CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

Nationally Accredited with 'A+' Grade by NAAC

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

B.Sc., MATHEMATICS

AUTONOMOUS SYLLABUS

(2026-2027 and ONWARDS)

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

VISION

To strive for excellence in the mathematical sciences in addition to encourage people to undertake opportunities in transdisciplinary domains.

MISSION

- To enhance analytical and logical problem-solving capabilities.
- To provide excellent mathematical science knowledge for a suitable career and to groom students for national prominence.
- To teach students how to use data analytics.
- To prepare students for transdisciplinary research and applications.
- Value-based education and service-oriented training programmes are used to acquire life skills.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOS	STATEMENTS
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest qualitystandards and train the students to be effective leaders in their chosenfields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents andto nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to thechanging global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES FOR B. Sc Mathematics PROGRAMME

After completing B.Sc., Programme, a learner will be able to

PO NO.	On completion of B.Sc Mathematics / B.Sc Physics / B.Sc Chemistry Programme, the students will be able to
PO1	**DOMAIN KNOWLEDGE** Analyse, design and develop solutions by applying from fundamental concepts of basic sciences and expertise in discipline.
PO2	**PROBLEM SOLVING** Ability to think abstractly, to evaluate and concentrates effectively on problem-solving, as well as knowledge of global challenges.
PO3	**CREATIVE THINKING AND TEAM WORK** Develop prudent decision-making skills and mobility to work in teams to solve multifaceted problems.
PO4	**EMPLOYABILITY** Self-study acclimatize them to observe effective interactive practices for practical learning enabling them to be a successful science graduate.
PO5	**LIFE LONG LEARNING** Assure consistent improvement in the performance and arouse interest to pursue higher studies in premium institutions.

PROGRAMME SPECIFIC OUTCOMES FOR B. Sc MATHEMATICS

PSO NO.	The Students of B. Sc Mathematics will be able to	POs Addressed
PSO1	Procure a precise understanding of the mathematical concepts.	PO1, PO3
PSO2	Excel by enhancing interpersonal skills, overcoming procedural challenges and intending career paths.	PO3, PO4
PSO3	Recognize, strengthen and analyse mathematical problems in order to acquire better conclusion.	PO4, PO5
PSO4	Manipulate numerical abilities across a variety of domains.	PO2, PO5
PSO5	Develop and desire to learn more about advanced mathematics and its applications.	PO5

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PG AND DEPARTMENT OF MATHEMATICS
BSc Mathematics
CHOICE BASED CREDIT SYSTEM-LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS - LOCF)
(For the candidates admitted from the academic year 2026-2027 and onwards)

Semester	Part	Course	Course Title	Course Code	Inst. Hrs. /	Credits	Exam			Total
							Hrs.	Marks		
								Int	Ext	
I	I	Ability Enhancement Course – I (AEC - I)	பொதுத்தமிழ்-I	26ULT1	6	3	3	30	70	100
			Hindi Language & Literature -I	26ULH1						
			Prose and Vocabulary	26ULS1						
			Basic French-I	26ULF1						
	II	Ability Enhancement Course – II (AEC - II)	General English -I	26UE1	6	3	3	30	70	100
	III	Core Course – I(CC-I)	Algebra and Trigonometry	26UMA1CC1	4	4	3	30	70	100
		Core Course - II (CC-II)	Differential Calculus	26UMA1CC2	4	4	3	30	70	100
		Allied Course- I (AC-I)	Statistics – I	26UMA1AC1	3	3	3	30	70	100
		Allied Course Practical- I(ACP-I)	Statistical Tools and Techniques – R Programming(P)	26UMA1ACP1	3	3	3	40	60	100
	IV	Ability Enhancement Compulsory Course-I (AECC-I)	Value Education	26UGVE	2	2	-	100	-	100
		Ability Enhancement Compulsory Course-II (AECC-II)	Cyber Security	26UGCS	2	2	-	100	-	100
Total					**30**	**24**				**800**
II	I	Ability Enhancement Course – III (AEC - III)	பொதுத்தமிழ்-II	26ULT2	6	3	3	30	70	100
			Hindi Language & Literature -II	26ULH2						
			Poetry and Grammar I	26ULS2						
			Basic French-II	26ULF2						
	II	Ability Enhancement Course – IV (AEC - IV)	General English -II	26UE2	6	3	3	30	70	100
	III	Core Course – III (CC-III)	Differential Equations and Laplace Transforms	26UMA2CC3	4	4	3	30	70	100
		Core Course - IV(CC-IV)	Integral Calculus	26UMA2CC4	4	4	3	30	70	100
		Allied Course- II (AC-II)	Statistics – II	26UMA2AC2	3	3	3	30	70	100
		Allied Course Practical- II(ACP-II)	Statistics with SPSS(P)	26UMA2ACP2	3	3	3	40	60	100
	IV	Ability Enhancement Compulsory Course-III (AECC-III)	Environmental Science	26UGEVS	2	2	-	100	-	100
		Ability Enhancement Compulsory Course-IV (AECC-IV)	Innovation and Entrepreneurship	26UGIE	2	2	-	100	-	100
	Extra Credit Course #		SWAYAM	As per UGC Recommendation						
	Total				**30**	**24**				**800**

III	I	Ability Enhancement Course – V (AEC - V)	பொதுத்தமிழ்-III	26ULT3	6	3	3	30	70	100
			Hindi Language & Literature -III	26ULH3						
			Didactics, Alankara and Grammar II	26ULS3						
			Intermediate French-I	26ULF3						
	II	Ability Enhancement Course – VI (AEC - VI)	Learning Grammar Through Literature-I	26UE3	6	3	3	30	70	100
	III	Core Course–V (CC)	Analytical Geometry(3D)	26UMA3CC5	5	4	3	30	70	100
		Core Course -VI(CC)	Vector Calculus and Fourier Series	26UMA3CC6	5	4	3	30	70	100
		Allied Course- III (AC-III)	Python Programming - I	26UMA3AC3	3	3	3	30	70	100
		Allied Course Practical- III (ACP-III)	Python Programming(P) -I	26UMA3ACP3	3	3	3	40	60	100
		Interdisciplinary Course- I (IDC-I)	Introduction to NCC@	26UNCID1	2	2	2	-	100	100
			Mathematics for Competitive Examinations-I	26UMA3ID1			3	30	70	
			Basic Tamil – I	26ULC3BT1						
			Special Tamil – I	26ULC3ST1						
		Ability Enhancement Compulsory Course-V (AECC-V)	Health and Wellness*	26UGHW	2*	1		100		100
	Extra Credit Course #		SWAYAM	As per UGC Recommendation						
	Total				**30**	**23**				**800**
IV	I	Ability Enhancement Course – VII (AEC - VII)	பொதுத்தமிழ்-IV	26ULT4	6	3	3	30	70	100
			Hindi Language & Literature -IV	26ULH4						
			Drama and Grammar III	26ULS4						
			Intermediate French-II	26ULF4						
	II	Ability Enhancement Course – VIII (AEC - VIII)	Learning Grammar Through Literature-II	26UE4	6	3	3	30	70	100
	III	Core Course – VII(CC-VII)	Sequences and Series	26UMA4CC7	4	4	3	30	70	100
		Core Course - VIII(CC-VIII)	Linear Algebra	26UMA4CC8	4	4	3	30	70	100
		Allied Course- IV (AC-IV)	Python Programming - II	26UMA4AC4	3	3	3	30	70	100
		Allied Course Practical- IV(ACP-IV)	Python Programming(P) -II	26UMA4ACP4	3	3	3	40	60	100
	IV	Interdisciplinary Course- II (IDC-II)	Specialisation in Army@	26UNC4ID2	2	2	2	-	100	100
			Mathematics for Competitive Examinations-II	26UMA4ID2			3	30	70	
			Basic Tamil - II	26ULC4BT2						
			Special Tamil - II	26ULC4ST2						
		Skill Enhancement Course – I (SEC-I)	Mathematical Documentation using LATEX (P)	26UMA5SEP1	2	2	3	40	60	100
	Extra Credit Course #		SWAYAM	As per UGC Recommendation						
	Total				**30**	**24**				**800**

30 Days INTERNSHIP during Semester Holidays

V	III	Core Course – IX(CC-IX)	Abstract Algebra	26UMA5CC9	5	4	3	30	70	100
		Core Course – X(CC-X)	Real Analysis	26UMA5CC10	5	4	3	30	70	100
		Core Course- XI(CC-XI)	Mechanics	26UMA5CC11	5	4	3	30	70	100
		Core Course– XII(CC-XII)	Fuzzy Sets and their Systems	26UMA5CC12	5	4	3	30	70	100
		Discipline Centric Elective Course– I (DCEC-I)	A. Stochastic Processes	26UMA5DCE1A	4	4	3	30	70	100
			B. Astronomy	26UMA5DCE1B						
			C. Artificial Intelligence	26UMA5DCE1C						
		Discipline Centric Elective Course- II (DCEC-II)	A. Mathematical Modelling	26UMA5DCE2A	4	4	3	30	70	100
			B. Web Designing	26UMA5DCE2B						
			C. Automata Theory	26UMA5DCE2C						
		Internship *	Internship	26UMA5INT	-	2	-	20	80	100
	IV	Ability Enhancement Compulsory Course-VI(AECC)	Introduction to Disaster Management	26UGDM	2	2	-	100	-	100
		Extra Credit Course #	SWAYAM	As per UGC Recommendation						
		Total			**30**	**28**				**800**
VI	III	Core Course – XIII(CC-XIII)	Methods in Numerical Analysis	26UMA6CC13	5	4	3	30	70	100
		Core Course – XIV(CC-XIV)	Complex Analysis	26UMA6CC14	5	4	3	30	70	100
		Core Course – XV(CC-XV)	Graph Theory	26UMA6CC15	5	4	3	30	70	100
		Core Practical –I(CP-I)	Programming Language Using MATLAB(P)	26UMA6CP1	4	4	3	40	60	100
		Discipline Centric Elective – III (DCEC-III)	A. Discrete Mathematics	26UMA6DCE3A	4	4	3	30	70	100
			B. Number Theory	26UMA6DCE3B						
			C. Fundamentals of Big Data Analytics	26UMA6DCE3C						
		Project	Project Work	26UMA6PW	4	3	-	20	80	100
		Skill Enhancement Course – II (SEC-II)	Professional Competency- General Studies for Competitive Examinations	26UMA6SE2	2	2	2	-	100	100
	IV	Ability Enhancement Compulsory Course-VII (AECC-VII)	Gender Studies	26UGGS	1	1	-	100	-	100
	V	Extension Activity *		26UGEA	-	1	-	-	-	-
				Total	**30**	**27**				**800**
				Grand Total	**180**	**150**				**4800**

- **@ NCC is one of the choices in GEC. Only the NCC cadets are eligible to chooses this course. However, NCC Course is a Compulsory Course for the NCC Cadets. If the Cadet has not studied Tamil in the school level, she has to take Basic Tamil Course.**
- *** Shall be outside instruction hours**
- **# Should complete a minimum of one Extra Credit Course from Semester II onwards**

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B. Sc Mathematics
CHOICE BASED CREDIT SYSTEM-LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS - LOCF)
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Curriculum Structure

Courses & Credits for UG Mathematics

Part	Course	No. of Courses	Hours	Credits	Total Credits
I	Ability Enhancement Course	4	6	12	12
II	Ability Enhancement Course	4	6	12	12
III	Core (Theory + Practical)	15+1	4/5	16*4=64	**105**
	Project Work	1	4	3	
	Internship	1	-	2	
	Allied Courses	8	3	8*3=24	
	DCEC	3	4	3*4=12	
IV	IDC	2	2	2*2=4	20
	SEC	2	2	2*2=4	
	AECC-I – Value Education	1	2	2	
	AECC-II Cyber Security	1	2	2	
	AECC-III-Environmental Science	1	2	2	
	AECC-IV-Innovation and Entrepreneurship	1	2	2	
	AECC-V- Health and Wellness	1	-	1	
	AECC-VI- Introduction to Disaster Management	1	2	2	
	AECC-VII Gender Studies	1	1	1	
V	Extension Activities		-	1	01
		48		150	**150**

The Internal and External marks for Theory and practical papers are as follows:

Subject	**Internal Marks**	**External Marks**
Theory	30	70
Practical	40	60

FOR THEORY:

The passing minimum for CIA shall be 40% out of 30 marks [i.e. 12 marks].

The passing minimum for University Examinations shall be 40% out of 70 marks [i.e. 0 marks].

FOR PRACTICAL:

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks].

The passing minimum for University Examinations shall be 40% out of 60 marks [i.e. 24 marks].

ELECTIVE COURSES FOR B.Sc. COMPUTER SCIENCE, B. Sc. INFORMATION TECHNOLOGY and B.Sc. COMPUTER SCIENCE WITH COGNITIVE SYSTEMS

Sem	Course Code	Part	Course	Course Title	Ins. Hrs/ Week	Credit	Marks		Total
							CIA	ESE	
I	26UCS1AC1/ 26UIT1AC1/ 26UCG1AC1	III	Allied Course- I (AC-I)	Numerical Methods	3	3	30	70	100
	26UCS1ACP1/ 26UIT1ACP1/ 26UCG1ACP1		Allied Course Practical- I (ACP-I)	Numerical Methods using MATLAB(P)	3	3	40	60	100
	Total				**6**	**6**			**200**
II	26UCS2AC2/ 26UIT2AC2/ 26UCG2AC2	III	Allied Course - II (AC-II)	Statistics and Operations Research	3	3	30	70	100
	26UCS2ACP2/ 26UIT2ACP2/ 26UCG2ACP2	III	Allied Course Practical- II (ACP-II)	Statistics Using SPSS(P)	3	3	40	60	100
	Total				**6**	**6**			**200**
Grand Total						**12**			**400**

ELECTIVE COURSES FOR B.Sc. PHYSICS

Sem	Course Code	Part	Course	Course Titles	Ins. Hrs/ Week	Credit	Marks		Total
							CIA	ESE	
I	26UPH1AC1	III	Allied Course- I (AC-I)	Mathematics- I	3	3	30	70	100
	26UPH1AC2		Allied Course- II (AC-II)	Mathematics - II	3	3	30	70	100
	Total				**6**	**6**			**200**
II	26UPH2AC3	III	Allied Course III (AC-III)	Mathematics - III	3	3	30	70	100
	26UPH2ACP1		Allied Course Practical - I (ACP-I)	Mathematical Computation using MATLAB(P)	3	3	40	60	100
	Total				**6**	**6**			**200**
Grand Total						**12**			**400**

ELECTIVE COURSES FOR B.Sc. CHEMISTRY

Sem	Course Code	Part	Course	Course Title	Ins. Hrs/ Week	Credit	Marks		Total
							CIA	ESE	
I	26UCH1AC1A	III	Allied Course- I (AC-I)	Mathematics- I	3	3	30	70	100
	26UCH1AC2A		Allied Course- II (AC-II)	Mathematics - II	3	3	30	70	100
	Total				**6**	**6**			**200**
II	26UCH2AC3A	III	Allied Course III (AC-III)	Mathematics - III	3	3	30	70	100
	26UCH2ACP1A		Allied Course Practical - I (ACP-I)	Mathematical Computation using MATLAB(P)	3	3	40	60	100
	Total				**6**	**6**			**200**
Grand Total						**12**			**400**

ELECTIVE COURSES FOR BACHELOR OF COMPUTER APPLICATION

Sem	Course Code	Part	Course Category	Course Title	Ins. Hrs/ Week	Credit	Marks		Total
							CIA	ESE	
I	26UCA1AC1	III	Allied Course- I (AC-I)	Mathematics Foundations to Computer Science-I	3	3	30	70	100
	26UCA1ACP1	III	Allied Course Practical- I (ACP-I)	SPSS for Statistical Analysis(P)	3	3	40	60	100
	Total				**6**	**6**			**200**
II	26UCA2AC2	III	Allied Course - II (AC-II)	Mathematics Foundations to Computer Science-II	3	3	30	70	100
	26UCA2ACP2	III	Allied Course Practical - II (ACP-II)	Mathematics Foundations with MATLAB(P)	3	3	40	60	100
	Total				**6**	**6**			**200**
Grand Total						**12**			**400**

ELECTIVE COURSES FOR B.Sc. ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Sem	Course Code	Part	Course Category	Course Title	Ins. Hrs/ Week	Credit	Marks		Total
							CIA	ESE	
I	26UAM1AC1	III	Allied Course- I (AC-I)	Probability and Statistics	3	3	30	70	100
	26UAM1ACP1	III	Allied Course Practical- I (ACP-I)	Statistical Techniques and Data Analysis using SPSS(P)	3	3	40	60	100
	Total				**6**	**6**			**200**
II	26UAM2AC2	III	Allied Course - II (AC-II)	Linear Algebra and Calculus	3	3	30	70	100
	26UAM2ACP2	III	Allied Course Practical- II (ACP-II)	MATLAB Applications in Scientific Computations(P)	3	3	40	60	100
	Total				**6**	**6**			**200**
Grand Total						**12**			**400**

CORE COURSE – I (CC)
ALGEBRA AND TRIGONOMETRY
(2026-2027 Onwards)

Semester I	Internal Marks: 30	External Marks:70		
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs /Week**	**CREDITS**
26UMA1CC1	**ALGEBRA AND TRIGONOMETRY**	**CORE**	**4**	**4**

Course Objectives

- **Explore** the fundamental concepts in Theory of Equations, Matrices, and trigonometry.
- **Analyze**, and solve trigonometric functions to address both theoretical and real-world problems.
- **Evaluate** hyperbolic functions as effective mathematical tools in solving scientific problems.

S. No.	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Employability, Entrepreneurship, Skill Development
2.	Course integrates cross cutting issues relevant to Professional Ethics/Gender sensitization/ Environment and Sustainability/ Human Values	Professional Ethics
3.	Course relevant to Local/Regional/National/ Global need	National,Global need
4.	Course focus on Sustainable Developmental Goal	SDG 4,8,9,12

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Knowledge Level
CO1	Explain the mathematical concepts and principles in algebra and trigonometry	**K1**
CO2	Classify and analyze different types of problem models within the discipline	**K2**
CO3	Solve different types of problems using appropriate mathematical techniques and methods.	**K3**
CO4	Identify the properties of solutions in the core areas	**K4**
CO5	Explore the applications of Algebra and Trigonometry	**K4**

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	2	3	3	3	2	2
CO2	3	3	3	2	2	3	2	2	2	2
CO3	3	3	3	3	3	3	2	2	2	2
CO4	3	2	3	3	2	3	3	3	2	2
CO5	2	2	3	2	2	3	3	2	2	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬

"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Relations between the roots and coefficients of equations – Symmetric function of the roots – Sum of the powers of the roots of an equation – Transformations of equations – Reciprocal Equation.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	Inequalities – elementary principles – Geometric and Arithmetic means – Weirstrass inequalities – Cauchy inequalities – Applications to maxima and minima.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	Theory of Numbers – Prime and Composite numbers – Divisors of a given number N – Euler's function ϕ(N) –Integral part of a real number – The highest power of a prime p contained in n! – The product of r consecutive integers is divisible by r! – Congruences – Numbers in arithmetical progression – Fermat's theorem –Wilson's theorem – Lagrange's theorem	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	Expansions of $\cos n\theta$ and $\sin n\theta$ - Expansion of $\tan n\theta$ in powers of $\tan \theta$- Expansion of tan (A+B+C+...) - Powers of sines and cosines of θ in terms of functions of multiples of θ, Expansions of $cos^n\theta$, $sin^n\theta$, $sin^n\theta cos^n\theta$ when n is a positive integer - Expansions of sin θ and cos θ in a series of ascending powers of θ- related problems.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	Hyperbolic functions – Relation between circular and hyperbolic functions – Inverse hyperbolic functions – related problems.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	**Self Study for Enrichment:** **(Not included for End Semester Examination)** Newton's theorem for the sum of the powers of the roots of an equation – Generalisation of Fermat's theorem – To resolve into factors the expression $x^N - a^n, x^n + a^n$ – Summation of trigonometric series – Logarithm of complex quantities	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Manicavachagom Pillay, T.K, Natarajan T, Ganapathy K S (2018). *Algebra, Volume I* S.Viswanathan (Printers &Publishers), Pvt. Ltd.
2. Manicavachagom Pillay, T.K, Natarajan T, Ganapathy K S (2015). *Algebra, Volume II* S.Viswanathan (Printers &Publishers), Pvt. Ltd.
3. Narayanan, S, Manicavachagom Pillay, T.K (2013). *Trigonometry*.S.Viswanathan (Printers &Publishers), Pvt. Ltd.

Chapters and Sections

UNIT-I Chapter VI: Sections 11 – 13, 15, 16 [1]

UNIT-II Chapter 4: Sections 1 – 13 [2]

UNIT-III Chapter 5 : Sections 1 – 18 [2]

UNIT- IV Chapter III: Sections 1 – 5 [3]

UNIT- V Chapter IV: Sections 1 – 2 [3]

Reference Books

1. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2020.
2. Frank Ayres JR, Theory and Problems of Plane and Spherical Trigonometry, Schaum's Outline Series McGraw-Hill Book Company, 1954.
3. Vittal P.R, Malini V, Algebra, Analytical Geometry and Trigonometry, Margham Publications, 2010.

Web References

1. **https://www.youtube.com/watch?v=0HwGGTdrBzg**
2. **https://www.youtube.com/watch?v=VLxGvhm-myQ**
3. **https://www.youtube.com/watch?v=3Cb0ys-jppU&t=11s**
4. **https://www.youtube.com/watch?v=IcBXhQNx4fY**
5. **https://www.youtube.com/watch?v=ZjBcmEeUWXg**

Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designer

Dr. V.Geetha

CORE COURSE – II (CC-II)

DIFFERENTIAL CALCULUS

(2026-2027 Onwards)

Semester I	Internal Marks: 30		External Marks:70	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs /Week**	**CREDITS**
26UMA1CC2	**DIFFERENTIAL CALCULUS**	**CORE COURSE**	**4**	**4**

Course Objectives

- **Explore** the basic skills of the students with mathematical methods formatted for their major concepts and train them in basic Differentiation.
- **Analyze** mathematical statements and expressions.
- **Evaluate** the fundamental concepts of differentiation, successive differentiation, and their applications.

S. No.	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Employability Skill Development
2.	Course integrates cross cutting issues relevant to Professional Ethics/Gender sensitization/ Environment and Sustainability/ Human Values/ Indian Knowledge System	Professional Ethics/Environment
3.	Course relevant to Local/Regional/National/ Global needs	National/ Global need
4.	Course focus on Sustainable Developmental Goals	SDG 4,8,12

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Knowledge Level
CO1	Explain the concepts of Calculus.	**K1, K2**
CO2	Classify the problem models in the respective area.	**K3**
CO3	Solve various types of problems in the corresponding stream.	**K3**
CO4	Identify the properties of solutions in the core area.	**K3**
CO5	Discover the applications of Calculus.	**K4**

Mapping of COs with POs and PSOs

Os	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	2	2	2
CO2	3	2	3	3	3	3	3	3	2	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	2	3	3	2	3	3	2	2	3
CO5	3	2	3	3	2	3	3	3	3	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬
"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Successive Differentiation**: Introduction (Basic concepts) – The n^{th} derivative – Standard results – Fractional expressions – Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product – A complete formal proof by induction.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	**Partial Differentiation**: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient – A special case – Implicit Functions- Homogeneous functions – Maxima and Minima of functions of two variables .	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	**Tangent and Normal:** The direction of the tangent – Equations of the tangent and normal at any point of a curve – The properties of the tangents and normals to the curves from their equations – Angle of intersection of curves – Subtangent and Subnormal .	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	**Envelope:** Method of finding the Envelope – Another definition of Envelope – Envelope of family of curves which are quadratic in the parameter – Family of curves of two parameters are connected by a relation.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	**Curvature:** Definition of Curvature – Circle, Radius and Centre of Curvature –Cartesian formula for the radius of curvature – The coordinates of the centre of Curvature – Evolutes and Involute – Radius of Curvature when the curve is given in Polar Co-ordinates	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	**Self -Study for Enrichment:** **(Not included for End Semester Examination)** Meaning of Derivative : Geometrical interpretation– Feynman's method of differentiation – Taylor's expansion of f(x,y) – Differential coefficient of the length of an arc of y=f(x) - p-r equation : pedal equation of a curve.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Book

Narayanan.S Manicavachagom Pillay.T.K**.** (2015). *Calculus Volume-I.* S. Viswanathan (Printers and Publishers) Pvt Limited.

Chapters and Sections

UNIT-I	Chapter III	:	Sections 1.1-1.6, 2.1,2.2
UNIT-II	Chapter VIII	:	Sections 1.1-1.6, 4
UNIT-III	Chapter IX	:	Sections 1.1 -1.4, 2
UNIT-IV	Chapter X	:	Sections 1.1-1.4
UNIT-V	Chapter X	:	Sections 2.1-2.6

Reference Books

1. Rawat.K.S.(2006). Differential Calculus.1st Edition, Adhyayan Pulishers and Distributors.
2. Singaravelu, A.(2003). Differential Calculus and Trigonometry. R Publication.
3. Vittal, P.R.(2014). Allied Mathematics. Margham Publications.

Web References

1. https://theengineeringmaths.com/wp-content/uploads/2017/08/Chapter-1-Successive-Differentiation-.pdf
2. https://www.youtube.com/watch?v=AXqhWeUEtQU
3. https://www.youtube.com/watch?v=j5VGo1n8KBY&list=PLpklqhIbn1jrIbgS6UckW39WE04bAFjOS
4. https://youtu.be/eHDUI3pNEn8?si=11SqkNYhX9TbmK3N
5. https://youtu.be/wlbHVSbiAMY?si=5VJJYnyBH6fhAzyn
6. https://youtu.be/pCZM7nXly7w?si=CW-2dIzyoi9GyDFf
7. https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/UNIT-2_14.pdf

Pedagogy

Chalk and Talk, Power point presentation, Group Discussion, Seminar, Assignment and Quiz.

Course Designer

Dr.P. Geethanjali

ALLIED COURSE –I (AC-I)

STATISTICS -I

(2026-2027 Onwards)

Semester I	Internal Marks: 30		ExternalMarks:70	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs / Week**	**CREDITS**
26UMA1AC1	**STATISTICS -I**	**ALLIED COURSE**	**3**	**3**

Course Objectives

- **Learn** in-depth knowledge of probability**.**
- **Explore** the concepts of some statistical data.
- **Analyse** the properties of discrete and continuous distributions.

S. No.	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Employability, Entrepreneurship, Skill Development
2.	Course integrates cross cutting issues relevant to Professional Ethics/Gender sensitization/ Environment and Sustainability/ Human Values	Professional Ethics
3.	Course relevant to Local/Regional/National/ Global need	Global need
4.	Course focus on Sustainable Developmental Goal	SDG 4,8,9,12

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Define the basic concepts in probability, some special distributions, and sampling distributions	K1
CO2	Explain the properties of probability and the theory of sampling distributions to find solutions of real-life problems.	K2
CO3	Solve problems in probability, some special distributions and sampling distributions.	K3
CO4	Examine the given data and interpret the results	K4
CO5	Analyze probability, and various distributions in the case of solid conclusions about the values of the population parameter.	K4

Mapping of COs with POs and PSOs

COs	PSO1	PSO2	SO3	SO4	SO5	O1	O2	O3	O4	O5
CO1	3	3	3	3	3	3	3	2	2	2
CO2	3	2	3	3	3	3	3	3	2	3
CO3	3	3	2	3	3	3	3	3	3	3
CO4	3	2	3	3	2	3	3	2	2	3
CO5	3	2	3	3	2	3	3	3	3	2

"1" – Slight (Low) Correlation "2" – Moderate (Medium)Correlation

"3" – Substantial (High) Correlation "-" indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Theory of probability:** Probability: Mathematical Notion – Probability Function – Laws of Addition of Probabilities – Extension of General Law of Addition of Probabilities – Law of Multiplication or Theorem of Compound Probability -Extension of Multiplication Law of Probability- Independent Events – Pairwise Independent Events – Mutually Independent Events – Baye's theorem.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	**Random Variables and Distribution Functions** Random Variable – Distribution Functions – Properties of Distribution Function – Discrete Random Variable – Probability Mass Function – Discrete Distribution Function – Continuous Random Variable – Probability Density Function – Various Measures of Central Tendency, Dispersion, Skewness and Kurtosis for Continuous Probability Distribution – Continuous Distribution Function – Joint Probability Mass Function and Marginal and Conditional Probability Function – Joint Probability Distribution Function – Joint Density Function, Marginal Density Function.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	**Mathematical Expectation** Mathematical Expectation – Addition Theorem of Expectation – Multiplication Theorem of Expectation – Co-variance – Expectation of a Linear Combination of Random Variables – Variance of a Linear Combination of Random Variables – Expectation of a Continuous random variable – Conditional Expectation & Conditional Variance.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	**Special Discrete Probability Distributions:** Binomial Distribution: Moments of Binomial Distribution – Recurrence Relation for the Moments of Binomial Distribution – Mode of Binomial Distribution – Moment Generating Function of Binomial Distribution – Additive Property of Binomial Distribution	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	**Special Continuous Probability Distributions:** Introduction –Normal Distribution: Normal Distribution as a Limiting Form of Binomial Distribution – Chief Characteristics of the Normal Distribution – Mode of Normal Distribution – Median of Normal Distribution – M.G.F. of Normal Distribution – Cumulant Generating Function (c.g.f.) of Normal Distribution - Fitting of Normal Distribution.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

VI	**Self-Study for Enrichment: (Not included for End Semester Examinations)** Extension of Multiplication Law of Probability – Independent Random Variables –Generating Functions – Poisson Distribution – Exponential Distribution.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Gupta.S.C. & Kapoor.V.K (2018), Elements of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Gupta. S.C & Kapoor.V.K (2021), Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.

Chapters and Sections

UNIT-I Chapter 4: Section 4.6 to 4.8 [1]

UNIT-II Chapter 5: Sections 5.1 to 5.5.3 [1]

UNIT-III Chapter 6: Sections 6.1 to 6.8 [1]

UNIT-IV Chapter 8: Sections 8.4 (8.4.1, 8.4.2, 8.4.5 to 8.4.7) [2]

UNIT-V Chapter 9: Sections 9.1 and 9.2 (9.2.1 to 9.2.6 & 9.2.14) [2]

Reference Books

1. Pillai.R.S.N & Bhagavathi (2008) Statistics, Theory and Practice , S.Chand & Sons.
2. Bhishma Rao.G.S.S (2011), Probability and Statistics, Scitech Publications (India) Pvt Ltd.
3. Veerarajan.T (2010), Probability, Statistics and Random Processes, Tata McGraw Hill Education Private Limited.

Web References

1. **https://www.youtube.com/watch?v=ZKkiCC6uCaU&list=PLpEFfNAthorfHzVYKNRFgtWJp2R1vTZfj**
2. **https://www.youtube.com/watch?v=jmqZG6roVqU**
3. **https://www.youtube.com/watch?v=gHBL5Zau3NE**
4. **https://www.youtube.com/watch?v=3PWKQiLK41M**
5. **https://www.youtube.com/watch?v=dOr0NKyD31Q**
6. **https://www.statisticshowto.com/probability-and-statistics/statistics-definitions/uniform-distribution/**

Pedagogy

Power point Presentations, Group Discussions, Seminar, Quiz, Assignment and Smart Classroom

Course Designer

Ms. P. Sangeetha

ALLIED COURSE PRACTICAL- I (ACP-I)
STATISTICAL TOOLS AND TECHNIQUES - R PROGRAMMING (P)
(2026 - 2027 Onwards)

Semester I	Internal Marks: 40		External Marks:60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs /Week**	**CREDITS**
26UMA1ACP1	**STATISTICAL TOOLS AND TECHNIQUES - R PROGRAMMING (P)**	**ALLIED COURSE PRACTICAL**	**3**	**3**

Course Objectives

- **Understand** how to use the R documentation.
- **Describe** key terminologies, concepts and techniques employed in statistical analysis.
- **Apply** various concepts to write programs and statistical analysis through R language

S. No.	Course Features	Relevance Status
1	Course emphasis on Employability /Entrepreneurship /Skill Development	Employability, Entrepreneurship, Skill Development
2	Course integrates cross cutting issues relevant to Professional Ethics/Gender sensitization/Environment and Sustainability/Human Values/ /Indian Knowledge System	Professional Ethics
3	Course relevant to Local/Regional/National/Global needs	Global need
4	Course focus on Sustainable Development Goals	SDG 4, 8, 9, 12

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	**Explain** the basic concepts of statistics and probability including mean, median, mode, discrete random variables, continuous random variables, probability mass function, and probability density function.	K1
CO2	**Describe** statistical measures such as variance, standard deviation, skewness, kurtosis, and covariance along with properties of Binomial distribution.	K2
CO3	**Apply** concepts of joint probability distribution functions, moment generating functions, and random variables to solve probability and statistical problems.	K3
CO4	**Analyze** statistical distributions including fitting of Normal distribution and interpret measures such as median and mode in data analysis.	K4
CO5	**Evaluate** Poisson and Exponential distributions using their statistical properties such as mean, variance, and distribution fitting techniques.	K5

Mapping of COs with POs and PSOs

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	2	2	3	3	2	2	2
CO2	3	3	3	2	2	2	3	2	2	3
CO3	2	2	2	2	2	2	2	2	2	2
CO4	2	3	2	3	2	3	2	3	2	2
CO5	2	2	2	2	2	2	2	2	2	2

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬
"3" – Substantial (High) Correlation ¬ "-" indicates there is no correlation.

LIST OF PROGRAMS

1. Mean
2. Median
3. Mode
4. Variance and Standard Deviation
5. Fitting of Poisson Distribution
6. Discrete Random Variables
7. Continuous Random Variables
8. Joint Probability Distribution Function
9. Fitting of Normal Distribution.
10. Skewness
11. Kurtosis
12. Co-variance
13. Binomial Distribution
14. Moment Generating Function
15. Exponential Distribution

Web References

1. **https://www.youtube.com/watch?v=9Eoa0XrHahI**
2. **https://www.youtube.com/watch?v=A5Kz8RrJ3nQ**
3. **https://www.youtube.com/watch?v=HBBUzgGgJUw**
4. **https://www.youtube.com/watch?v=q90gNCbFe3M**
5. **https://www.youtube.com/watch?v=2CaRpHh__6I**
6. **https://www.youtube.com/watch?v=UEBzPCT9oGA**
7. **https://www.youtube.com/watch?v=x-ApQenI5ko**
8. **https://www.youtube.com/watch?v=Z_11FDzyn7k**
9. **https://www.youtube.com/watch?v=jCCcDkPvAdk**
10. **https://www.youtube.com/watch?v=HenFpbOz6E4**

Pedagogy

Power point presentations , Live demo, Hands on training.

Course Designer

Dr.R.Divya

ABILITY ENHANCEMENT COMPULSORY COURSE -II(AECC-II)

CYBER SECURITY

(2026 - 2027 Onwards)

Semester I	Internal Marks: 100		External Marks: -	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs /Week**	**CREDITS**
26UGCS	**CYBER SECURITY**	**ABILITY ENHANCEMENT COMPULSORY COURSE**	**2**	**2**

Course Objectives

- To understand the concept of cyber security and the issues and challenges associated with it
- To develop an understanding of cyber-crimes, their nature, and legal remedies
- To analyse and evaluate the basic security aspects related to Computer and Mobiles

S. No.	Course Features	Relevance Status
1.	Course emphasis on Employability/ Entrepreneurship/Skill Development	Employability, Skill Development
2.	Course integrates cross cutting issues relevant to Professional Ethics/Gender sensitization/ Environment and Sustainability/ Human Values/Indian Knowledge System	Professional Ethics, Gender Sensitization, Human Values
3.	Course relevant to Local/Regional/National/ Global needs	Local, Regional, National, Global needs
4.	Course focus on Sustainable Developmental Goals	SDG 4, 5, 16

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Outline the concept of cyber security, cyber-crime, cyber law and the issues and challenges	K1
CO2	Develop deeper understanding of cyber-crimes, their nature, and legal remedies using case studies	K2
CO3	Apply various privacy and security measures in social media and online payments	K3
CO4	Analyse tools and techniques used for cyber security	K4
CO5	Evaluate security aspects of Computer, Mobiles and other digital devices	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	2	3	3	3
CO2	3	3	3	3	3	2	3	3	2	3
CO3	3	3	3	3	3	2	3	2	3	3
CO4	3	3	3	3	3	3	3	2	2	3
CO5	3	3	3	3	3	3	2	3	3	3

"1" – Slight (Low) Correlation ¬ "2" – Moderate (Medium) Correlation ¬
"3" – Substantial (High) Correlation ¬ "-" indicates there is No correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Introduction to Cyber Security:** Defining Cyberspace and Overview of Computer and Web technology - Communication and web technology - Internet infrastructure for data transfer and governance - Issues and challenges of cyber security.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Cyber Crime :** Cyber crime targeting computers and mobiles - cyber crime against women and children - financial frauds- social engineering attacks - zero day and zero click attacks.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Social Media Overview and Security:** Introduction to Social networks - Types of Social Media - Social media monitoring – Hashtag - Viral content - Social media marketing .	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**E-Commerce :** Definition of E- Commerce - Elements of E-Commerce security - ECommerce threats - E-Commerce security best practices.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Digital Payments:** Unified Payment Interface (UPI) - Digital payments related common frauds and preventive measures - RBI guidelines on digital payments and customer protection in unauthorized banking transactions.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment (Not included for End Semester Examinations)** Case Studies: Parliament Attack Cyber Crime - Pune Citibank MphasiS Call Center Fraud - Yahoo Data Breach - Equifax Data Breach.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Reference Books

1. Sunit Belapure and Nina Godbole, (2011). *Cyber Security Understanding Cyber Crimes*,
2. Henry A. Oliver, (2015). *Security in the Digital Age: Social Media Security Threats and Vulnerabilities* Create Space Independent Publishing Platform, Pearson.
3. Krishna Kumar, (2011). *Cyber Laws: Intellectual Property & E-Commerce Security*, Dominant Publishers.
4. Eric Cole, Ronald Krutz, (2011). *Network Security Bible*, Wiley India Pvt. Ltd, 2nd Edition.
5. R. C Mishra, (2010). *Cyber Crime: Impact on the New Millennium*, Authors Press. Edition 2010.

Web References

11. **https://www.udacity.com/course/intro-to-cybersecurity-nanodegree--nd545**
12. **https://www.techtarget.com/searchsecurity/definition/cybersecurity**
13. **https://www.financemagnates.com/fintech/payments/the-evolution-of-digital-payments-and-ecommerce/**
14. **https://www.cyberralegalservices.com/casestudies.php**
15. **https://www.vidhikarya.com/legal-blog/cyber-crime-and-cyber-law-in-india**

Pedagogy

Power Point Presentations, Group Discussions, Seminar, Quiz, Assignment.

Course Designers

1. Dr. R. Divya
2. Ms. A. Gowri Shankari