

ST. JOSEPH'S DEGREE & PG COLLEGE

(Autonomous) - Affiliated to Osmania University
Re-accredited by NAAC (3rd Cycle)
Basheerbagh, King Koti Road, Hyderabad – 29

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF) FOR UNDERGRADUATE PROGRAMMES

FACULTY OF SCIENCES

DEPARTMENT OF MATHEMATICS & STATISTICS



BSc (MSCs/MECs/MPCs)

(Common Core Syllabus for all the Students Admitted from the Academic
Year 2022-25 Batch onwards)

ABOUT THE PROGRAMME

B. Sc (MSCs/MECs/MPCs) MATHEMATICS (Common Core Syllabus for all the Students Admitted from the Academic Year 2022-25 Batch onwards)

DURATION: 3 Years (2022-25)

ELIGIBILITY CRITERIA: A pass in the two-year Intermediate Examination of T.S. or +equivalent to and with an aggregate of 50% marks in the concerned Science subjects are Physical Sciences & Mathematics

PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)

PEO 1	Graduates can pursue PG and Research.
PEO 2	Graduates are provided with domain knowledge to get employed in IT industries, Scientific & Research organizations and allied industries
PEO 3	Graduates are trained to develop and demonstrate creativity and innovation equipped with Collaborative Working Skills.
PEO 4	Graduates will develop positive attitude and life skills which enable them to become a multi facet personality with a sense of environmental consciousness and responsible citizen with moral and ethical values

PROGRAMME OUTCOMES (POs)

PO 1	Acquire knowledge in Physical Sciences with a thrust on fundamental principles and theories related to various scientific phenomena and their relevance in day-to-day life.
PO 2	Graduates attain practical knowledge through hands-on training and project experience to meet the industrial needs.
PO 3	Graduates develop critical thinking skills to identify, analyze and solve problems of their core areas using modern tools.
PO 4	To enhance arithmetic skills and logical reasoning for better.
PO5	Graduates develop lifelong learning skills with interdisciplinary approach towards sustainable development.
PO6	Ability to communicate effectively the comprehended scientific data and knowledge, write effective reports, design documentation and make effective presentations.
PO7	Apply ethical, moral and social values in personal and professional life leading to highly cultured and civilized society.
PO8	Ability to work effectively as an individual or as a member or Team leader in diverse teams and in multidisciplinary environs.

(cont.... as per the Programme requirement)

*Note: Select from the below Graduate Attributes

Knowledge (Factual & Conceptual Knowledge)	Disciplinary Knowledge
Skills (Procedural Knowledge)	<ul style="list-style-type: none"> • Communication Skills • Critical Skills • Problem Solving • Analytical Reasoning • Research – related skills • Reflective thinking • Information / Digital Literacy • Self-directed Learning
Attitude (Metacognitive Knowledge)	<ul style="list-style-type: none"> • Cooperation • Scientific Reasoning • Multicultural Competence • Moral and Ethical Awareness / Reasoning • Leadership Readiness / Qualities • Lifelong Learning

PROGRAMME SPECIFIC OUTCOMES (PSOs)

B.Sc (MSCs)	<ul style="list-style-type: none"> • PSO1: Students develop problem solving skills and methods and develop logical tools and models used to solve various real life problems. • PSO2: Students acquire knowledge of traditional and modern techniques of solving algebraic, transcendental equations, differential and integral equations, which have applications in many disciplines. • PSO3: Apply and analyze data using concepts of probability, statistical models, sampling theory, experimental designs, statistical quality control, reliability, optimization techniques, Indian official statistics and vital statistics with modern applied statistical tools and techniques both in learning and research. • PSO4: Ability to design and develop software applications to address real time problems using Programming languages, Databases, Operating Systems, and Computer Network Concepts.
B.Sc (MECs)	<ul style="list-style-type: none"> • PSO1: Students develop problem solving skills and methods and develop logical tools and models used to solve various real life problems. • PSO2: Students acquire knowledge of traditional and modern techniques of solving algebraic, transcendental equations, differential and integral equations, which have applications in many disciplines. • PSO3: Students attain comprehensive knowledge in electronics that will help to construct, analyze, verify, program and troubleshoot digital and discrete component circuits using appropriate tools and techniques. • PSO4: Ability to design and develop software applications to address real time problems using Programming languages, Databases, Operating Systems , and Computer Network Concepts.
B.Sc (MPCs)	<ul style="list-style-type: none"> • PSO1: Students develop problem solving skills and methods and develop logical tools and models used to solve various real life problems. • PSO2: Students acquire knowledge of traditional and modern techniques of solving algebraic, transcendental equations, differential and integral equations, which have applications in many disciplines. • PSO3: The students attain sound knowledge in the areas of Mechanics, Thermal Physics, Waves and oscillations, optics, electromagnetism, modern physics, solid-state physics for pursuing higher education and research. • PSO4: Ability to design and develop software applications to address real time problems using Programming languages, Databases, Operating Systems, and Computer Network Concepts.

FUTURE SCOPE:

- **Higher Education:** MA/MCA/M.Sc./ MBA/ MS/ Integrated Courses
- **Career Opportunities:**
- **Employment Opportunities:** Graduates have wide scope in the fields of IT, ITES, Technical Support, Government and Research Firms etc.
- **Designations:** Developer/Programmer/Application Analyst/Technical Analyst, System Analyst, Web Designer/ Full stack developer/ Database Administrator/IT Consultant/Network Administrator/System Administrator/ Mobile Application Developer/Computer Application Specialist/Application Developer Informatics Analyst etc.

SEMESTER I
FACULTY OF SCIENCE
DSCT: MATHEMATICS PAPER-I (Differential & Integral Calculus)

Scheme of Instruction	Scheme of Examination
Course Code: DIC-1-MM-22T	Course Title : Differential & Integral Calculus
Credits : 4	Max. Marks : 100
Category : DSCT	Internal Examination : 30
Hours/Week :4	SBT :10
Total durations Hrs : 60	External Examination :60
Instruction Mode: Lecture Method	External Exam Duration :3 Hrs

Course Objective: The course aims at imparting the knowledge of Partial and Total differentiation and their Applications to Maxima &Minima, Length of Arcs, Curvature, & techniques of double and triple integrals and their applications .

Course Outcomes: Upon successful completion of this course, students will demonstrate the ability to	Cognitive Level
CO1: Apply Euler's Theorem on Homogeneous Functions using the comprehensive understanding of partial differentiation techniques,	BL4
CO 2: Demonstrate proficiency in total differentiation and apply the differentiation techniques to solve the problems	BL4
CO 3: Apply Differentiation techniques to find the Radius of curvature, Length of the Arc, Center of Curvature and the equation of Evolutes.	BL4
CO 4: Demonstrate proficiency in double integration techniques, including the application of double and for determining areas, volumes of solids as well as the ability to manipulate integrals through change of order	BL4

SEMESTER- I
FACULTY OF SCIENCE
DSCP: MATHEMATICS PAPER-I (Differential & Integral Calculus)

Scheme of Instruction	Scheme of Examination
Course Code: DIC-1-MM-22P	Course Title : Differential & Integral Calculus (Practical)
Credits : 1	Max. Marks : 50
Category : DSCP	Internal Examination : 20
Hours/Week :3	External Examination :30
Total durations Hrs : 45	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: The course aims at imparting the knowledge of Partial and Total differentiation and their Applications to Maxima &Minima, Length of Arcs, Curvature, & techniques of double and triple integrals and their applications .

Course Outcomes: Upon successful completion of this course, students will demonstrate the ability to	Cognitive Level
CO1: Apply Euler's Theorem on Homogeneous Functions using the comprehensive understanding of partial differentiation techniques,	BL4
CO 2: Demonstrate proficiency in total differentiation and apply the differentiation techniques to solve the problems	BL4
CO 3: Apply Differentiation techniques to find the Radius of curvature, Length of the Arc, Center of Curvature and the equation of Evolutes.	BL4
CO 4: Demonstrate proficiency in double integration techniques, including the application of double and for determining areas, volumes of solids as well as the ability to manipulate integrals through change of order	BL4

SEMESTER II
FACULTY OF SCIENCE
DSCT: MATHEMATICS PAPER-II (Differential Equations)

Scheme of Instruction	Scheme of Examination
Course Code: DE-2-MM-22T	Course Title : Differential Equations
Credits : 4	Max. Marks : 100
Category :DSCT	Internal Examination : 30
Hours/Week :4	SBT :10
Total durations Hrs : 60	External Examination :60
Instruction Mode: Lecture Method	External Exam Duration :3 Hrs

Course Objective: To impart the knowledge of various types of Differential Equations, methods of solving ordinary differential equations, formulation of partial differential equations, methods of solving first order partial differential equations.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Identify the types of differential equations and solve first order first degree differential equations.	BL4
CO 2: Solve first order higher degree differential equations	BL4
CO3: Translate the skills to solve higher order homogeneous and non-Homogeneous differential equations with constant as well as variable coefficients.	BL4
CO 4: Solve linear differential equations with non-constant coefficients, formulate & Solve the Partial differential equations of first order	BL4

SEMESTER II
FACULTY OF SCIENCE
DSCP: MATHEMATICS PAPER-II (Differential Equations)

Scheme of Instruction	Scheme of Examination
Course Code: DE-2-MM-22P	Course Title : Differential Equations (Practical)
Credits : 1	Max. Marks : 50
Category :DSCP	Internal Examination : 20
Hours/Week : 3	External Examination :30
Total durations Hrs : 45	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method	

Course Objective: To impart the knowledge of various types of Differential Equations, methods of solving ordinary differential equations, formulation of partial differential equations, methods of solving first order partial differential equations.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Identify the types of differential equations and solve first order first degree differential equations.	BL4
CO 2: Solve first order higher degree differential equations	BL4
CO 3: Translate the skills to solve higher order homogeneous and non-homogeneous differential equations with constant as well as variable coefficients.	BL4
CO 4: Solve linear differential equations with non-constant coefficients, formulate & Solve the Partial differential equations of first order	BL4

SEMESTER III
FACULTY OF SCIENCE
DSCT: MATHEMATICS PAPER-III (REAL ANALYSIS)

Scheme of Instruction	Scheme of Examination
Course Code: RA-3-MM-23T	Course Title : Real Analysis
Credits : 4	Max. Marks : 100
Category : DSCT	Internal Examination : 30
Hours/Week :4	SBT :10
Total durations Hrs : 60	External Examination :60
Instruction Mode: Lecture Method	External Exam Duration :3 Hrs

Course Objective: The course is aimed to impart knowledge of sequences, limit of a sequence, convergence of sequences, infinite series, uniform convergence, Riemann integration, integral functions and their properties.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level

CO1: Analyze the concepts of sequences, limit of a sequence, convergent sequences, monotonic sequences .	BL4
CO 2: Examine the convergence and divergence of various infinite series	BL4
CO 3: Examine uniform convergence of power series .	BL4
CO 4: Demonstrate the concepts of integral functions and examine the properties of integral functions .	BL4

SEMESTER- III
FACULTY OF SCIENCE
DSCP: MATHEMATICS PAPER-III (REAL ANALYSIS)

Scheme of Instruction	Scheme of Examination
Course Code: RA-3-MM-23P	Course Title : Real Analysis (Practical)
Credits : 1	Max. Marks : 50
Category : DSCP	Internal Examination : 20
Hours/Week :3	External Examination :30
Total durations Hrs : 45	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: The course is aimed to impart knowledge of sequences, limit of a sequence, convergence of sequences, infinite series, uniform convergence, Riemann integration, integral functions and their properties.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Analyze the concepts of sequences, limit of a sequence, convergent sequences, monotonic sequences .	BL4
CO 2: Examine the convergence and divergence of various infinite series	BL4
CO 3: Examine uniform convergence of power series .	BL4
CO 4: Demonstrate the concepts of integral functions and examine the properties of integral functions .	BL4

SEMESTER- IV
FACULTY OF SCIENCE
DSCT: MATHEMATICS PAPER-IV (ALGEBRA)

Scheme of Instruction	Scheme of Examination
Course Code: ALG-4-MM-23T	Course Title : Algebra
Credits : 4	Max. Marks : 100
Category : DSCT	Internal Examination : 30
Hours/Week :4	SBT :10
Total durations Hrs : 60	External Examination :60
Instruction Mode: Lecture Method/Using software	External Exam Duration :3 Hrs

Course Objective: The course is aimed to impart a fair knowledge of some basic algebraic structures like groups, cyclic groups, permutation groups, rings, ideals, group and ring homeomorphisms.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Analyze the concepts of algebraic structures that arise in matrix algebra, linear algebra .	BL4
CO 2: Understand and analyze the properties of groups, subgroups, cyclic groups, normal sub groups and permutation groups	BL4
CO 3: Students will examine the algebraic structures like rings, subrings and ideals and their basic properties .	BL4
CO 4: Apply and analyze the concepts of homomorphism and isomorphism between the algebraic structures .	BL4

SEMESTER- IV
FACULTY OF SCIENCE
DSCT: MATHEMATICS PAPER-IV (ALGEBRA)

Scheme of Instruction	Scheme of Examination
Course Code: ALG-4-MM-23P	Course Title : Algebra (Practical)
Credits : 1	Max. Marks : 50
Category : DSCP	Internal Examination : 20
Hours/Week :3	External Examination :30
Total durations Hrs : 45	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: The course is aimed to impart a fair knowledge of some basic algebraic structures like groups, cyclic groups, permutation groups, rings, ideals, group and ring homomorphisms.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Demonstrate a comprehensive understanding of fundamental concepts in group theory, specifically focusing on finite groups, subgroups and cyclic groups .	BL4
CO 2: Understand and Analyze the properties of groups, subgroups, cyclic groups, normal sub groups and permutation groups.	BL4
CO 3: Acquire comprehensive understanding of advanced group theory concepts, including normal sub groups, factor groups and their applications. They will be proficient in identifying and analyzing normal subgroups and factor groups, as well as demonstrating a clear understanding of group homomorphism and first isomorphism theorem .	BL4
CO 4: Understand concepts of ideals and factor rings, identify and analyze ideals and factor rings including prime ideals and maximal ideals and understanding their significance in algebraic structures.	BL4

SEMESTER V
FACULTY OF SCIENCE
SEC: MATHEMATICAL MODELING -IIIA (Mathematics)

w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: MM-6-MM-24T	Course Title : Mathematical Modelling (Theory)
Credits : 2	Max. Marks : 50
Category : SEC	Internal Examination : 20
Hours/Week :2	External Examination :30
Total duration Hrs : 30	External Exam Duration :2 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: This topic aims to provide the student with some basic modelling skills that will have application to a wide variety of problems.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Students will demonstrate advanced proficiency in mathematical modeling techniques for decision making and problem-solving	BL4
CO 2: They will exhibit an in-depth understanding of compartmental models, including their applications in exponential decay, radioactivity, and case studies such as detecting art forgeries and analyzing lake pollution	BL4
CO 3: Furthermore, students will showcase their ability to construct and analyze models of single populations and interacting populations, including exponential growth, density-dependent growth, limited growth with harvesting, and models for epidemics, predators and prey, and competing species	BL4

SEMESTER V
FACULTY OF SCIENCE
SEC: LOGIC AND SETS –IIB (Mathematics)
w. e. f 2024-25 AY

Scheme of Instruction	Scheme of Examination
Course Code: LS-5-MM-24T	Course Title : Logic and Sets (Theory)
Credits : 2	Max. Marks : 50
Category : SEC	Internal Examination : 20
Hours/Week :2	External Examination :30
Total duration Hrs : 30	External Exam Duration :2 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: To impart knowledge of some concepts in set theory and logic.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Understand and analyze enough mathematical thinking maturity to understand logic, discrete and algebraic structures	BL4
CO 2: Enhance and apply knowledge of basic set operations and their applications	BL4
CO 3: Apply and analyze the knowledge of Probability and discrete random variables	BL4

SEMESTER V
FACULTY OF SCIENCE
DSC: MATHEMATICS PAPER-V (Linear Algebra)

w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: LA-5-MM-24T	Course Title : Linear Algebra (Theory)
Credits : 4	Max. Marks : 100
Category : DSCT	Internal Examination : 30
Hours/Week :4	SBT :10
Total durations Hrs : 45	External Examination :60
Instruction Mode: Lecture Method/Using software	External Exam Duration :3 Hrs

Course Objective: The objective of the course is to provide students with a comprehensive understanding of fundamental concepts in linear algebra, spanning vector spaces, coordinate systems, eigenvalues, eigenvectors, and orthogonality. fostering critical thinking and problem-solving skills in mathematical contexts.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Evaluate and analyze the properties of vector spaces, including subspaces such as null spaces and column spaces, linearly independent and dependent theorem and apply the Spanning set theorem	BL4
CO 2: Apply Rank and Nullity theorem to solve the system of equations with a fair understanding of finite dimension vector spaces , unique representation theorem, .	BL4
CO 3: Apply concepts such as the characteristic equation and determinants to diagonalize matrices, understanding the significance of eigen values and vectors in representing linear transformations and obtain the eigen values and eigen vectors of a given matrix	BL4
CO 4: Analyze concepts of orthogonality and apply inner product principles to determine vector lengths and angles, comprehend the significance of orthogonal complements orthogonal projections	BL4

SEMESTER V
FACULTY OF SCIENCE
DSC: MATHEMATICS PAPER-V (Linear Algebra)

w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: LA-5-MM-24P	Course Title : Linear Algebra (Practical)
Credits : 1	Max. Marks : 50
Category : DSCP	Internal Examination : 20
Hours/Week :3	External Examination :30
Total durations Hrs : 45	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: The objective of the course is to provide students with a comprehensive understanding of fundamental concepts in linear algebra, spanning vector spaces, coordinate systems, eigenvalues, eigenvectors, and orthogonality. fostering critical thinking and problem-solving skills in mathematical contexts.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Evaluate and analyze the properties of vector spaces, including subspaces such as null spaces and column spaces, linearly independent and dependent theorem and apply the Spanning set theorem	BL4
CO 2: Apply Rank and Nullity theorem to solve the system of equations with a fair understanding of finite dimension vector spaces , unique representation theorem, .	BL4
CO 3: Apply concepts such as the characteristic equation and determinants to diagonalize matrices, understanding the significance of eigen values and vectors in representing linear transformations and obtain the eigen values and eigen vectors of a given matrix	BL4
CO 4: Analyze concepts of orthogonality and apply inner product principles to determine vector lengths and angles, comprehend the significance of orthogonal complements orthogonal projections	BL4

SEMESTER V
FACULTY OF SCIENCE

Generic Elective - V(A): Quantitative Aptitude for Competitive Examinations

w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: QACE-5-MM-24T	Course Title :Quantitative Aptitude for Competitive Examinations (Theory)
Credits : 4	Max. Marks : 100
Category : GE	Internal Examination : 30
Hours/Week :4	SBT :10

Total duration Hrs : 60	External Examination :60
Instruction Mode: Lecture Method/Using software	External Exam Duration :3 Hrs

Course Objective: The course objective is to instill a strong grasp of foundational mathematical concepts like number systems, ratios, and percentages. It aims to cultivate problem-solving abilities in real-world scenarios including profit-loss calculations and time-distance relationships. Additionally, it seeks to deepen algebraic understanding with topics such as linear and quadratic equations, alongside introducing data interpretation techniques and probability analysis.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Demonstrate proficiency by comprehending and applying foundational mathematical concepts such as number systems, divisibility rules, LCM and HCF, binary number system, square roots, cube roots, surds, indices, averages, ages, ratio, proportion, and percentages.	BL 2
CO2: Solve problems related to profit-loss calculations, simple and compound interest, time-speed-distance, time-work, and mensuration, applying mathematical principles to real-life scenarios and competitive exam questions.	BL3
CO 3: Apply advanced mathematical concepts such as mixtures and allegation, number and letter series, coding-decoding, directional sense, calendars, clocks, seating arrangement, syllogism, and mathematical operations	BL3
CO4: Solve linear and quadratic equations, data interpretation, permutations and combinations, probability, Venn diagrams, and blood relations to solve problems for both competitive exams and real-life problem-solving situations.	BL 3

SEMESTER V
FACULTY OF SCIENCE
Generic Elective - V(B): Mathematics for Economics and Finance
w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: MEF-5-MM-24T	Course Title :Mathematics for Economics and Finance (Theory)
Credits : 4	Max. Marks : 100
Category : GE	Internal Examination : 30
Hours/Week :4	SBT :10
Total durations Hrs : 60	External Examination :60
Instruction Mode: Lecture Method/Using software	External Exam Duration :3 Hrs

Course Objective: Many models and problems in modern economics and finance can be expressed using the language of mathematics and analyzed using mathematical techniques. The aim is to show how a range of important mathematical techniques work and how they can be used to explore and understand the structure of economic models.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Analyze linear, simultaneous linear and quadratic equations, interpret their graphs and apply them to real-world scenarios like budget lines and supply-demand analysis, and analyze profit functions. .	BL 3
CO 2: Understand the concepts of functions of a single variable, including limits, polynomial functions, reciprocal functions, and inverse functions, adeptly analyze properties of exponential and logarithmic functions and apply them to various financial contexts	BL 3
CO 3: Understand the fundamentals of matrices and determinants, including matrix operations, solutions of linear systems of equations and apply them to solve real world problems.	BL 3
CO4: Understand the fundamentals of linear difference equations, and their solutions and adeptly apply these concepts to model and solve various problems related to economics	BL 3

**SEMESTER VI
FACULTY OF SCIENCE**

SEC: THEORY OF EQUATIONS –IVA (Mathematics)

w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: TE-5-MM-24T	Course Title : Theory of Equations (Theory)
Credits : 2	Max. Marks : 50
Category : SEC	Internal Examination : 20
Hours/Week :2	External Examination :30
Total duration Hrs : 30	External Exam Duration :2 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: To enhance the student's domain knowledge on roots and coefficients of a polynomial equation, Descartes' rule of signs in finding the number of positive and negative roots of a polynomial equation.

Course Outcomes: By the end of the course the student would be able to

- CO1:** Analyze and interpret polynomial functions graphically, determine their maxima and minima values, apply theorems related to real roots of equations, understand the existence of roots in general equations and identify and analyse imaginary roots
- CO 2:** Analyze and derive relationships between the roots and coefficients of polynomial equations using relevant theorems

**SEMESTER VI
FACULTY OF SCIENCE**

SEC: VECTOR CALCULUS -IVB (Mathematics)

w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: VC-6-MM-24T	Course Title : Vector Calculus (Theory)
Credits : 2	Max. Marks : 50
Category : SEC	Internal Examination : 20
Hours/Week :2	External Examination :30
Total duration Hrs : 30	External Exam Duration :2 Hrs
Instruction Mode: Lecture Method/Using software	
Course Objective: To impart the knowledge of vector functions, derivatives and integrals of vector functions.	

Course Outcomes: By the end of the course the student would be able to
CO1: Understand space curves and partial derivatives of vectors..
CO 2: Understand the vector differential operators gradient, divergence, curl and their significance.
CO 3: Apply techniques to solve line, surface and volume integrals and Green's, Gauss and Stokes theorems in Integral Transformations.

**SEMESTER VI
FACULTY OF SCIENCE**

DSET: MATHEMATICS PAPER-VI (A) (Numerical Analysis)

w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: NA-6-MM-24T	Course Title : Numerical Analysis(Theory)
Credits : 4	Max. Marks : 100
Category : DSET	Internal Examination : 30
Hours/Week :5	SBT :10
Total duration Hrs : 45	External Examination :60
Instruction Mode: Lecture Method/Using software	External Exam Duration :3 Hrs

Course Objective: The course aims to introduce numerical methods to solve the algebraic and transcendental equations, interpolation problems, Numerical Differentiation, and Integration.
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Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Solve the algebraic and transcendental equations	BL 4

CO 2: Apply the interpolation techniques to solve the problems	BL 4
CO 3: Solve problems using numerical differentiation and numerical integration techniques	BL 4
CO 4: Translate the skills to solve the Initial Value Problems for Ordinary differential equations using various methods	BL 4

SEMESTER VI
FACULTY OF SCIENCE
DSEP: MATHEMATICS PAPER-VI (A) (Numerical Analysis)
w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: NA-6-MM-24P	Course Title : Numerical Analysis using MATLAB (Practical)
Credits : 1	Max. Marks : 50
Category : DSEP	Internal Examination : 20
Hours/Week :3	External Examination :30
Total duration Hrs : 45	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: The course aims to introduce numerical methods to solve the algebraic and transcendental equations, interpolation problems, Numerical Differentiation, and Integration.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Solve the algebraic and transcendental equations	BL 4
CO 2: Apply the interpolation techniques to solve the problems	BL 4
CO 3: Solve problems using numerical differentiation and numerical integration techniques	BL 4
CO 4: Translate the skills to solve the Initial Value Problems for Ordinary differential equations using various methods	BL 4

SEMESTER VI
FACULTY OF SCIENCE
DSET: MATHEMATICS PAPER-VI (B) (Discrete Mathematics)
w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: DM-6-MM-24T	Course Title : Discrete Mathematics (Theory)
Credits : 4	Max. Marks : 100
Category : DSET	Internal Examination : 30
Hours/Week :4	SBT :10
Total duration Hrs : 45	External Examination :60

Instruction Mode: Lecture Method/Using software

External Exam Duration :3 Hrs

Course Objective: To impart knowledge of fundamental concepts of graph theory

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Comprehend the principles of recurrence relations, including generating functions of sequences and the calculation of coefficients and apply these concepts to model and solve problems in various fields such as combinatorics	BL 4
CO 2: Students will be able to analyze and classify binary relations, equivalence relations and ordering relations, apply the concepts of lattices and enumerations to solve problems, construct and analyze paths and closures in directed graphs	BL 4
Co 3: Understand and apply fundamental graph theory concepts, identifying isomorphisms and subgraphs within graphs, recognize and analyze special types of graphs, demonstrate a comprehensive understanding of trees and their properties	BL 4
CO 4: Construct Spanning trees and minimal spanning trees, analyze properties of Directed trees & Binary trees and Apply Euler's formula to solve graph related problems	BL 4

SEMESTER VI
FACULTY OF SCIENCE
DSEP: MATHEMATICS PAPER-VI (B) (Discrete Mathematics)
w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: DM-6-MM-24P	Course Title : Discrete Mathematics (Practical)
Credits : 1	Max. Marks : 50
Category : DSEP	Internal Examination : 20
Hours/Week :3	External Examination :30
Total duration Hrs : 45	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: To impart knowledge of fundamental concepts of graph theory

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Comprehend the principles of recurrence relations, including generating functions of sequences and the calculation of coefficients and apply these concepts to model and solve problems in various fields such as combinatorics	BL 4
CO 2: Students will be able to analyze and classify binary relations, equivalence relations and ordering relations, apply the concepts of lattices and enumerations to solve problems, construct and analyze paths and closures in directed graphs	BL 4
Co 3: Understand and apply fundamental graph theory concepts, identifying isomorphisms and subgraphs within graphs, recognize and analyze special types of graphs, demonstrate a comprehensive understanding of trees and their properties	BL 4

CO 4: Construct Spanning trees and minimal spanning trees, analyze properties of Directed trees & Binary trees and Apply Euler's formula to solve graph related problems

BL 4

**SEMESTER VI
FACULTY OF SCIENCE**

DSE: MATHEMATICS PAPER-VI (C) (Analytical Solid Geometry)

w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: ASG-6-MM-24T	Course Title : Analytical Solid Geometry (Theory)
Credits : 4	Max. Marks : 100
Category : DSET	Internal Examination : 30
Hours/Week :4	SBT :10
Total duration Hrs : 45	External Examination :60
Instruction Mode: Lecture Method/Using software	External Exam Duration :3 Hrs

Course Objective: The course is designed to introduce geometric shapes like sphere, cone, cylinder, conicoids and their geometric properties.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Derive the equation of a sphere, circle, tangent plane to the sphere and find the angle of intersection between two spheres with a fair knowledge of definition and general equation of a sphere	BL 4
CO 2: Determine the equation of a cone, tangent lines and planes of a cone, reciprocal and right circular cone by learning the definition, equation and properties of the cone	BL 4
CO 3: Get a fair knowledge of expressing the geometrical figure Cylinder algebraically, Types, properties of Cylinder and the various surfaces represented by it.	BL 4
CO 4: Acquire the knowledge of expressing the geometrical figures Conicoids algebraically and their properties and deriving their equations	BL 4

**SEMESTER VI
FACULTY OF SCIENCE**

DSEP: MATHEMATICS PAPER-VI (C) (Analytical Solid Geometry)

w. e. f 2024 -25 AY

Scheme of Instruction	Scheme of Examination
Course Code: ASG-6-MM-24P	Course Title : Analytical Solid Geometry (Practical)
Credits : 1	Max. Marks : 50
Category : DSEP	Internal Examination : 20
Hours/Week :3	External Examination :30

Total duration Hrs : 45	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: The course is designed to introduce geometric shapes like sphere, cone, cylinder, conicoids and their geometric properties.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Derive the equation of a sphere, circle, tangent plane to the sphere and find the angle of intersection between two spheres with a fair knowledge of definition and general equation of a sphere	BL 4
CO 2: Determine the equation of a cone, tangent lines and planes of a cone, reciprocal and right circular cone by learning the definition, equation and properties of the cone	BL 4
CO 3: Get a fair knowledge of expressing the geometrical figure Cylinder algebraically, Types, properties of Cylinder and the various surfaces represented by it.	BL 4
CO 4: Acquire the knowledge of expressing the geometrical figures Conicoids algebraically and their properties and deriving their equations	BL 4

**SEMESTER VI
FACULTY OF SCIENCE
PROJECT: MATHEMATICS
w. e. f 2024 -25 AY**

Scheme of Instruction	Scheme of Examination
Course Code: RMMP-6-MM-24T	Course Title : Research Methodology for Mathematics Project (Theory)
Credits : 4	Max. Marks : 100
Category : DSET	Internal Examination : Test 20 Marks and Project 20 Marks
Hours/Week :4	External Examination : Project 60 Marks
Total duration Hrs : 60	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: Describe what your research project intends to accomplish. They should guide every step of the research process, including how you collect data, build your argument, and develop your conclusions.

Course Outcomes: By the end of the course the student would be able to

CO1: Understand the psychology of research which includes different perspectives and necessity of research.

CO 2: Apply the research knowledge to formulate a suitable problem statement by adopting different research methods and models.

CO 3: Analyze the research outcome by using suitable statistical tool.

CO 4: Write or present a scientific report and research proposal by adopting copyright based ethical values.

St. Joseph's Degree & PG College
(An autonomous College of Osmania University)
Kingkoti Road, Hyderabad-29
Department of Mathematics & Statistics
Value Added Course : Numerical Ability

The Department of Mathematics & Statistics is intending to offer Numerical Ability training programme for UG students. The department ensures that students are given required amount of practice in various areas of numerical ability.

Course Objectives:

- To introduce basic concepts of Mathematics to students.
- To enhance the arithmetic abilities of the students through various shortcut methods.
- To create a confidence among the students to face various entrance exams like, ICET, CAT, MAT etc.
- To make the students competent enough to face all competitive exams like, BANK, LIC, GROUPS etc.

Course Outcome: At the end of the course, the participants will be able to gradually master many areas of Arithmetic.

Competencies (knowledge, skills, values) achievable after completion of an entire program of study.

St. Joseph's Degree & PG College
(An autonomous College of Osmania University)
Kingkoti Road, Hyderabad-29
Department of Mathematics & Statistics
Value Added Course: Verbal and Non-Verbal Reasoning

Course Objective: 1. To improve verbal ability skill and communicative skill of the students. To enhance the analytical skill and problem solving skill of the students to make them prepare for various public and private sector exams & placement drives.

Course Outcome:

1. It will improve verbal ability skill among students.
2. Students will communicate effectively & appropriately in real life situation.
3. It will enhance student's problem solving skill.
4. Students will be able to prepare for various public and private sector exams & placement drives.

ST. JOSEPH'S DEGREE & PG COLLEGE

(Autonomous) - Affiliated to Osmania University

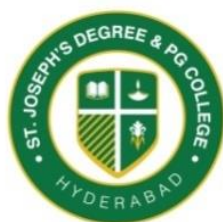
Re-accredited by NAAC (3rd Cycle)

Basheerbagh, King Koti Road, Hyderabad – 29

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF) FOR UNDERGRADUATE PROGRAMMES

FACULTY OF SCIENCES

DEPARTMENT OF MATHEMATICS & STATISTICS



BSc (MSDs)

(Common Core Syllabus for all the Students Admitted from the Academic
Year 2024-27 Batch onwards)

B. Sc MSDs

SEMESTER I
FACULTY OF SCIENCE
DSCT: MATHEMATICS COURSE-I (Differential & Integral Calculus and Applications)

Scheme of Instruction	Scheme of Examination
Course Code: DICA-1-MM-24T	Course Title : Differential & Integral Calculus with Applications
Credits : 4	Max. Marks : 100
Category : DSCT	Internal Examination : 30
Hours/Week :4	SBT :10
Total duration Hrs : 60	External Examination :60
Instruction Mode: Lecture Method	External Exam Duration :3 Hrs

Course Objective: The course aims at imparting the knowledge of successive , Partial and Total differentiation and their Applications to Maxima &Minima, Length of Arcs, Curvature, & techniques of double and triple integrals and their applications .

Course Outcomes: Upon successful completion of this course, students will demonstrate the ability to	Cognitive Level
CO1: Apply calculus techniques to determine the nth derivatives of rational functions and products of powers of sines and cosines,	BL4
CO 2: Apply Euler’s Theorem on Homogeneous Functions using the comprehensive understanding of partial differentiation techniques	BL4
CO 3: Demonstrate proficiency in total differentiation and apply the differentiation techniques to solve the problems	BL4
CO 4: Demonstrate proficiency in multiple integration techniques, including the application of double and triple integrals for determining areas, volumes of solids as well as the ability to manipulate integrals through change of order	BL4

SEMESTER- I
FACULTY OF SCIENCE
DSCP: MATHEMATICS PAPER-I (Differential & Integral Calculus with Applications)

Scheme of Instruction	Scheme of Examination
Course Code: DICA-1-MM-24P	Course Title : Differential & Integral Calculus with Applications (Practical)
Credits : 1	Max. Marks : 50
Category : DSCP	Internal Examination : 20
Hours/Week :3	External Examination :30
Total duration Hrs : 45	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method/Using software	

Course Objective: The course aims at imparting the knowledge of successive , Partial and Total differentiation and their Applications to Maxima &Minima, Length of Arcs, Curvature, & techniques of double and triple integrals and their applications .

Course Outcomes: Upon successful completion of this course, students will demonstrate the ability to	Cognitive Level
CO 1: Apply calculus techniques to determine the nth derivatives of rational functions and products of powers of sines and cosines,	BL4
CO 2: Apply Euler's Theorem on Homogeneous Functions using the comprehensive understanding of partial differentiation techniques	BL4
CO 3: Demonstrate proficiency in total differentiation and apply the differentiation techniques to solve the problems	BL4
CO 4: Demonstrate proficiency in multiple integration techniques, including the application of double and triple integrals for determining areas, volumes of solids as well as the ability to manipulate integrals through change of order	BL4

SEMESTER II
FACULTY OF SCIENCE
DSCT: MATHEMATICS PAPER-II (Differential Equations and Applications)

Scheme of Instruction	Scheme of Examination
Course Code: DEA-2-MM-24T	Course Title : Differential Equations and Applications
Credits : 4	Max. Marks : 100
Category :DSCT	Internal Examination : 30
Hours/Week :4	SBT :10
Total duration Hrs : 60	External Examination :60
Instruction Mode: Lecture Method	External Exam Duration :3 Hrs

Course Objective: To impart the knowledge of various types of Differential Equations, methods of solving ordinary differential equations, formulation of partial differential equations, methods of solving first order partial differential equations.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Identify the types of differential equations and solve first order first degree differential equations.	BL4
CO 2: Solve first order higher degree differential equations and apply these differential equations to model real-world phenomena	BL4
CO 3: Translate the skills to solve higher order homogeneous and non-homogeneous differential equations with constant as well as variable coefficients.	BL4
CO 4: Solve linear differential equations with non-constant coefficients, formulate & Solve the Partial differential equations of first order	BL4

SEMESTER II

FACULTY OF SCIENCE
DSCP: MATHEMATICS PAPER-II (Differential Equations and Applications)

Scheme of Instruction	Scheme of Examination
Course Code: DEA-2-MM-24P	Course Title : Differential Equations (Practical)
Credits : 1	Max. Marks : 50
Category :DSCP	Internal Examination : 20
Hours/Week : 3	External Examination :30
Total duration Hrs : 45	External Exam Duration :3 Hrs
Instruction Mode: Lecture Method	

Course Objective: To impart the knowledge of various types of Differential Equations, methods of solving ordinary differential equations, formulation of partial differential equations, methods of solving first order partial differential equations.

Course Outcomes: By the end of the course the student would be able to	Cognitive Level
CO1: Identify the types of differential equations and solve first order first degree differential equations.	BL4
CO 2: Solve first order higher degree differential equations and apply these differential equations to model real-world phenomena	BL4
CO 3: Translate the skills to solve higher order homogeneous and non-homogeneous differential equations with constant as well as variable coefficients.	BL4
CO 4: Solve linear differential equations with non-constant coefficients, formulate & Solve the Partial differential equations of first order	BL4