## FATIMA COLLEGE (AUTONOMOUS), MADURAI – 625018
## 2020 – 2021

**NAME OF THE PROGRAMME: B.SC. MATHEMATICS** **PROGRAMME CODE: UAMA**

**PROGRAMME OUTCOMES:**

The learners will be able to

**PO1:** Apply mathematical concepts to concrete and abstract problems and draw logical conclusions using the logic and inductive and deductive reasoning.

**PO2:** Mathematical concepts are used in environmental issues such as population growth, wastefulness, resource scarcity, air and water pollution and electrical energy demand.

**PO3:** The course strives to encourage women to study higher Mathematics, promote excellent women students and support their academic careers.

**PO4:** Mathematics is a subject which is exact, real, original and precise and one who studies Mathematics needs to follow the laws and rules. Thus, Mathematics helps the people to be cultured citizens having sound morals.

**PO5:** Explore employment in fields such as information technology, corporate sector, banking sector, public sector and service sector utilizing their mathematical knowledge

**PROGRAMME SPECIFIC OUTCOMES:**

**PSO 1**: Gain broad knowledge and understanding in pure Mathematics and applications of Mathematics.

**PSO 2**: Demonstrate a computational ability and apply logical thinking skills to solve problems that can be modelled Mathematically.

**PSO 3**: Read, understand, analyse and formulate Mathematical theorems.

**PSO 4**: Acquire proficiency in the use of technology to assist in learning and investigating, Mathematical ideas and in problem solving.

**PSO 5**: Communicate Mathematical concepts accurately, precisely and effectively with clarity and coherence both verbal and in written form.

| COURSE CODE | COURSE TITLE | COURSE OUTCOMES |
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| 19M1CC1/ 19G1CC1 | Calculus | CO1: Explain higher derivatives and apply Leibnitz theorem to find the nth derivative of functions.<br>CO2: Solve problems on curvature, envelopes, asymptotes and curve tracing. |

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| | | CO3: Construct reduction formula for trigonometric functions.<br>CO4: Define Jacobian, double & triple integrals and apply the knowledge of change of variables to solve the problems in double and triple integrals.<br>CO5: Construct Fourier series by recalling integration. |
| 19M1CC2/ 19GICC2 | Classical Algebra | CO1: Explain sets, relations and functions<br>CO2: Define binomial series, logarithmic and exponential series and solve problems.<br>CO3: Identify Relations between the roots and coefficients of equations. CO4: Explain the transformations of equations.<br>CO5: Recognize the important Methods in finding roots. |

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| 19M1AC1/ 19G1AC1 | Statistics | CO1: Solve problems on moments, skewness, kurtosis and correlation.<br>CO2: Construct regression line and curve equation.<br>CO3: Explain random variables and probability density function<br>CO4: Solve problems on expectation.<br>CO5: Define and explain analysis of time series and index numbers. |
| 19P1ACM1 | Allied Mathematics -I | CO 1: Find summation of any series.<br>CO 2: Explain the concepts of theory of equations.<br>CO 3: Calculate roots of equations using different methods.<br>CO 4: Expand trigonometric functions |

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| | | CO 5: Apply the Leibnitz's theorem to find the nth derivative |
| 19M1NME/<br>19M2NME | Quantitative Aptitude | CO1: Solve problems on ages<br>CO2: Illustrate profit and loss with examples<br>CO3: Explain partnership and related problems<br>CO4: Discuss problems on time and work<br>CO5: Solve problems on time and distance |
| 19M2CC3/ 19G2CC3 | Differential Equations | CO 1: Solve problems in differential equations of first order.<br>CO 2: Classify homogeneous and Non homogeneous differential equations of second order and solve problems.<br>CO 3: Solve differential equation problems using Laplace transform. |

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| | | CO 4: Define Partial differential equations and solve problems.<br>CO 5: Solve problems on Growth, decay and chemical reactions |
| 19M2CC4/ 19G2CC4 | Numerical Methods | CO1: Solve algebraic and transcendental equations using various methods. CO2: Identify the various methods of solving simultaneous linear algebraic equations.<br>CO3: Recognize difference operators and apply the concept of interpolation.<br>CO4: Compute the values of the derivatives at some point using numerical differentiation and integration.<br>CO5: Solve problems on higher order differential equations using Euler's, Runge- kutta and Predictor Corrector methods. |

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| 19M2AC2/ 19G2AC2 | Advanced Statistics | CO1: Classify discrete and continuous random variables and characteristics of Binomial distribution and Poisson distribution<br>CO2: Explain and illustrate the properties of Normal distribution and solve variety of problems.<br>CO3: Distinguish between a population and a sample and explain testing of hypothesis.<br>CO4: Explain chi square distribution, distribution and describe their various applications is Statistics. CO5: Define F- distribution and apply it to solve problems in analysis of variance |
| 19P2ACM2 | Allied Mathematics - II | CO 1: Solve linear differential equations.<br>CO 2: Solve second order linear differential equations with variable coefficient. |

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| | | CO 3: Define Laplace transform and apply it to solve differential equation.<br>CO 4: Explain the concepts of gradient, divergence, curl and their properties<br>CO 5: Apply line, volume and surface integrals to verify the Gauss divergence and Stoke's theorem |
| 19M3CC5/ 19G3CC5 | Modern Algebra | **CO1:** Classify groups and explain their properties.<br>**CO2**: Describe cosets and Lagrange's theorem.<br>**CO3**: Explain the characteristics of different types of rings and their properties.<br>**CO4**: Classify various types of ideals.<br>**CO5**: Construct polynomial rings over UFD. |

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| 19M3CC6/ 19G3CC6 | Vector calculus and Fourier Transform | **CO 1:** Explain the concept of differentiation of vectors.<br>**CO 2:** Compute divergence and curl of vectors.<br>**CO 3:** Solve problems on line and surface integrals.<br>**CO 4:** Compute fourier sine and cosine transforms.<br>**CO 5:** Describe the properties of fourier transforms |
| 19M3SB1\ 19G3SB1 | Applications of Calculus and Differential Equations | **CO1**: Explain Beta and Gamma functions and their properties.<br>**CO2**: Solve the problems in Maxima minima of functions of two variables.<br>**CO3**: Describe trajectories and orthogonal trajectories. |

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| | | **CO4**: Solve Brachistrochone problems<br>**CO5:** Discuss dynamical problems with variable mass |
| 19C3ACM1 | Allied Mathematics - I | • To enable the students to understand mathematical concepts like matrices, higher derivatives of functions, solving differential equations, trigonometric series, measures of dispersion and moments.. |
| 19B3ACM1 | Linear Programming | • To enable the students to convert real life problems into a Mathematical problem and to solve them using different techniques like graphical method, simplex method, Big – M method, Two - phase method and dual simplex |

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| | | method and also to obtain optimality in transportation, assignment problems. |
| 19M4CC7/ 19G4CC7 | Sequences and Series | **CO 1:** Define basic concepts of sequences<br>**CO 2:** Explain subsequences and Cauchy sequences<br>**CO 3:** Differentiate various convergence test for series and use them to solve problems<br>**CO 4:** Recognize alternating, convergent, conditionally and absolutely convergent series<br>**CO 5:** Distinguish the behaviour of series and power series |
| 19M4CC8/ 19G4CC8 | Linear Algebra | **CO 1:** Define Vector Space and explain its various concepts |

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| | | **CO 2:** Illustrate Inner Product Spaces<br>**CO 3:** Define basic concepts of matrices and solve linear equations<br>**CO 4:** Appraise Eigen Value and Eigen Vectors of matrices<br>**CO 5:** Describe bilinear forms and quadratic forms |
| 19M4SB2/ 19G4SB2 | Foundations of Mathematics | **CO 1:** Recall some expansions of Trigonometric functions.<br>**CO 2:** Explain Logarithms of Complex quantities.<br>**CO 3:** Describe properties of integers.<br>**CO 4:** Solve puzzles using Chinese remainder Theorem. |

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| | | **CO 5:** Analyse inequalities |
| 19C4ACM2 | Allied Mathematics - II | • To enable the students to understand the mathematical concepts like groups, integration, Laplace transform, Correlation, Regression and curve fitting. |
| 19B4ACM2 | Algebra and graph theory | • To study the concepts of functions, matrices and graph theory. |
| M5CC9/ G5CC9 | Real Analysis | **CO 1:** Define basic concepts of sequences<br>**CO 2:** Explain sub sequences and Cauchy sequences<br>**CO 3:** Differentiate various convergence test for series and use them to solve problems |

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| | | **CO 4:** Recognize alternating, convergent, conditionally and absolutely convergent series<br><br>**CO 5:** Distinguish the behaviour of series and power series |
| M5CC10/ G5CC10 | Mechanics | • Enable the students to apply the laws, principles, postulates, 12 governing the statics of the system and to apply the laws and principles governing dynamics of the system, in physical reality. |
| M5CC11/ G5CC11 | Computer Programming in C | • C language is one of the most popular computer languages today and the programs written in C are powerful, efficient, fast and compact. Realizing the need for educating our |

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| | | students in the various applications of mathematics, we have introduced this course. |
| M5CCP1 | C - Practicals | • Abstract concepts in Mathematics, in all branches of Science and Technology, even in Social and Natural sciences find representations in graph theory. 13 There is hardly any field where graph theory does not find application. This paper is to enable the students to have better application of abstract concepts through graph theory. |
| M5ME1/ G5ME1 | Graph Theory | • Abstract concepts in Mathematics, in all branches of Science and Technology, even in Social and Natural sciences find representations in graph theory. 13 There is hardly any field where graph theory does not |

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| | | find application. This paper is to enable the students to have better application of abstract concepts through graph theory. |
| M5ME2/ G5ME2 | Fuzzy Mathematics | • The objective of this course is to introduce to the students the concepts of Fuzzy Sets, Fuzzy Logic, Fuzzy Operations and Fuzzy Relations. |
| M5SB3/ G5SB3 | Fourier Transforms | • Enable the students to apply Fourier transforms which plays an important role in the study of continuous time signals |
| M5SB4/ G5SB4 | Advanced Linear Programming | • To enable the students to convert real problems into a Mathematical 14 model and solve them using different |

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| | | techniques. That is through method of duality, Gomory's method, Branch and Bound Technique, Dynamic programming method . |
| M6CC12/ G6CC12 | Complex Analysis | • To provide the student with an introduction to Complex Analysis of one variable since it has its application in almost every branch of Mathematics. |
| M6CC13/ G6CC12 | Numerical Methods | • To give basic knowledge in Numerical methods and to solve problems purely mathematical in nature so that the students develop the confidence of solving research level problems. |

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| M6CC14/ G6CC14 | Operations Research | • This course deals with sequencing problem, Game theory, Inventory Control, Queuing theory and Network scheduling by PERT/CPM and it emphasis the students to convert real problem into a mathematical model and solve them using these techniques. |
| M6ME3/ G6ME3 | Object Oriented Programming with C++ | • In the expanding field of computer education, one of the fastest growing, versatile and much sought after languages is C++. This course enables the students to understand the fundamentals of the language, the |

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| | | concepts related to the syntax of the language. |
| M6MEP1 | C++ - Practicals | • In the expanding field of computer education, one of the fastest growing, versatile and much sought after languages is C++. |
| M6ME4/ G6ME4 | Astronomy | • To introduce the concepts about the celestial bodies such as Earth, Moon and Planets and to import the knowledge on duration of day and night, lunar and solar eclipses, maximum number of eclipses. |
| M6MEP2 | Astronomy Project | |

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| M6ME5 | Lattices and Boolean Algebra | • To enable the students to know more about lattices and Boolean Algebra and their usefulness in other areas of Mathematics. |
| M6ME6 | Automata Theory | • It provides techniques useful in a wide variety of applications and helps to develop a way of thinking that leads to understanding of the structure behavior and limitations and capabilities of logical machines. |
| M6ME7 | Theory of Numbers | • The objective of this course to present the students an introduction to an area of Pure mathematics which has intrigued non professionals as well as |

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| | | the greatest minds of human kind since the dawn of history. A brief history of the development of numbers and some of the influential number theorist will be presented. Some application will also be considered. |
| M6SB5 | MATLAB | • To learn the MATLAB tools and its applications in various areas of Mathematics. |
| M6SB6 | Applied Dynamics | • To enable the students to apply the laws and principles governing dynamics of the system in physical reality |