

Holy Cross College (Autonomous), Nagercoil
Kanyakumari District, Tamil Nadu.
Accredited with A⁺ by NAAC - IV cycle – CGPA 3.35

Affiliated to
Manonmaniam Sundaranar University, Tirunelveli



Semester I & II
POs, PSOs & COs

DEPARTMENT OF MATHEMATICS



2023-2026
(With effect from the academic year 2023-2024)

DEPARTMENT OF MATHEMATICS

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

POs	Upon completion of M. Sc. Degree Programme, the graduates will be able to:	Mapping with Mission
PEO1	apply scientific and computational technology to solve social and ecological issues and pursue research.	M1, M2
PEO2	continue to learn and advance their career in industry both in private and public sectors.	M4 & M5
PEO3	develop leadership, teamwork, and professional abilities to become a more cultured and civilized person and to tackle the challenges in serving the country.	M2, M5 & M6

PROGRAMME OUTCOMES (POs)

Pos	Upon completion of M.Sc. Degree Programme, the graduates will be able to:	Mapping with PEOs
PO1	apply their knowledge, analyze complex problems, think independently, formulate and perform quality research.	PEO1 & PEO2
PO2	carry out internship programmes and research projects to develop scientific and innovative ideas through effective communication.	PEO1, PEO2 & PEO3
PO3	develop a multidisciplinary perspective and contribute to the knowledge capital of the globe.	PEO2
PO4	develop innovative initiatives to sustain ecofriendly environment	PEO1, PEO2
PO5	through active career, team work and using managerial skills guide people to the right destination in a smooth and efficient way.	PEO2
PO6	employ appropriate analysis tools and ICT in a range of learning scenarios, demonstrating the capacity to find, assess, and apply relevant information sources.	PEO1, PEO2 & PEO3
PO7	learn independently for lifelong executing professional, social and ethical responsibilities leading to sustainable development.	PEO3

Programme Specific Outcomes (PSOs)

PSO	Upon completion of M.Sc. Degree Programme, the graduates of Mathematics will be able to:	PO Addressed
PSO-1	acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics	PO1 & PO2
PSO-2	understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.	PO3 & PO5
PSO-3	prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions	PO6
PSO-4	pursue scientific research and develop new findings with global Impact using latest technologies.	PO4 & PO7

PSO-5	possess leadership, teamwork and professional skills, enabling them to become cultured and civilized individuals capable of effectively overcoming challenges in both private and public sectors.	PO5 & PO7
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Mapping of PO'S and PSO'S

POs	PSO1	PSO 2	PSO3	PSO4	PSO5
PO 1	S	M	S	S	S
PO 2	S	S	S	S	M
PO 3	S	S	M	S	S
PO4	S	M	S	S	M
PO5	M	S	M	S	S
PO6	S	S	S	M	S
PO7	S	S	S	S	S

Strong -S (3), Medium – M (2), Low – L (1)

Course Outcomes

SEMESTER – I
CORE COURSE – I: ALGEBRAIC STRUCTURES
Course Code : MP231CC1

On the successful completion of the course, student will be able to:		
1.	recall basic counting principle, define class equations to solve problems, explain Sylow's theorems and apply the theorem to find number of Sylow subgroups.	K1
2.	define Solvable groups, define direct products, examine the properties of finite abelian groups, define modules	K2
3.	define similar Transformations, define invariant subspace, explore the properties of triangular matrix, to find the index of nilpotence to decompose a space into invariant subspaces, to find invariants of linear transformation, to explore the properties of nil potent transformation relating nilpotence with invariants.	K3
4.	define Jordan, canonical form, Jordan blocks, define rational canonical form, define companion matrix of polynomial, find the elementary devices of transformation, apply the concepts to find characteristic polynomial of linear transformation.	K3, K4
5.	define trace, define transpose of a matrix, explain the properties of trace and transpose, to find trace, to find transpose of matrix, to prove Jacobson lemma using the triangular form, define symmetric matrix, skew symmetric matrix, adjoint, to define Hermitian, unitary, normal transformations and to Evaluate whether the transformation in Hermitian, unitary and normal	K5

K1–Remember **K2** - Understand **K3** - Apply **K4**– Analyze **K5**-Evaluate

SEMESTER – I
CORE COURSE – II: REAL ANALYSIS I
Course Code : MP231CC2

On the successful completion of the course, student will be able to:		
1	analyze and evaluate functions of bounded variation and Rectifiable Curves.	K4 & K5
2	describe the concept of Riemann-Stieltjes integral and its properties.	K1 & K2
3	demonstrate the concept of step function, upper function, Lebesgue function and their integrals.	K3
4	construct various mathematical proofs using the properties of Lebesgue integrals and establish the Levi monotone convergence theorem.	K3 & K5
5	formulate the concept and properties of inner products, norms and measurable functions.	K2 & K3

K1-Remember **K2**- Understand **K3** - Apply **K4**- Analyze **K5** - Evaluate

SEMESTER – I

CORE COURSE -III: ORDINARY DIFFERENTIAL EQUATIONS

Course Code : MP231CC3

On the successful completion of the course, student will be able to:		
1.	establish the qualitative behavior of solutions of systems of differential equations.	K3
2.	recognize the physical phenomena modeled by differential equations and dynamical systems.	K1
3.	analyze solutions using appropriate methods and give examples.	K4
4.	formulate Green's function for boundary value problems.	K5
5.	understand and use the various theoretical ideas and results that underlie the mathematics in course.	K2

K1–Remember **K2** - Understand **K3** - Apply **K4**– Analyze **K5**–Evaluate

SEMESTER I

ELECTIVE COURSE I: a) NUMBER THEORY & CRYPTOGRAPHY

Course Code : MP231EC1

On the successful completion of the course, student will be able to:		
1	understand quadratic and power series forms and Jacobi symbol.	K1 & K2
2	apply binary quadratic forms for the decomposition of a number into sum of sequences.	K3
3	determine solutions using Arithmetic Functions.	K3
4	calculate the possible partitions of a given number and draw Ferrer's graph.	K4
5	identify the public key using Cryptography.	K5 & K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER – I

ELECTIVE COURSE I: b) GRAPH THEORY AND APPLICATIONS

Course Code : MP231EC2

On the successful completion of the course, student will be able to:		
1	recall the basic concepts of graph theory and know its various parameters.	K1
2	understand the many results derived on the basis of known parameters.	K2
3	apply the concepts to evaluate parameters for the family of graphs.	K3 & K5
4	analyze the steps of various theorems and know its applications.	K1 & K4
5	create a graphical model for the real-world problem using the relevant ideas.	K6

K1-Remember **K2**- Understand **K3** - Apply **K4**- Analyze **K5**–Evaluate **K6** - Create

SEMESTER – I

ELECTIVE COURSE I c): PROGRAMMING IN C++
Course Code : MP231EC3

On the successful completion of the course, student will be able to:		
1	understand and analyze the concepts of tokens, expressions and control structures	K1
2	develop the knowledge in functions and arguments	K2
3	solve simple programs using classes and objects in C++	K3
4	apply the properties of constructors and destructors to solve programs	K4
5	create programs and applications using C++	K5

K1– Remember **K2** - Understand **K3** - Apply **K4**– Analyze **K5**–Evaluate **K6** - Create

SEMESTER I

ELECTIVE COURSE II: a) DISCRETE MATHEMATICS
Course Code : MP231EC4

On the successful completion of the course, student will be able to:		
CO1	remember and interpret the basic concepts in permutations and combinations and distinguish between distribution of distinct and non-distinct objects	K1, K2, K4
CO2	interpret the recurrence relation and generating functions and evaluate by using the technique of generating functions	K2, K3
CO3	solve the problems by the principle of inclusion and exclusion	K3
CO4	to prove the basic theorems in boolean algebra and to develop the truth table for a boolean expression	K2
CO5	differentiate between variety of lattices and their properties	K4

K1 – Remember **K2** - Understand **K3** - Apply **K4** – Analyse **K5** – Evaluate **K6** - Create

SEMESTER I

ELECTIVE COURSE II: b) ANALYTIC NUMBER THEORY
Course Code : MP231EC5

On the successful completion of the course, student will be able to:		
CO1	study the basic concepts of elementary number theory	K1, K2
CO2	explain several arithmetical functions and construct their relationships	K3
CO3	apply algebraic structure in arithmetical functions	K3
CO4	demonstrate various identities satisfied by arithmetical functions	K2
CO5	determine the application to $\mu(n)$ & $\Lambda(n)$ and several equivalent form of prime number theorem	K4

K1 – Remember **K2** - Understand **K3** - Apply **K4** – Analyse **K5** – Evaluate **K6** - Create

SEMESTER I

ELECTIVE COURSE II: c) FUZZYSETSANDTHEIRAPPLICATIONS

Course Code : MP231EC6

On the successful completion of the course, student will be able to:		
CO1	understand the definition of Fuzzy sets and its related concepts	K1, K2
CO2	define Fuzzy Graphs and can explain the concepts	K3
CO3	explain the concepts in Fuzzy sets and its relations	K3
CO4	Discuss about Fuzzy logic	K2
CO5	analyze the compositions of Fuzzy sets.	K4

K1 – Remember **K2** - Understand **K3** - Apply **K4** – Analyse **K5** – Evaluate **K6** - Create

SEMESTER I

SPECIFIC VALUE ADDED COURSE –SCILAB

Course Code : MP231V01

On the successful completion of the course, student will be able to:		
1	learn basic SCILAB programming.	K1
2	understand the basic mathematical operations using SCILAB software.	K2
3	execute SCILAB codes for vectors, matrices, plotting lines, polynomial and differential equations	K3
4	implement simple mathematical functions/ equations in numerical computation environment such as SCILAB.	K4
5	interpret and visualize simple mathematical functions and operations by using plots.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER I

SPECIFIC VALUE- ADDED COURSE: Creating Documents using LaTeX

Course Code : MP231V02

On the successful completion of the course, student will be able to:		
1.	typeset complex mathematical formulae using LaTeX	K2& K3
2.	use tabular and array environments within LaTeX	K2 & K3
3.	prepare a LaTeX document, to make scientific article and project report	K3 & K6
4.	create automatic generation of table of contents, bibliographies	K6
5.	learn about graphics in LaTeX	K2& K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

SEMESTER – I

LIFE SKILL TRAINING – I ETHICS

Course Code : PG23LST1

Course Outcomes	On completion of this course the student will be able to	
CO1	understand deeper insight of the meaning of their existence.	K1
CO2	recognize the philosophy of life and individual qualities	K2
CO3	acquire the skills required for a successful personal and professional life.	K3
CO4	develop as socially responsible citizens.	K4
CO5	create a peaceful, communal community and embrace unity.	K3