ST. FRANCIS COLLEGE
Koramangala
Affiliated to Bengaluru City University

DEPARTMENT OF SCIENCE

B.Sc - MSE (MATHEMATICS,SCIENCE& ECONOMICS)

2019-20 ONWARDS (CBCS SCHEME)

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1. Pursue masters and doctoral research degrees to work in colleges, universities as professors or as scientists in research establishments

PEO 2. Act as administrators in public, private and government organisations or business administrator or entrepreneur with further training and education.

PEO 3. Pursue masters and doctoral research degrees to work in colleges, universities as professors or as scientists in research establishments

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PROGRAMME OUTCOMES (POs):

PO 1 .Scientific Knowledge:

Understand and apply the fundamental principles, concepts and methods in key areas of science and multidisciplinary fields

PO2. Design [Development of Solutions:

Demonstrate problem solving, analytical and logical skills to provide solutions for the scientific requirements

PO3. Problem analysis:

Develop the critical thinking with scientific temper

PO4. Communication Efficacy:

Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

PO5. Societal and Environmental Concern:

Understand the importance and judicious use of technology for the sustainable growth of mankind in synergy with nature

PO6. Effective Citizenship:

Understand the professional, ethical and social responsibilities

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO 1. Demonstrate the problem-solving skills in mathematical sciences.

PSO 2. Address current economic issues and trends.

PSO 3. Acquire a strong foundation in statistical analytics.

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COURSE OUTCOMES (Cos)

2019-20 ONWARDS (CBCS SCHEME)

I SEM B .Sc (MSE)

B .Sc (MSE) BASIC STATISTICS -1 (THEORY)

CO 1. To define statistics, primary and secondary data, diagrammatic, graphical Presentation and Concepts of statistical population and sample, variables, and attributes. Tabular and graphical representation of data based on variables.

CO 2. Solve problems using Measures of central tendency.

CO 3. To describe measures of dispersion, deviation and skewers and Concept of Principle of least squares for curve fitting and regression lines.

CO 4. To explain the concept of correlation, various correlation coefficientsPearson's correlation coefficient, Spearman's rank correlation coefficient, partial correlation coefficient and Multiple correlation coefficient.

CO 5. To know different approaches to the theory of probability the concept about probability and Bayes theorem.

B .Sc (MSE) BASIC STATISTICS -1 (PRACTICAL)

CO 1. Representing statistical data diagrammatically and graphically and with the help of Ms-Excel

CO 2. Computing various Measures of Central Tendency, Dispersion, Moments, Skewness and Kurtosis

CO 3. Ability to compute Correlation Coefficient, Regression Coefficient, Multiple and Partial correlation coefficient.

CO 4. Analysis of the data pertaining to discrete variables and to interpret the results.

B .Sc (MSE) MATHEMATICS-I (THEORY)

CO 1. Perform matrix operations, solve homogeneous and non-homogeneous systems, solve problems on Cayley Hamilton theorem.

CO 2. Be familiar with successive differentiation and use Leibnitz theorem to solve problems, perform partial differentiation.

CO 3. Solve problems by using differentiation under integral sign, reduction formula.

CO 4. Master the fundamental concepts of analytical geometry.

B .Sc (MSE) MATHEMATICS PRACTICAL - 1

CO 1. Proficiency in Maxima/Scilab fundamentals.

CO 2. Using Scilab functions for performing calculations on matrices and plotting the graphs.

CO 3. Using Maxima functions for finding nth derivatives. CO 4. Obtain partial derivatives of some standard functions.

CO 4. Implement vector form of line and plane.

B .Sc (MSE) MICROECONOMICS

CO 1. Describe different kinds of microeconomic concept

CO 2. Examine Price determination in economy.

CO 3. To understand cost concepts and its application

CO 4. To study and evaluate market equilibrium

CO 5. To evaluate income distribution among various factors

B .SC (MSE) ENVIRONMENTAL SCIENCE

CO 1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.

CO 2. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

CO 3. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.

CO 4. Apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes.

CO 5. Reflect critically about their roles and identities as citizens, consumers, and environmental actors in a complex, interconnected world.

II SEM B .Sc (MSE)

Bsc. (MSE) 1.1 BASIC STATISTICS -11 (THEORY)

CO 1. Students learn about random events, marginal distributions and moments.

CO 2. Studied deeply about characteristic functions, Binomial and Poisson distributions.

CO 3. Gains knowledge about various probability distributions and normal distributions.

CO 4. Students learn different types of continuous distribution with their properties and applications.

CO 5. Gain the knowledge about limit theorems

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Bsc. (MSE) 1.2 BASIC STATISTICS -11 (PRACTICAL)

CO l. Ability to compute probabilities of standard probability distribution.

CO 3. Drawing random sample from standard probability distribution

CO 4. Ability to sketch pmf and pdf of various probability distributions for given parameter

CO 5. Ability to fit various probability distributions by using Ms-Excel

Bsc. (MSE) 2.1 MATHEMATICS-II (THEORY)

CO 1. Solve problems on the properties, theorems of groups and subgroups.

CO 2. Solve problems in differential calculus
CO 3. Apply integral calculus to find length, area, surface area, volume of solids.

CO 4. Solve first order differential equations using standard methods, such as separation of variables, use of integrating factors and substitution methods.

Bsc. (MSE) 2.2 MATHEMATICS-II (PRACTICAL - 11)

CO 1. Proficiency in using Maxima/Scilab fundamentals.

CO 2. Using Maxima/Scilab functions in solving problems on groups.

CO 3. Proficiency in using Maxima/Scilab functions for tracing the curves, applying in calculus.

CO 4. Using Maxima/Scilab functions in solving ODE's.

Bsc. (MSE) 3 MACROECONOMICS

CO 1. To study and compare national income.

CO 2. Describe economic growth of a nation.

CO 3. Identify consequences and solutions to inflation.

CO 4. Practical applicability of employment theories.

CO 5. To evaluate stages of business cycle.

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Bsc. (MSE) 4 INDIAN CONSTITUTION

CO 1. Able to understand historical background of the Constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration, Knowledge/Understand

CO 2. Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

CO 3. Able to analyse the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.

CO 4. Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions

III SEM B .Sc (MSE)

B .Sc (MSE) STATISTICAL INFERENCE -1 (THEORY)

CO 1: Ability to derive the distributional results needed for statistical inference.

CO 2: Explain the concept of estimation of parameters.

CO 3: Calculate the problems related to point estimation and interval estimation

CO 4: Demontrate understanding of theory of maximum estinnation and numnent estilnation for a scalarparanneter.

CO 5: Explain the simulation process and random number generation.

B .Sc (MSE) STATISTICAL INFERENCE -1 (PRACTICAL)

CO I: Drawing random samples using random number tables.

CO 2: Point estimation of parameters and obtaining estimates of standard error and Comparison ofestimators by plotting mean square error.

CO 3: Ability to solve the problems using methods of point estimation

CO 4: Ability to find the interval estimation

CO 5: Ability to analyse data and fit simulation Illoclels and random nutliber generation using Excel,

B .SC (MSE) MATHEMATICS- III (THEORY)

CO 1: The course will enable the students to: i) Recognize the mathematical objects called groups. ii)Link the fundamental concepts of groups and symmetries of geometrical objects. iii)Explain the significance of the notions of cosets. iv)Analyse consequences of Lagrange's theorem.

CO 2: This course will enable the students to: i) Assimilate the notions of limit of a sequence and convergence of a series of real numbers.

CO 3: This course will enable the students to i) Calculate the limit and examine the continuity of a function at a point. ii)Understand the consequences of various mean value theorems for differentiable functions

IV SEM B .Sc (MSE)

Bsc. (MSE) 1 INTRODUCTION TO STATISTICS FOR ECONOMICS

CO I: Critically evaluate the underlying assumptions of analysis tools

CO 2: The students will be able to understand the key terminology, concept tools and techniques used in statistical analysis.

CO 3: Solve a range of problems using the statistical methods.

CO 4: Conduct basic statistical analysis of data.

CO 5: The students will be able to measure economic variables with statistical techniques.

BSC. (MSE) 2 STATISTICAL INFERENCE – II (THEORY)

CO I: Known broad idea of Testing of Hypothesis.

CO 2: Understood the concepts of Statistical Inference.

CO 3: Formulation of Statistical hypothesis is real life situations. Apply appropriate test to validate the hypothesis

CO 4: Known the application of non-parametric test.

CO 5: On completion of this course the student should be able to demonstrate knowledge of, and a critical understanding of, statistical methodologies (including the main concepts and methods of inference and modeling)

BSC. (MSE) 3 STATISTICAL INFERENCE - 11 (PRACTICALS)

CO 1: Understand critically the problems that are faced in testing of a hypothesis with reference to the errors in decision making.

CO 2: Apply the different testing tools like t-test, F-test, chi-square test, sign test, run test, etc to analyze the relevant real-life problem

BSC. (MSE) 4 MATHEMATICS IV (THEORY)

CO 1: Understand Algebraic structures, state and instantiate the definitions of the following terms: Normal subgroups, Quotient Group, Homomorphism of groups; homomorphic image; kernel of a homomorphism; image of a homomorphism, Isomorphism of groups; well-defined mapping

CO 2: Learn to represent periodic functions using Fourier series and identify the Fourier series of function with period CO 2•.TT and Period CO 2:L also the half range cosine and sine series.

CO 3: Learning about continuity and differentiability of function of two and three variables. Construct the Taylor's theorem and apply derivative tests in optimization problems appearing in social sciences, physical sciences, life sciences and a host of other

disciplines.

CO 4: Work with second and higher order ODEs and systems of ODEs in various situations and use correct mathematical terminology, notation, and symbolic processes

BSC. (MSE) MATHEMATICS-IV PRACTICALS

CO I: Learn how to design and program Python applications for the implementation of various Mathematical concepts and thus acquire proficiency in using different functions of Python

CO 2: Demonstrate the use of Python software to know the concept of Algebraic structures and Construction of Normal subgroups and Quotient group. Learning Homomorphism and isomorphism of groups. Identify the Kernel and image of a homomorphism. Knowing about fundamental theorem of homomorphism and Cayley's theorem

CO 3: Lay a good foundation for classical analysis and identify the Fourier series of function with period CO 2•.TT and Period CO 2:Land the half range cosine and sine series.

CO 4: Understand the notion of differential calculus, use of derivatives in optimization and to solve the second and higher order ordinary differential equations.

BSC. (MSE) 5 PERSONALITY DEVELOPMENT

CO I: Course will enable the students to understand and familiarize Personality Development through Self-Awareness, goal setting and creativity.

CO 2: Students will learn the on developing Interpersonal skills with techniques and its benefits. Also Effects of stress on body and mind-Stress removal techniques.

CO 3: Course will enable the students to enhance personality through effective time management with its benefits and necessity. Also the leadership development

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V SEM B .Sc (MSE)

MATHEMATICS-V THEORY

CO 1: Defining the Rings, subrings, Ideals Principal Ideals, prime and Maximal ideals in a commutative ring, Homomorphism, Isomorphism and properties, Quotient rings, Integral Domain, fields. Knowing about the Fundamental Theorem of Homomorphism of rings.

CO 2: Knowing about gradient of a scalar field, directional derivative, Maximum directional derivative. Divergence and curl of a vector field and knowing about solenoidal and irrotational vectors. Verifying vector identities and Harmonic functions.

CO 3: Constructing the forward and back difference table, constructing the divided difference table.

CO 4: Finding the numerical solutions by using Newton-Gregory forward and backward interpolation formulae, Lagrange's, Newton's interpolation formulae for unequal intervals, inverse interpolation. Evaluating numerical solutions by integration method by Trapezoidal rule, Simpson's CO I:/CO 3:rd rule, **CO 3**:/CO 8:th rule

MATHEMATICS- V PRACTICAL

CO L : Learn how to design and program using FOSS such as SCILAB and Maxima for the implementation of various Mathematical concepts and acquire proficiency in using different functions of Maxima/SCILAB to compute solutions of mathematical problems.

CO 2: Demonstrate the use of Maxima/SCILAB to solve mathematical problems along with visualizing the solutions.

CO 3: Understand the concept of Algebraic structures, Defining the Rings, subrings, Ideals Principal Ideals, prime and Maximal ideals in a commutative ring. Defining the Homomorphism, Isomorphism and properties, Quotient rings, Integral Domain, fields. Knowing about the Fundamental Theorem of Homomorphism of rings.

CO 4: Knowing about gradient of a scalar field, directional derivative, Maximum directional derivative. Divergence and curl of a vector field and knowing about solenoidal and irrotational vectors. Verifying vector identities, Harmonic functions.

CO 5: Constructing the forward and back difference table, constructing the divided difference table. Finding the numerical solutions by using Newton-Gregory forward and backward interpolation formulae, Lagrange's, Newton's interpolation formulae for unequal intervals, inverse interpolation. Evaluating numerical solutions by integration method by Trapezoidal rule, Simpson's CO I:/CO 3:rd rule, CO 3:/C0 8:th rule.

E0240 INDIAN ECONOMY

CO 1: Students will know the Indian Economy, during Pre-British rule.

CO 2: Students will be able to compare the economic status of India pre and post

British rule.

CO 3: Critically understanding the impact of agriculture on Indian economy.

CO 4: Analysing the role and significance of Industrial revolution in India.

CO 5: Understanding the recent trends in Infrastructure development.

E0270 ENVIRONMENTAL ECONOMY

CO I : Good experience with the concept, policies and issues in environmental economics.

CO 2: Understand the power of market and market failure,

CO 3: Evaluate and suggest proper remedies to solve environmental issues.

CO 4: Understanding the policies to protect environment for the healthy and development society.

CO 5: Understand the economics of sustainability.

E0261 MATHEMATICS-VI (THEORY)

CO L : Apply a range of techniques to solve first & second order partial differential equations.

CO 2: Model physical phenomena using partial differential equations such as the heat and wave equations.

CO 3: Understand problems, methods and techniques of calculus of variations.

CO 4: Apply problem-solving with differential geometry to diverse situations in physics, engineering and in other mathematical contexts

EP261 MATHEMATICS PRACTICAL - VI (PRACTICALS)

CO L : Learn Free and Open-Source Software (FOSS) tools for computer programming

CO 2: Solve problem on algebra and calculus theory studied in theory by using FOSS

CO 3: Acquire knowledge of applications of algebra and calculus through FOSS Practical/Lab Work to be performed in Computer Lab (FOSS)

SAMPLING THEORY AND STATISTICAL QUALITY CONTROL (THEORY)

CO L : Understood different sampling procedures with its mathematical derivations.

CO 2: Able to apply different sampling techniques in different situations.

CO 3: Able to know applications of SQC in Industrial sector.

CO 4: Understood the applications of Control in production processes.

STATISTICS PRACTICAL - V

CO L : Know the practical issues arising in sampling studies.

CO 2: Appropriately interpret results of analysis of variance tests.

CO 3: Understand the concepts of quality control, chance and assignable causes of variation, control charts for variables and attributes, producer and consumer risk Acceptance sampling plans.

CO 4: Understand the setting of mean chart limits, range chart limits using mean and range charts.

STATISTICS —VI: DESIGN AND ANALYSIS OF EXPERIMENTS

(THEORY)

CO L : Students will be able to recognize the situation in which analysis of variance (ANOVA) is appropriate and be able to perform one-way and two-way ANOVA with the assistance of computer software.

CO 2: Identify features common in experiments, like the experimental unit, treatment, factors, control groups, randomization and blocking.

CO 3: Understand the importance of statistical design of experiments and its benefits; to choose an appropriate experimental design based on the study objectives.

CO 4: Understand the need and the procedure of conducting factorial experiments.

CO 5: Appreciate the need for confounding a factorial experiment, identify the confounded effect.

STATISTICS PRACTICAL VI

CO L : Ability to design an experiment.

CO 2: Ability to analyze and interpret the experiment results by analysis of variance (ANOVA).

CO 3: Ability to consider random effects and mixed effects.

BANKING & FINANCE (FC)

CO 1 : The students will be able to Understand the operation of financial system.

CO 2: Analyse the mechanism of banking system and other financial institutions.

CO 3: The students will be able to understand the power and significance of money.

CO 4: Understand the functions and applications of finance in trade and commerce.

VI SEM B .Sc (MSE)

STATISTICS VII: APPLIED STATISTICS (THEORY)

CO 1 : It is learnt that Time series, index numbers and official statistics play an ever-increasing role in framing policies in Economics and Business.

CO 2: Demonstrate understanding of the concepts of time series and its applications indifferent areas.

CO 3: It helps in understanding that population and GDP growth go hand in hand for development

CO 4: Acquire knowledge on vital statistics, Index numbers and calculate an indices fromgiven data.

CO 5: Should be able to decompose and estimate the time series

STATISTICS VII . APPLIED STATISTICS (PRACTICALS)

CO 1 : Analyze such problems and to make better decisions for future in their fields.

CO 2: Apply the statistical tools in business, economical and commercial areas with

thehelp of time series, index numbers, etc

STATISTICS VIII:OPERATIONS RESEARCH (PRACTICALS)

CO I : Know the different optimal techniques to solve physical problems.

CO 2: Apply the various optimization techniques in areas of manufacturing, transportation, job assignment, inventories of stock, project monitoring.

ENTREPRENEURSHIP AND INNOVATION -VI (FC)

CO 1 : The students will be able understand the nature and concepts of entrepreneurship.

CO 2: Analyses the impact of Make in India, Start-up India and Mudra Bank.

CO 3: Understand the business ideas and innovative techniques.

CO 4: Develops innovative business plans and strategies among students.

CO 5: Explain the process of business projects reports.

F0240 INTERNATIONAL TRADE THEORY AND POLICY

CO 1: Good acquaintance with the concept and theories of international trade.

CO 2: Understand the importance of international trade.

CO 3: Knowledge on understanding foreign trade and balance of payments.

CO 4: Understand the concepts of terms of trade.

CO 5: Understand the origin, structure and of IMF and its relation with India.

F0260 HUMAN RESOURCE MANAGEMENT

CO L : Good experience with the fundamentals of HRM.

CO 2: Understand the vital aspects of HRM.

CO 3: The students will be able to understand the basic functions of Business organisation.

CO 4: Understand the difference between IQ and EQ.

CO 5: The students will be able to apply Time management and Stress management in day-to-day activities.

MATHEMATICS-VII THEORY

CO L: Apply linear transformation in Physics, Engineering, Social sciences and various branches of Mathematics.

CO 2: Use Eigen values and Eigen vectors of a matrix in the study of vibrations, chemical reactions and geometry.

CO 3: Get well equipped with Mathematical Modelling abilities.

CO 4: Learn methods to solve first order Partial Differential Equations

MATHEMATICS VII (PRACTICALS)

CO 1: Enhance Problem solving skills of students and develop Interdisciplinary approach.

CO 2: Apply mathematical concepts to practical and real life problems.

MATHEMATICS-VIII THEORY

CO L : Get equipped with the understanding of the fundamental concepts of functions of a complex variable along with the concepts of analyticity, Cauchy-Riemann relations and harmonic functions and Complex Transformations.

CO 2: Evaluate complex contour integrals applying the Cauchy's integral theorem and Cauchy's integral formula

CO 3: Compute numerical solution of algebraic and transcendental equations and solutions of system of linear equations in three variables by iterative methods

CO 4: Computing the numerical solutions of initial value problems by Taylor's, Euler's and Euler's modified method and RungeKutta of CO 4:th order method.

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MATHEMATICS-VIII PRACTICAL

CO 1: Learn how to design and program using FOSS such as SCILAB and Maxima for the implementation of various Mathematical concepts.

CO 2: Acquire proficiency in using different functions of Maxima/SCILAB to compute solutions of mathematical problems and Demonstrate the use of Maxima/SCILAB to solve mathematical problems along with visualizing the solutions.

CO 3: Be familiar with the built-in functions to deal with Complex valued functions and Construct analytic function from complex function. Understand the basic methods of complex integration and its application in contour integration and complex Transformations.

CO 4: Demonstrate the use of Maxima/Scilab to compute numerical solution of algebraic and transcendental equations and solutions of system of linear equations in three variables by iterative methods along with visualizing the solutions, which in turn gives a foundation for pursuing research in Mathematics as well as provides quantitative Skills.

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