on Regression, Clustering and Decision trees.	4
CO5	Review the performance, evaluations and verify assumptions for several algorithms. Determine models suitable for a given data.	5

CO6	Generate models on random data, verify assumptions using performance metrics to generate the best algorithm.	6
Title of the Course and Course Code	**Theoretical Computer Science (MTS5406)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify mathematical foundations, algorithmic principles and computer science theory necessary for the modelling and designing of computer-based systems.	1
CO2	Discuss key notions of theoretical computer science.	2
CO3	Apply mathematical foundations, algorithmic principles and computer science theory to the modelling and design of computer-based systems.	3
CO4	Explain knowledge of formal computation and its relationship to languages, formal reasoning about languages.	4
CO5	Compare different computing languages and their respective types.	5
CO6	Develop efficient and effective algorithmic solutions for different real-world problems.	6
Title of the Course and Course Code	**UNIX Internals(MTS5407)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Recall the history of the UNIX operating system and retrieve the general overview about system structure.	1
CO2	Interpolate the basic architecture of the UNIX operating system, Kernel data structures and system administration, internal representation of file systems.	2
CO3	Interpret the applications of various file systems.	3
CO4	Compare different concepts of buffer cache.	4
CO5	Determine different system level algorithms applicable to different types of UNIX subsystems.	5

CO6	Specify the structure of a process, process creation and signal processing.	6
Title of the Course and Course Code	**Experiential Training Course on Java Programming (MTS5408)**	**Number of Credits: 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify Java language components and their working in applications.	1
CO2	Discuss the concepts of OOPs and Java 8 features.	2
CO3	Implement object-oriented design with Java, file handling operations in Java.	3
CO4	Analyze Java APIs for program development.	4
CO5	Test and validate Java applications using exception handling mechanism.	5
CO6	Write applications using JDBC and Threads.	6
Title of the Course and Course Code	**Experiential Training Course on Python Programming (MTS5409)**	**Number of Credits: 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe various constructs of python programming.	1
CO2	Illustrate file handling operations in Python.	2
CO3	Use an IDE to write, compile, run, and test python programs.	3
CO4	Explain Object-oriented programming concepts in python.	4
CO5	Test and validate Python applications using exception handling mechanism.	5
CO6	Write interactive applications using Database, GUI and multithreading.	6

Title of the Course and Course Code	**Experiential Training Course on Web UI & UX (MTS5410)**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	State design process for single-page applications using ReactJS.	1
CO2	Illustrate the use of jQuery as a light-weight JavaScript library.	2
CO3	Demonstrate AJAX calls, use of a debugger and a DOM inspector.	3
CO4	Analyze the importance of user experience in designing of the websites.	4
CO5	Test and validate web applications using JavaScript.	5
CO6	Write web pages using various web technologies.	6
T.Y. M.Sc. Semester V		
Title of the Course and Course Code	**Numerical Analysis MTS6501**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	State and apply different methods of numerical integration, Numerical Differentiation and Numerical Optimization.	1
CO2	Explain the basic principles and theory of Interpolation.	2
CO3	Implement all standard curve fitting techniques.	3
CO4	Explain basic methods of solving Linear and Non-Linear Equations and Linear systems.	4
CO5	Test different methods of solving differential equations and Compute and evaluate differential equations numerically.	5
CO6	Develop knowledge of basic concepts and principles related to Mean Value Theorems, Error Term in Taylor Series, Big O notation.	6

Title of the Course and Course Code	**Optimization Techniques - MTS6502**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Identify and state basic concepts in Linear, Non-linear programming and Game theory.	1
CO2	Interpret the Game as a Linear Programming problem and discuss methods to solve them.	2
CO3	Apply methods to solve Integer programming problems and examine the solutions	3
CO4	Analyse the primal-dual relationship of a Linear programming problem and compute the dual.	4
CO5	Determine local solutions to develop techniques and solve non-linear programming problems.	5
CO6	Formulate and solve a Linear Programming problem using Simplex method.	6
Title of the Course and Course Code	**Simulation - MTS6503**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Outline key concepts in Simulations to build Conceptual Models.	1
CO2	Discuss various methods for Random Variate Generation.	2
CO3	Implement the Monte Carlo Simulation method and variance reduction techniques to solve problems.	3
CO4	Analyse simulation models for Single server Queuing systems.	4
CO5	Evaluate and develop methods required for Statistical analysis of Simulated data.	5
CO6	Design methods to simulate Random Variables and Stochastic Processes	6

Title of the Course and Course Code	**Compiler Construction MTS6504**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe compiler, aspects of compilation, structure and phases of compiler, One pass and Multi-pass compilers, cross compiler. Outline Bootstrapping.	1
CO2	Interpolate Applications of Regular Expressions and Finite Automata, Recognition of tokens, LEX: A Lexical analyzer generator. Explain Compilation of expression and three address code.	2
CO3	Implement the Top-Down Parser, Recursive Descent Parsing, Predictive [LL (1)] Parser, Operator Precedence Parser , Shift Reduce Parser, LR Parser concepts, Syntax Directed Definitions and syntax trees.	3
CO4	Compare SDD and SDT.	4
CO5	Discriminate Triples and quadruples, expression trees.	5
CO6	Hypothesize issues in Design of Code Generator	6
Title of the Course and Course Code	**Data Mining - MTS6505**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define Data Mining and its functionalities, Machine learning, DBMS, Statistics, Data warehouses, terminologies used for Attribute oriented analysis.	1
CO2	Compare operational database systems and data warehouses. Explain Data warehouse Characteristics, Architecture and its Components. Articulate Advanced Techniques, Data Mining software and applications	2
CO3	Apply Data Cleaning and Data Transformation concepts.	3
CO4	Analyse major issues in Data Mining. Classify Interestingness measures, implement Visualization Techniques. Categorize types of Attributes. Explain clustering concepts.	4
CO5	Compare Relevance Measures, Statistical Measures. Compare and Interpret Data mining algorithms: Associative	5

	rules, classification, prediction. Discriminate different schemas and Measures.	
CO6	Hypothesize the algorithms, characterization.	6
Title of the Course and Course Code	**Introduction to UML and Design patterns - MTS6506**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe various UML building blocks, its diagrams.	1
CO2	Distinguish between different categories of design patterns.	2
CO3	Demonstrate the Conceptual model of UML and SDLC. Apply the suitable design patterns to refine the basic design for given context.	3
CO4	Compare the Creational, Structural, Behavioral and Concurrency design patterns.	4
CO5	Select appropriate design pattern to design solutions.	5
CO6	Develop the conceptual model into various scenarios and applications using UML.	6
Title of the Course and Course Code	**Mobile Application Development - MTS6507**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe core concepts of Flutter Framework and components Dart Language and React Native.	1
CO2	Compare the challenges of native and cross-platform mobile development.	2
CO3	Use an IDE to write, compile, run, and test applications developed using Flutter framework and React Native.	3
CO4	Integrate widgets and state into apps with Firebase as a data store and learn to authenticate a user.	4
CO5	Test and deploy the app to emulators, simulators, and real devices.	5
CO6	Design native mobile apps for both Android and iOS.	6

Title of the Course and Course Code	**Soft Computing - MTS6508**	**Number of Credits : 04**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe key concepts associated with Soft computing and hard computing.	1
CO2	Illustrate various concepts associated with Genetic algorithms and compare Generic Algorithm vs. Traditional Algorithms	2
CO3	Apply the concept of Artificial neural network to find linear separability and solve various problems.	3
CO4	Explain and Compute Mathematical properties of Fuzzy Logic, Classical Sets and Fuzzy Sets and solve examples to justify the properties.	4
CO5	Review the concept of Swarm Computing and Ant colony optimization, formulate the concept of Associative Memory Network and Neuro Fuzzy Modeling to discuss real life problems.	5
CO6	Design and analyze the concept of Supervised learning and unsupervised learning to solve real life problems.	6

Title of the Course and Course Code	**Experiential Training course on Project Implementation MTS6509**	**Number of Credits : 08**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Define a problem statement relevant for the Project Topic.	1
CO2	Outline the prerequisites for the Proposed Project.	2
CO3	Implement multiple programming languages, databases and frameworks as a part of their self-learning exercises.	3
CO4	Break down complex user requirements into simple use cases using design mythologies / principles / patterns.	4
CO5	Determine performance and scalability requirements.	5
CO6	Formulate user journeys ,flows to minimal and reusable development and comprehensive testing.	6

T.Y. M.Sc. Semester VI		
Title of the Course and Course Code	**Industrial Training MTS6601**	**Number of Credits : 08**
On completion of the course, the students will be able to:		**Bloom's Cognitive level**
CO1	Describe and develop the various skills, attitude, and knowledge to understand the professionalism in the IT industry.	1
CO2	Discuss and explain the working culture of the Industry in view to maintain quality standards.	2
CO3	Implement the confidence, presentation skills and logical thinking, communication skills in developing the system.	3
CO4	Differentiate between the academics and professional work culture in timely delivery of projects.	4
CO5	Compare and contrast the professional development of the programs and project.	5
CO6	Combine the techniques to enhance oneself as a thorough software professional.	6