MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA

A College with Potential for Excellence

NAAC Accredited & ISO 9001: 2015 Certified

PROGRAMME REGISTER

2020-23

UG DEPARTMENT OF MATHEMATICS

INDEX

UG PROGRAMMES OFFERED

S.No.	Programme	Combination offered	Programme Code
1	B.Sc.	Mathematics, Physics, Chemistry (MPC)	301
2		Mathematics, Physics, Computer Science (MPCs)	303
3		Mathematics, Statistics, Computer Science (MSCs)	304
4		Mathematics, Electronics, Computer Science (MECs)	306
5		Mathematics, Chemistry, Computer Science (MCCs)	309

PROGRAMME OUTCOMES (POs)

2020-23

At the end of the programme students will:

PO1: Essential Knowledge:

Have comprehensive discipline knowledge and understanding, the ability to engage with different schools of thought and to apply their knowledge in practice including in multi-disciplinary or multi-professional contexts.

PO2: Creative and critical thinking and problem solving abilities:

Be effective problem solvers, able to apply critical and evidence-based thinking to conceive innovative responses to future challenges.

PO3: Teamwork and communication skills:

Be able to convey ideas and information effectively to a range of audiences for a variety of purposes and contribute in a positive and collaborative manner to achieving common goals.

PO4: Motivation and preparation in life-long learning:

Exhibit life-long skills; broad based multiple career oriented general skills; self and field based learning skills; digital skills; social responsibility and compassionate commitment; preparedness for living, learning and working in any environment

PO5: Professionalism and leadership readiness:

Be able to engage in professional behaviour and have the potential to be entrepreneurial and take leadership roles in their chosen occupations and communities.

PO6: Intercultural and ethical competency:

Be responsible and effective global citizens whose personal values and practices are consistent with their roles as responsible members of society.

PO7: Self-awareness and emotional intelligence:

Be self-aware and reflective, flexible and resilient and act with integrity and take responsibility for their actions as empowered women.

PO8: Social responsibility:

Be sensitive to and demonstrate agency in matters of environment, gender and other social issues to promote an equitable society.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

2020-23

At the end of the programme students will be able to:

PSO1: Interpret principles, classifications, concepts, theories and mechanisms.

PSO2: Analyse hypothesis, procedures, properties, experimental facts and draw conclusions.

PSO3: Apply techniques in solving problems, results, sample analysis and production.

PSO4: Develop communicative competence, creative and critical thinking, practical, technical and employability skills, social sensibility and responsibility.

Course Outcomes (COs)

2020-23

S.No.	Sem	Course Code	Course Title	Course Outcomes (COs)
1	I	20MTCCDE15	Differential Equations	**CO1:**Classify and solve analytically differential equations based on their order and degree.
				CO2: Apply appropriate method to solve differential equations of the first order and the first degree.
				CO3: Apply acquired knowledge to solve the first order and higher degree differential equations.
				CO4: Identify a family of orthogonal trajectories for a family of curves.
				CO5: Apply suitable method to solve higher-order differential equations with constant and variable coefficients.
2	II	20MTCCAG25	Analytical Solid Geometry	**CO1:** Distinguish the geometry of planes, lines, spheres and cones and describe their properties.
				CO2: Explain concepts in planes and lines and solve problems.
				CO3: Explain concepts in spheres and cones and solve problems.
				CO4: Analyze methods to solve problems on planes, lines, spheres and cones and apply an appropriate method to solve them.
				CO5: Demonstrate 2D & 3D geometry using GeoGebra in interactive mode.
3	II/III	20LSCAS2	Analytical Skills	**CO1**: Explain arithmetic and business concepts and develop the associated skills.
				CO2: Exhibit acquired skills and competencies in the related areas.
				CO3: Solve problems pertaining to quantitative ability, logical and verbal reasoning.

S.No.	Sem	Course Code	Course Title	Course Outcomes (COs)
4	III	20MTCCAA35	Abstract Algebra	**CO1:** Describe structure of group, substructures, cyclic group and their properties.
				CO2: Analyse a group by the notion of a coset and apply Lagrange's theorem for finite groups.
				CO3: Analyse properties of group isomorphism to describe the isomorphic groups and its generalization, group homomorphism.
				CO4: Classify non abelian group of functions (permutations) and illustrate its characteristics.
				CO5: Classify algebraic systems equipped with one and two binary operations and describe different types of rings and substructures.
5	IV	20MTCCRA45	Real Analysis	**CO1:** Identify the nature of a sequence whether bounded, monotonic and convergent by employing relevant results.
				CO2: Describe the nature of a series by applying a suitable test of convergence.
				CO3: Illustrate the significance of real number system, real valued and real variable functions, mean value theorems, fundamental theorem and applications
				CO4: Identify continuity of a function and type of discontinuity.
				CO5: Categorize real valued and real variable functions as continuous, differentiable and integrable functions by applying learned principles and results.
6	IV	20MTCCLA45	Linear Algebra	**CO1:** Describe algebraic systems vector space, subspace and inner product space and their properties.
				CO2: Identify a basis for a finite dimensional vector space and an orthonormal basis for a finite dimensional inner product space.
				CO3: Analyse a linear transformation on a finite dimensional vector space and determine the dimension of range space and null space.
				CO4: Apply a suitable technique to find the rank of a matrix and solve a system of linear equations.

				CO5: Determine the eigen values and eigen vectors for a square matrix and apply a suitable method to find the inverse of it.
S.No.	**Sem**	**Course Code**	**Course Title**	**Course Outcomes (COs)**
7	V/VI Set 1	20MTSEC11 NM5	Numerical Methods	**CO1:** Employ calculus of finite differences and interpolation techniques.
				CO2: Apply numerical methods to obtain approximate solutions whenever analytical methods are not applicable.
				CO3: Identify the significance of numerical methods and analyze the accuracy of employing them.
				CO4: Evaluate derivative and integral of a tabulated function using suitable numerical method and compute error.
				CO5: Solve 1^{st} order and 1^{st} degree initial value problems applying appropriate numerical method and compute errors.
8	V/VI Set 1	20MTSEC12 SF5	Special Functions	**CO1:** Apply Beta and Gamma functions to evaluate certain definite integrals.
				CO2: Describe Legendre polynomials and their properties.
				CO3: Express Bessel functions and their properties.
				CO4: Discuss Hermite polynomials and their properties.
				CO5: Explain Laguerre polynomials and their properties.
9	V/VI Set 2	20MTSEC21 MV5	Multiple Integrals & Vector Calculus	**CO1:** Evaluate double and triple integrals of different functions over different regions.
				CO2: Apply double integral to determine plane and surface area, as well as double and triple integral to determine volume.
				CO3: Determine gradient of a scalar function, divergence and curl of a vector function and explain their properties.
				CO4: Evaluate line, circulation, surface & volume integrals of scalar and vector functions.
				CO5: Explain the significance of Gauss, Green and Stoke theorems and apply them to evaluate certain integrals.

10	V/VI Set 2	20MTSEC22 IT5	Integral Transforms	**CO1:** Evaluate Laplace and inverse Laplace transforms of certain functions, derivatives and integrals.
				CO2: Apply Laplace transforms to solve ordinary differential equations with constant and variable coefficients.
				CO3: Solve simultaneous and partial differential equations with boundary conditions using Laplace transforms.
				CO4: Employ Laplace transforms to solve integral equations, convert differential equations into integral equations and vice versa.
				CO5: Explain properties and significance of Fourier transforms and determine finite Fourier transforms of functions.
11	V/VI Set 3	20MTSEC31 PF5	PDE & Fourier Series	**CO1:** Classify partial differential equations of order one, describe their formation and solve them using appropriate method.
				CO2: Solve Cauchy's problem for first order equations and Lagrange's equations of different types using suitable rule.
				CO3: Determine integral surface passing through a given curve and surfaces orthogonal to a given system of surfaces.
				CO4: Solve non-linear partial differential equations of order one by Charpit's, Clairaut's and Jacobi's methods.
				CO5: Identify Fourier series expansions of some functions and applications of Parseval's theorem and draw conclusions.
12	V/VI Set 3	20MTSEC32 NT5	Number Theory	**CO1:** Describe properties of integers, elements of number theory and their significance.
				CO2: Solve linear congruences and identify applications of Fermat, Wilson, Euler and Chinese remainder theorems.
				CO3: Discuss properties and applications of number theoretic and multiplicative functions.
				CO4: Solve quadratic congruences and determine quadratic residues using Euler's criterion.
				CO5: Evaluate Legendre symbols using Gauss lemma and quadratic reciprocity law.

Mapping of COs with PSOs & POs

S.No.	Sem	Course Code	Course Title	COs	PSOs	POs
1	I	20MTCC DE15	Differential Equations	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
2	II	20MTCC AG25	Analytical Solid Geometry	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
3	III	20MTCC AA35	Abstract Algebra	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
4	IV	20MTCC RA45	Real Analysis	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
5	IV	20MTCC LA45	Linear Algebra	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4

				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
6	V/VI Set 1	20MTSE C11NM5	Numerical Methods	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
7	V/VI Set 1	20MTSE C12SF5	Special Functions	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
8	V/VI Set 2	20MTSE C21MV5	Multiple Integrals & Vector Calculus	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
9	V/VI Set 2	20MTSE C22IT5	Integral Transforms	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
10	V/VI Set 3	20MTSE C31PF5	PDE & Fourier Series	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4

11	V/V Set	20MTSEC32NT5	Number Theory	CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO4	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO5	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
12	II/III	20LSCAS2	Analytical Skills	CO1	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO2	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4
				CO3	PSO1, PSO2, PSO3, PSO4	PO1, PO2, PO3, PO4

Mapping of Courses with PSOs

Course Title	PSO1	PSO2	PSO3	PSO4
Differential Equations (DE)	✓	✓	✓	✓
Analytical Solid Geometry (AG)	✓	✓	✓	✓
Abstract Algebra (AA)	✓	✓	✓	✓
Real Analysis (RA)	✓	✓	✓	✓
Linear Algebra (LA)	✓	✓	✓	✓
Numerical Methods (NM)	✓	✓	✓	✓
Special Functions (SF)	✓	✓	✓	✓
Multiple Integrals & Vector Calculus (MV)	✓	✓	✓	✓
Integral Transforms (IT)	✓	✓	✓	✓
PDE & Fourier Series (PF)	✓	✓	✓	✓
Number Theory (NT)	✓	✓	✓	✓
Analytical Skills (AS)	✓	✓	✓	✓

Mapping of Courses with POs

Course	PO1 Essential Knowledge	PO2 Creative and critical thinking and problem solving abilities	PO3 Teamwork and communication skills	PO4 Motivation and preparation in life-long learning	PO5 Professionalism and leadership readiness	PO6 Intercultural and ethical competency	PO7 Self-awareness and emotional intelligence	PO8 Social Responsibility
DE	✓	✓	✓	✓				
AG	✓	✓	✓	✓				
AA	✓	✓	✓	✓				
RA	✓	✓	✓	✓				
LA	✓	✓	✓	✓				
NM	✓	✓	✓	✓				
SF	✓	✓	✓	✓				
MV	✓	✓	✓	✓				
IT	✓	✓	✓	✓				
PF	✓	✓	✓	✓				
NT	✓	✓	✓	✓				
AS	✓	✓	✓	✓				