# **CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)**

Nationally Accredited with 'A' Grade by NAAC ISO 9001:2015 Certified

## PG AND RESEARCH DEPARTMENT OF

## MATHEMATICS



# B.Sc., MATHEMATICS AUTONOMOUS SYLLABUS (2023-2024 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 quality standards and train the students to be effective leaders in their chosen fields.					
PEO2	ACADEMIC EXCELLENCE					
	To provide a conducive environment to unleash their hidden talents and to 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 the changing 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, B.Sc Physics, B.Sc Chemistry PROGRAMME

After completing a 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



#### CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS) PG AND RESEARCH DEPARTMENT OF MATHEMATICS B.Sc MATHEMATICS PROGRAMME STRUCTURE

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS-LOCF)

(For the candidates admitted from the Academic year 2023-2024 Onwards)

ter	ť				Hrs. ek	its		Exan	n	al
nest	Par	Course	<b>Course Title</b>	<b>Course Code</b>	st. I wee	red	IS.	Ma	rks	Tot
Ser					In /	0	Η	Int	Ext	
			பொதுத்தமிழ் - I	23ULT1						
			Hindi Ka Samanya Gyan Aur	23ULH1						
	т	Language Course – I	Nibandh		6	2	2	25	75	100
	1	(LC)	of Sanskrit Literature	230LS1	0	3	3	23	13	100
			Foundation Course: Paper I-							
			French I	23ULF1						
	Π	English Language Course – I (ELC)	General English-I	23UE1	6	3	3	25	75	100
т		Core Course – I (CC)	Algebra and Trigonometry	23UMA1CC1	4	4	3	25	75	100
1		Core Course – II (CC)	Differential Calculus	23UMA1CC2	5	4	3	25	75	100
	III	First Allied Course – I	Mathematical Statistics	23UMA1AC1	5	4	3	25	75	100
		First Allied Course – II	Programming Language using	23UMA1AC2P	2	2	3	40	60	100
		(AP)	MATLAB (P)							
	117	Ability Enhancement	Value Education	23UGVE	2	2	-	100	-	100
	IV	Compulsory Course – I								
		(indee)		Total	30	22				700
			பொதுக்கமிழ் -II	23ULT2						
			Hindi Literature and	22ULH2						
		Languaga Course II	Grammar II							
	Ι	(LC)	Prose, Grammar and	23ULS2	6	3	3	25	75	100
		()	History of Sanskrit							
			Basic French-II	22UILF2						
		English Language Course	23UE2	6	3	3	25	75	100	
	II	– II (ELC)		23012	0	5	5	25	15	100
		Core Course – III (CC)	Differential Equations and Laplace Transforms	23UMA2CC3	4	4	3	25	75	100
п	TIT	Core Course – IV (CC)	Integral Calculus	23UMA2CC4	4	4	3	25	75	100
	111	Core Practical –I (CP)	Statistics with Excel (P)	23UMA2CC1P	2	2	3	40	60	100
		First Allied Course – III	Applied Statistics	23UMA2AC3	4	3	3	25	75	100
		(AC)	E ' (10) 1'		2	2		100		100
		Ability Enhancement	Environmental Studies	22UGEVS	2	2	-	100	-	100
	IV	(AECC)								
		Ability Enhancement	Innovation and	22UGIE	2	1	-	100	-	100
		Compulsory Course-III	Entrepreneurship							
		(AECC)			•				1	
		Extra Credit Course	SWAYAM		As pe	er UG	U Re	comm	ienda	tion
			Total		30	22				800

			பொதுத்தமிழ் -III	23ULT3						
			Hindi Literature & Grammar	22ULH3						
	-	Language Course – III	III			-			75	100
	Ι	(LC)	Drama, Grammar and History	23ULS3	6	3	3	25	75	100
			of Sanskrit Literature							
			Intermediate French – I	22ULF3						
	II	English Language Course	Learning Grammar Through	23UE3	6	3	3	25	75	100
		– II (ELC)	Literature – I							
		Core Course – V (CC)	Analytical Geometry (3D)	22UMA3CC5	4	4	3	25	75	100
	III Second Allied Course – I (AC) Second Allied Course–I	Core Course – VI (CC)	Vector Calculus and Fourier	23UMA3CC6	5	4	3	25	75	100
Ш			Series							
111		Second Allied Course – I	Python Programming	23UMA3AC4	4	3	3	25	75	100
		(AC)								
		Python Programming (P)	23UMA3AC5P	3	3	3	40	60	100	
		(AP)								
			Mathematics for Competitive	22UMA3GEC1						
	IV	Generic Elective Course	Examinations – I					~ ~		100
	1,	-I(GEC)	Basic Tamil-I	22ULC3BT1	2	2	3	25	75	100
			Special Tamil-I	22ULC3ST1						
		Extra Credit Course	SWAYAM	As	per UGC Recommendation					
			<b></b>		20	22				-
	Total									700

15 Days INTERNSHIP during Semester Holidays

			Total		30	24				800
		Extra Credit Course	SWAYAM		As	per U	IGC I	Recom	menda	ation
		1 (SEC)	Techniques - R Programming (P)							
		Skill Enhancement Course –	Statistical Tools and	22UMA4SEC1P	2	2	3	40	60	100
			Special Tamil-II	22ULC4ST2						
	IV		Basic Tamil-II	22ULC4BT2						
		(GEC)	- II		2	2 2		25	5 75	100
		Generic Elective Course – II	Competitive Examinations	220IVIA40LC2						
IV		Internship	Methometics for		-	2	-	-	100	100
		(AC)	22UMA4INT		2			100	100	
		Second Allied Course – III	Internet of Things	22UMA4AC6	4	3	3	25	75	100
	III		Analysis							
		Core Course – VIII (CC)	Methods in Numerical	23UMA4CC8	5	4	3	25	75	100
ľ		Core Course – VII (CC)	Sequences and Series	22UMA4CC7	5	5	3	25	75	100
	Π	English Language Course – IV (ELC)	Learning Grammar Through Literature – II	23UE4	6	3	3	25	75	100
			Intermediate French - II	22ULF4						
			Translation							
	Ι	(LC)	Alankara, Didactic and	23ULS4	6 3			3 25	75	100
		Language Course IV	Functional Hindi							
			Hindi Literature &	22ULH4						
			ொதுக்குமிம் –IV	23ULT4						

		Core Course - IA(CC)	Abstract Algebra	25UMAJCC9	0	5	5	25	15	100
		Core Course – X (CC)	Real Analysis	22UMA5CC10	5	5	3	25	75	100
		Core Course – XI (CC)	Statics	23UMA5CC11	5	4	3	25	75	100
	III	Core Course – XII (CC)	<b>Discrete Mathematics</b>	23UMA5CC12	5	4	3	25	75	100
		Discipline Specific Elective	A. Operations Research	23UMA5DSE1A						
v		– I (DSE)	B. Astronomy	23UMA5DSE1B	5	3	3	25	75	100
•			C. Artificial Intelligence	23UMA5DSE1C						
		Ability Enhancement	UGC Jeevan Kaushal -	22UGPS	2	2	-	100	-	100
	IV	Compulsory Course – IV (AECC)	Professional Skills							
		Skill Enhancement Course -	LaTeX (P)	22UMA5SEC2P	2	2	3	40	60	100
		II (SEC)								
	Ext	tra Credit Course		As per UGC Recommendation			ation			
			Total			25				700
		Core Course – XIII (CC)	Linear Algebra	23UMA6CC13	5	4	3	25	75	100
		Core Course – XIV(CC)	Complex Analysis	23UMA6CC14	5	4	3	25	75	100
		Core Course –XV (CC)	Dynamics	22UMA6CC15	4	4	3	25	75	100
				2011000	-		-	25	75	100
		Core Course –XVI (CC)	Cyber Security	220GCS	5	4	3	25	15	100
	III	Core Course –XVI (CC) Discipline Specific	Cyber Security A. Graph Theory	22UGCS 23UMA6DSE2A	5	4	3	25	15	100
VI	III	Core Course –XVI (CC) Discipline Specific Elective –II (DSE)	Cyber SecurityA. Graph TheoryB. Number Theory	23UMA6DSE2A 23UMA6DSE2B	5	4	3	25	75	100
VI	Ш	Core Course –XVI (CC) Discipline Specific Elective –II (DSE)	Cyber SecurityA. Graph TheoryB. Number TheoryC. Fundamentals of Big	23UMA6DSE2A 23UMA6DSE2B 23UMA6DSE2C	5	4	3	25	75	100
VI	Ш	Core Course –XVI (CC) Discipline Specific Elective –II (DSE)	Cyber SecurityA. Graph TheoryB. Number TheoryC. Fundamentals of Big Data Analytics	23UMA6DSE2A 23UMA6DSE2B 23UMA6DSE2C	5	4	3	25	75	100
VI	III	Core Course –XVI (CC) Discipline Specific Elective –II (DSE) Project	Cyber Security A. Graph Theory B. Number Theory C. Fundamentals of Big Data Analytics Project Work	22UGCS 23UMA6DSE2A 23UMA6DSE2B 23UMA6DSE2C 22UMA6PW	5 5 5	4 3 4	3 3 -	25	75	100
VI	III	Core Course –XVI (CC) Discipline Specific Elective –II (DSE) Project Gender Studies	Cyber Security A. Graph Theory B. Number Theory C. Fundamentals of Big Data Analytics Project Work Gender Studies	22UGCS 23UMA6DSE2A 23UMA6DSE2B 23UMA6DSE2C 22UMA6PW 22UGGS	5 5 5 1	4 3 4 1	3 3 - -	25 25 - 100	75	100 100 100
VI	III V	Core Course –XVI (CC) Discipline Specific Elective –II (DSE) Project Gender Studies Extension activity	Cyber Security A. Graph Theory B. Number Theory C. Fundamentals of Big Data Analytics Project Work Gender Studies	22UGCS 23UMA6DSE2A 23UMA6DSE2B 23UMA6DSE2C 22UMA6PW 22UGGS 22UGGS	5 5 5 1 0	4 3 4 1 1	3 3 - - -	25 25 - 100 -	75 75 100 -	100 100 100 -
VI	III V	Core Course –XVI (CC) Discipline Specific Elective –II (DSE) Project Gender Studies Extension activity	Cyber Security A. Graph Theory B. Number Theory C. Fundamentals of Big Data Analytics Project Work Gender Studies	22UGCS 23UMA6DSE2A 23UMA6DSE2B 23UMA6DSE2C 22UMA6PW 22UGGS 22UGEA Total	5 5 1 0 <b>30</b>	4 3 4 1 1 25	3 3	25 25 <u>-</u> 100 -	75 100 -	100 100 100 - <b>700</b>
VI	III V	Core Course –XVI (CC) Discipline Specific Elective –II (DSE) Project Gender Studies Extension activity	Cyber Security A. Graph Theory B. Number Theory C. Fundamentals of Big Data Analytics Project Work Gender Studies	22UGCS 23UMA6DSE2A 23UMA6DSE2B 23UMA6DSE2C 22UMA6PW 22UGGS 22UGEA Total Grand Total	5 5 1 0 30 180	4 3 4 1 1 25 140	3 3	25 25 100 -	75 100 -	100 100 100 - 700 4400

#### Note:

Part - I-Language - Tamil/Hindi/French/Sanskrit

Part – II- English

#### List of Allied Courses:

Allied Course I- Mathematical Statistics

Allied Course II- Computer Science

Part	Course	No. of	Credits	Total Credits
		Courses		
Ι	Tamil/ Other Language	4	12	12
II	English	4	12	12
	Core (Theory& Practical)	16+1	69	
	Project Work	1	4	
TTT	Internship	1	2	99
111	First Allied	3	9	
	Second Allied	3	9	
	DSE	2	6	
	GEC	2	4	
	SEC	2	4	
IV	AECC-I -Universal Human	1	2	
	Values			
	AECC-II-Environmental	1	2	15
	Studies			15
	AECC-III-Innovation and	1	1	
	Entrepreneurship			
	AECC-IV- Professional Skills	1	2	
V	Gender Studies	1	1	02
	Extension Activities	_	1	
		44		140

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

Subject	Internal Marks	<b>External Marks</b>
Theory	25	75
Practical	40	60

#### FOR THEORY:

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks].

The passing minimum for University Examinations shall be 40% out of 75 marks [ i.e. 30 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].

# I SEMESTER

#### **CORE COURSE – I (CC)**

#### ALGEBRA AND TRIGONOMETRY

#### (2023-2024 Onwards)

Semester I	Internal Marks	s: 25	External Marks:75				
COURSE CODE	COURSE TITLE	CATEGORY	Hrs /Week	CREDITS			
23UMA1CC1	ALGEBRA AND TRIGONOMETRY	CORE	4	4			

## **Course Objective**

- Basic ideas on the Theory of Equations, Matrices and Number Theory.
- Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.
- Understanding of how Hyperbolic functions can be used as a powerful tool in solving problems in science.

#### **Course Outcomes**

#### **Course Outcome and Cognitive Level Mapping**

	CO Statement	Cognitive
СО	On the successful completion of the course, students	Level
Number	will be able to	
CO1	Define and interpret on reciprocal equations	K1, K2
CO2	Illustrate the sum of binomial, exponential and	К3
	logarithmic series	
CO3	Compute Eigen values, eigen vectors, verify Cayley -	K3
	Hamilton theorem and diagonalize a given matrix.	
CO4	Determine the powers and multiples of trigonometric	K4
	functions in terms of sine and cosine.	
CO5	Evaluate the relationship between circular and	K5
	hyperbolic functions and the summation of	
	trigonometric series.	

## Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	<b>PO1</b>	PO2	PO3	PO4	<b>PO5</b>
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  $\neg$  "-" indicates there is no correlation.

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Reciprocal Equations - Standard form - To increase or decrease the roots of a given equation by a given quantity- Removal of terms- Horner's method – related problems.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	Binomial Series– The following are the deductions from the Binomial Series - Approximations using Binomial Series- The Exponential Series – The Logarithmic series- related problems.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	Inverse matrix -Characteristic equation – Eigen values and Eigen Vectors-Similar matrices - Cayley – Hamilton Theorem (Statement only) - Finding powers of square matrix, Inverse of a square matrix up to order 3, Diagonalization of square matrices - related problems.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
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 $\theta$ in terms of functions of multiples of $\theta$ , Expansions of $\cos^n \theta$ , $\sin^n \theta$ , $\sin^n \theta \cos^n \theta$ when n is a positive integer - Expansions of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of $\theta$ - related problems.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
v	Hyperbolic functions – Relation between circular and hyperbolic functions - Inverse hyperbolic functions - Logarithm of complex quantities - related problems.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	Self Study for Enrichment: (Not included for End Semester Examination) Symmetric function of the roots - Partial Fractions- Rank of a matrix - To resolve into factors the expression $x^n - a^n, x^n + a^n$ - Summation of trigonometric series.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

## **Text Books**

 Manicavachagom Pillay, T.K, Natarajan T, Ganapathy K S (2018). Algebra, Volume I. S.Viswanathan (Printers & Publishers), Pvt. Ltd.

- 2. Sudha S (1998). Algebra, Analytical Geometry(2D) and Trigonometry. Emerald Publishers.
- 3. Manicavachagom Pillay, T.K, Natarajan T, Ganapathy K S (2015). *Algebra, Volume II*. S.Viswanathan (Printers & Publishers), Pvt. Ltd.
- Narayanan, S, Manicavachagom Pillay, T.K (2013). *Trigonometry*. S.Viswanathan (Printers & Publishers), Pvt. Ltd.

#### **Chapters and Sections**

UNIT-I	Chapter VI: Sections 16-17,19, 30 [1]
UNIT-II	Chapter I: Sections 1.1-1.5 [2]
UNIT-III	Chapter II: Sections 8, 16 [3]
UNIT- IV	Chapter III: Sections 1-5 [4]
UNIT- V	Chapter IV: Fully [4]
	Chapter V : Section 5 [4]

#### **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. <u>https://www.youtube.com/watch?v=BydVprh9NgQ</u>
- 3. <u>https://www.youtube.com/watch?v=r-b4m2-yCt0</u>
- 4. <u>https://www.youtube.com/watch?v=IcBXhQNx4fY</u>
- 5. https://www.youtube.com/watch?v=ZjBcmEeUWXg

#### Pedagogy

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

#### **Course Designer**

Dr. R.Divya

## **CORE COURSE – II (CC)**

#### **DIFFERENTIAL CALCULUS**

#### (2023-2024 Onwards)

Semester I	Internal Marks: 25		External M	Iarks:75
COURSE	COURSETITLE	CATEGORY	Hrs	CREDITS
CODE			/Week	
23UMA1CC2	DIFFERENTIAL	CORE	5	4
	CALCULUS			

#### **Course Objective**

- **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.

#### **Course Outcomes**

#### **Course Outcome and Cognitive Level Mapping**

CO	CO Statement	Cognitive
Number	On the successful completion of the course, students	Level
	will be able to	
CO1	Explain the concepts of Calculus.	K1, K2
CO2	Classify the problem models in the respective area.	К3
CO3	Solve various types of problems in the corresponding	K3
	stream.	
CO4	Identify the properties of solutions in the core area.	К3
CO5	Discover the applications of Calculus.	K4

#### Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	<b>PO1</b>	PO2	PO3	<b>PO4</b>	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.

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
Ι	Successive Differentiation: Introduction (Review of 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.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
П	PartialDifferentiation:Partialderivatives–Successivepartialderivatives–Function of a function rule–Totaldifferentialcoefficient–Aspecial case–Implicit Functions.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	<b>Partial Differentiation (Continued):</b> Homogeneous functions – Partial derivatives of a function of two functions – Maxima and Minima of functions of two variables – Lagrange's method of undetermined multipliers.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	<b>Envelope:</b> Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter – Family of curves will contain two parameters and the two parameters are connected by a relation.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	<b>Curvature:</b> 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	15	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) – p-r equation : pedal equation of a curve.	_	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

#### **Text Book**

1. Narayanan.S Manicavachagom Pillay.T.K. (2019). *Calculus Volume-I*. Ananda Book Depot.

#### **Chapters and Sections**

UNIT-IIChapter VIIISections 1.1-1.5UNIT-IIIChapter VIIISections 1.6,1.7,4,5UNIT-IVChapter XSections 1.1-1.4UNIT-VChapter XSections 2.1-2.6	UNIT-I	Chapter III	Sections 1.1-1.6, 2.1,2.2
UNIT-IIIChapter VIIISections 1.6 ,1.7,4,5UNIT-IVChapter XSections 1.1-1.4UNIT-VChapter XSections 2.1-2.6	UNIT-II	Chapter VIII	Sections 1.1-1.5
UNIT-IVChapter XSections 1.1-1.4UNIT-VChapter XSections 2.1-2.6	UNIT-III	Chapter VIII	Sections 1.6, 1.7, 4, 5
UNIT-V Chapter X Sections 2.1-2.6	UNIT-IV	Chapter X	Sections 1.1-1.4
	UNIT-V	Chapter X	Sections 2.1-2.6

#### **Reference Books**

- Rawat.K.S.(2006). An Differential Calculus.1<sup>st</sup> Edition, Daryaganj, Newdelhi-2:AdhyayanPulishers and distributors, j m d House, Murarlal stre.
- 2. Arumugam. S and Issac. (2014). Calculus. New Gamma Publishing House.
- Bali. N.P. (2010). *Differential Calculus*. Laxmi Publications (P) Ltd. New Delhi.

#### Web References

- 1. <u>https://www.youtube.com/watch?v=s8hVridQ5IA</u>
- 2. <u>https://freevideolectures.com/course/4224/nptel-integral-vector-</u> calculus/34
- 3. https://www.youtube.com/watch?v=IQJ0UiM91Z4
- 4. <u>https://www.youtube.com/watch?v=AXqhWeUEtQU</u>
- 5. <u>https://www.youtube.com/watch?v=j5VGo1n8KBY&list=PLpklqhIbn1jrI</u> <u>bgS6UckW39WE04bAFjOS</u>
- 6. https://archive.nptel.ac.in/courses/111/104/111104095/

#### Pedagogy

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

#### Course Designer

Dr.L.Mahalakshmi

## FIRST ALLIED COURSE -I (AC)

## MATHEMATICAL STATISTICS

#### (2023-2024 Onwards)

Semester I	Internal Marks:2	External Marks:75		
COURSE CODE	COURSE TITLE	CATEGORY	Hrs/Week	CREDITS
23UMA1AC1	MATHEMATICAL	ALLIED	5	4
	STATISTICS			

#### **Course Objectives**

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

## **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

СО	CO Statement	Cognitive
Number	On the successful completion of the course, students will	Level
	be able to	
CO1	Define the basic concepts in probability, some special	<b>K1</b>
	distributions, and sampling distributions.	
CO2	Explain the properties of probability and the theory of	K2
	sampling distributions to find solutions of real-life	
	problems.	
CO3	Solve problems in probability, some special distributions and sampling distributions.	К3
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 CO with PO and PSO

	<u> </u>	•								
Cos	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	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.

UNIT	CONTENT	HOURS	COs	COGNITIVE
				LEVEL
Ι	Theory of Probability:			
	Introduction – Short History – Definitions of			
	Various Terms – Mathematical or Classical			
	or 'a Priori' Probability –Statistical or			
	Empirical Probability –Mathematical Tools:			
	Preliminary Notion of sets-Sets and		CO1,	K1,
	Elements of Sets - Operations on Sets -		CO2,	K2,
	Algebra of Sets-Axiomatic approach to	15	CO3,	K3,
	Probability-Random Experiment (Sample		CO4,	K4
	Space) – Event–Some Illustrations–Algebra		CO5	
	of Events-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-Independent Events-Pair wise			
	Independent Events-Mutually Independent			
	Events- Baye's theorem.			
II	Random Variables and Distribution			
	Functions:			
	Random Variable–Distribution Functions –			
	Properties of Distribution Function-Discrete			
	Random Variable –Probability Mass			
	Function – Discrete Distribution Function–		CO1,	K1,
	Continuous Random Variable – Probability		CO2,	K2,
	Density Function–Various Measures of	15	CO3,	K3,
	Central Tendency, Dispersion, Skewness and		CO4,	K4
	Kurtosis for Continuous Probability		CO5	
	Distribution – Continuous Distribution			
	Function – Joint Probability Mass Function			
	and Marginal and Conditional Probability			
	Function–Joint Probability Distribution			
	Function–Joint Density Function, Marginal			
	Density Function - The Conditional			
	Distribution Function and Conditional			
	Probability Density Function.			

III	Mathematical Expectation			
	Mathematical Expectation – Addition			
	Theorem of Expectation - Multiplication			
	Theorem of Expectation - Co-variance -		CO1,	K1,
	Expectation of a Linear Combination of		CO2,	K2,
	Random Variables -Variance of a Linear		CO3,	K3,
	Combination of Random Variables -	15	CO4,	K4
	Expectation of a Continuous random		CO5	
	variable – Conditional Expectation &			
	Conditional Variance.			
IV	Special Discrete Probability			
	<b>Distributions:</b> Introduction – Discrete			
	uniform Distribution – Bernoulli			
	Distribution: Moments of Bernoulli		CO1,	K1,
	Distribution-Binomial Distribution:		CO2,	K2,
	Moments of Binomial Distribution -		CO3,	K3,
	Recurrence Relation for the Moments of		CO4,	K4
	Binomial Distribution – Factorial Moments	15	CO5	
	of Binomial Distribution-Mean Deviation			
	about Mean of Binomial Distribution-Mode			
	of Binomial Distribution –Moment			
	Generating Function of Binomial			
	Distribution – Additive Property of			
	Binomial Distribution.			
V	Special Continuous Probability			
	Distributions:			
	Introduction – Normal Distribution:			
	Normal Distribution as a Limiting Form		CO1,	K1,
	of Binomial Distribution–Chief		CO2,	K2,
	Characteristics of the Normal Distribution-	15	CO3,	K3,
	Mode of Normal Distribution-Median of		CO4,	K4
	Normal Distribution-M.G.F. of Normal		CO5	
	Distribution-Cumulant Generating Function			
	(c.g.f.) of Normal Distribution-Moments of			
	Normal Distribution –A Linear Combination			
	of Independent Normal Variates -Fitting of			
	Normal Distribution.			
VI	Self-Study for Enrichment: (Not included		CO1,	K1,
	for End Semester Examinations)		CO2,	K2,
	Extension of Multiplication Law of	-	CO3,	K3,
	Probability– Independent Random Variables		CO4,	K4
	-Generating Functions- Poisson distribution		CO5	
	-Exponential Distribution.			

## **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 (2014), *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, New Delhi.

#### **Chapters and Sections**

UNIT-I	Chapter 4: Section 4.1 to 4.8 (omit 4.7.1) [1]
UNIT-II	Chapter 5: Sections 5.1 to 5.5.3, 5.5.5 [1]
UNIT-III	Chapter 6: Sections 6.1 to 6.8 [1]
UNIT-IV	Chapter 8: Sections 8.1 to 8.3, 8.4 (8.4.1 to 8.4.7) [2]
UNIT-V	Chapter 9: Sections 9.1 and 9.2 (9.2.1 to 9.2.8, 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. <u>https://www.youtube.com/watch?v=ZKkiCC6uCaU&list=PLpEFfNAthorfHz</u> <u>VYKNRFgtWJp2R1vTZfi</u>
- 2. <u>https://www.youtube.com/watch?v=jmqZG6roVqU</u>
- 3. <u>https://www.youtube.com/watch?v=gHBL5Zau3NE</u>
- 4. <u>https://www.youtube.com/watch?v=3PWKOiLK41M</u>
- 5. https://www.youtube.com/watch?v=dOr0NKyD310
- 6. <u>https://www.statisticshowto.com/probability-and-statistics/statistics-</u> definitions/uniform-distribution/

#### Pedagogy

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

#### **Course Designers**

- 1. Dr. S. Sasikala
- 2. Dr. R. Radha

#### FIRST ALLIED COURSE -II (AP)

#### PROGRAMMING LANGUAGE USING MATLAB (P)

#### (2023-2024 Onwards)

Semester I	Internal Marks: 4	External	Marks: 60	
COURSE	COURSE TITLE	CATEGORY	Hrs	CREDITS
CODE			/Week	
23UMA1AC2P	Programming	ALLIED	2	2
	Language Using	PRACTICAL		
	MATLAB (P)			

#### **Course Objective**

- **Apply** MATLAB as a simulation tool.
- **Compute** mathematical solutions using MATLAB and develop interdisciplinary skills.
- **Determine** syntax, semantics, data-types and library functions of numerical computing.

#### **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

CO	CO Statement	Cognitive
Number	On the successful completion of the course, students will	Level
	be able to	
CO1	Explain fundamental concepts of MATLAB.	K2
CO2	Illustrate a great numbers of MATLAB commands and how to use them in programming and in many applications of Mathematics.	K2
CO3	Compute simple program for a given problem in MATLAB coding.	K3
CO4	Determine the result and the outcome of any command or script.	K4
CO5	Deduce Mathematical solutions using MATLAB tools.	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	2	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	2	3

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

"3" – Substantial (High) Correlation  $\neg$  "-" indicates there is no correlation.

#### Listings:

- 1. Operations using Matrices (Addition, Subtraction, Multiplication, Transpose and Inverse)
- 2. Basic plotting of variables (Simple and multiple data set).
- 3. Sorting of given data.
- 4. Finding the sum of 'n' numbers, sum of square of 'n' numbers, sum of 'n' odd numbers.
- 5. Finding the roots of a polynomial equation.
- 6. Solving system of equations using matrices.
- 7. Finding the Eigen vectors and Eigen values.
- 8. Generating Fibonacci series.
- 9. Vector operations.
- 10. Evaluation of integrals.
- 11. Finding the derivatives of given order.
- 12. Operations on sets.
- 13. Finding rank of a matrix.
- 14. Solving ordinary differential equations.

#### Web References

- 1. <u>https://www.youtube.com/watch?v=EF4wmV5xBM0</u>
- 2. <u>https://www.youtube.com/watch?v=XsrhAO3r3VY</u>
- 3. <u>https://www.youtube.com/watch?v=aEjeuj5jfLU</u>
- 4. <u>https://www.youtube.com/watch?v=ZBafH5fss1E</u>
- 5. <u>https://www.youtube.com/watch?v=XtiAC4adozQ</u>
- 6. <u>https://www.youtube.com/watch?v=kt8QSkt-M6c</u>
- 7. https://www.youtube.com/watch?v=pi6Dkvs6rP4
- 8. <u>https://www.youtube.com/watch?v=YzEp0jiVyYs</u>
- 9. https://www.youtube.com/watch?v=LFoutvnfP6A
- 10. https://youtu.be/rqWPw21E90A
- 11. https://youtu.be/CUdL4-tJy58

#### Pedagogy

Power point presentations, Live Demo, Hands on Training.

#### **Course Designer**

Dr. C. Saranya

# **II SEMESTER**

#### CORE COURSE – III (CC) DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS (2023-2024 Onwards)

Semester II	Internal Marks	s: 25	Externa	l Marks:75
COURSE	COURSETITLE	CATEGORY	Hrs / Week	CREDITS
CODE				
23UMA2CC3	DIFFERENTIAL	CORE	4	4
	EQUATIONS			
	AND LAPLACE			
	TRANSFORMS			

#### **Course Objective**

- **Explain** the basics of Ordinary Differential Equations.
- **Evaluate** in the field of Partial Differential Equations.
- **Explore** the mathematical methods formatted for major concepts.

#### **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

CO	CO Statement	Cognitive
Number	On the successful completion of the course, students	Level
	will be able to	
CO1	Explain various notions in ODE, PDE, Laplace transforms.	K1, K2
CO2	Classify the problem models in the respective area.	K3
CO3	Identify the properties of solutions in the field of mathematics.	К3
CO4	Solve various types of problems involving differential equations.	К3
CO5	Analyze the applications of the Differential equations in practical life.	K4

## 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	3	2	2	3
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  $\neg$  "-" indicates there is no correlation.

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
Ι	Equations of the first order but of higher degree: Equations solvable for $dy/dx$ – Equations solvable for y – Equations solvable for x – Clairaut's form – Extended form of Clairaut's form – Exact differential equations – Conditions of integrability of M dx + N dy = 0 – Practical rule for solving an exact differential equation – Rules for finding integrating factors - simple problems.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
Π	Linear equations with constant coefficients: Definition – The operator D – Complementary function of a linear equation with constant coefficients – Particular integral – General method of finding P.I. – Special methods for finding P.I. of the forms e <sup>ax</sup> , cos ax or sin ax, e <sup>ax</sup> V, x <sup>m</sup> – Linear equations with variable coefficients – Methods of finding particular integrals – Method of Variation of Parameters.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	Partial differential equations of the first order: Classification of Integrals – Derivation of partial differential equations – By elimination of constants – By elimination of an arbitrary function – Lagrange's method of solving the linear equation – Special methods for some standard forms F(p,q) = 0, F(x, p, q) = 0, F(y, p, q) = 0, F(z, p, q) = 0, $f_1(x, p) = f_2(y, q)$ – Clairant's form – Equations reducible to the standard forms – Charpit's method.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	Laplace transforms: Definition – Piecewise continuity – Sufficient conditions for the existence of the Laplace Transforms – Basic results – Laplace Transform of periodic functions – Some general theorems & simple applications – Evaluation of certain integrals using Laplace Transform.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	Inverse laplace transforms: The Inverse Transforms –Modification of results in Laplace Transform to get the inverse Laplace Transform - Use of Laplace Transforms in solving ODE with constant coefficients – The Laplace transform can also be used to solve systems of differentiable equations- Laplace transforms can be used to solve differential equations with variable coefficients.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

VI	<ul> <li>Self Study for Enrichment:</li> <li>(Not included for End Semester Examination) Equations that do not contain x explicitly- Equations that do not contain y explicitly - Special method of evaluating the P.I. when X is of the form x<sup>m</sup>-Solving of few standard forms from Charpit's method - Certain equations involving integrals can also be solved by Laplace transform.</li> </ul>	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
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#### **Text Books**

1. Narayanan, S and Manicavachagom Pillay, T.K (2016). *Differential Equations And Its Applications*. S.Viswanathan Publishers Pvt. Ltd.

## **Chapters and Sections**

UNIT-I	Chapter IV: Sections $1 - 3$ .
	Chapter II: Section 6.
UNIT <b>-II</b>	Chapter V: Sections 1-5 (Omit 5.5).
	Chapter VIII: Section 4.
UNIT <b>-III</b>	Chapter XII: Sections 1-6.
UNIT- IV	Chapter IX: Sections 1-5.
UNIT- V	Chapter IX: Sections 6-10.

## Web References

- Raisinghania M.D. (2008). Ordinary and Partial Differential Equations.S.Chand & Company.
- 2. Zafar Ahsan.(2006). Differential Equation and Their Applications (Second Edition). Prentice Hall of India Private Limited.
- 3. Dr.S.Arumugam, A Thangapandi Isaac (2014). Differential Equations and Applications. New Gamma Publishing House.

## Web References

- 1. https://youtu.be/aYrsPeE7NLQ
- 2. https://youtu.be/913LV\_0QDO0
- 3. <u>https://youtu.be/JEyzQtRPnjk</u>
- 4. https://youtu.be/2LyY4t0Gfvs?si=Bq9dFIA4dHSQdSRg
- 5. <u>https://youtu.be/UzaBAA3VJOY?si=MUQxwUqrykVZzkSt</u>

## Pedagogy

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

## **Course Designer**

Dr. R.Divya

## CORE COURSE – IV (CC)

#### INTEGRAL CALCULUS

#### (2023-2024 Onwards)

Semester II	Internal Marks:	External N	larks:75	
COURSE	COURSE TITLE	CATEGORY	Hrs /Week	CREDITS
CODE				
23UMA2CC4	INTEGRAL	CORE	4	4
	CALCULUS			

#### **Course Objective**

- Analyze the properties of definite integral and Reduction formulae.
- **Explore** the order of Integration, Triple Integrals, Beta and Gamma functions.
- Apply Geometrical Applications of Integration of area under plane curve.

#### **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

CO	CO Statement	Cognitive
Number	On the successful completion of the course, students will	Level
	be able to	
CO1	Identify the integrals of algebraic, trigonometric and	K1, K2
	logarithmic functions and to find the reduction formulae.	
CO2	Solve multiple integrals and to find the areas of curved	К3
	surfaces and volumes of solids of revolution.	
CO3	Evaluate double and triple integrals and problems using	K4
	change of order of integration.	
CO4	Explain beta and gamma functions and to use them in	K5
	solving problems of integration.	
CO5	Discover the applications of Integral Calculus.	K5

#### Mapping of CO with PO and PSO

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

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

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
	Integration:		CO1,	K1,
т	Bule(a) Bule(b) Bule(a) Integration	12	$CO_2$ ,	K2, V2
1	- Kule(a), Kule(b), Kule(c) $-$ Integration of irrational functions Case(i) Case(ii)	12	CO3,	К3, КЛ
	only		C04,	K4, K5
	only.		C01	K1
	Integration.		CO1,	K1, K2
п	Integration by parts – Reduction	12	$CO_2$	K2, K3
	formulae – Bernoulli's formula	12	CO4	K4,
			CO5	K5
	Multiple Integrals:		CO1	K1
	Definition of the double integral –		CO2.	K2.
III	Evaluation of the double integral –	12	CO3.	K3.
	Double integrals in polar co-ordinates –		CO4,	K4,
	Triple integrals.		CO5	K5
	Improper integrals: Beta and Gamma		COL	V 1
	functions:		CO1,	$\mathbf{K}$
IV	Definitions – Convergence to $\Gamma(n)$ -	12	$CO_2$ ,	K2, K3
1 V	Recurrence formula of Gamma functions	12	CO3	K3, K4
	– Properties of Beta functions - Relation		$CO_{1}$	K5
	between Beta and Gamma functions.			
	Geometrical Applications of		CO1,	K1,
	Integration:	10	CO2,	K2,
V	Areas under plane curves: Cartesian co-	12	CO3,	K3,
	ordinates – Area of a closed curve –		CO4,	K4, <i>V5</i>
	Areas in polar co-ordinates.		COS	KJ
	(Not included for End Semester			
	Examination)			
	Integration of the form $\sqrt{ax^2 + bx + a}$		CO1,	K1,
VI	Integration of the form $\sqrt{dx} + bx + c$		CO2,	K2,
	and $(px+q)\sqrt{ax^2+bx+c}$ - Integration	-	CO3,	КЗ,
	as summation - Applications of multiple		CO4,	K4,
	integrals - Applications of Gamma		CO5	K5
	functions to multiple integrals –			
	Approximate Integration: Trapezoidal			
	rule.			

## Text Book

1. Narayanan.S Manicavachagom Pillay.T.K. (2021). *Calculus Volume II*. Ananda Book Depot.

#### **Chapters and Sections**

UNIT-I	Chapter 1	:	Sections 7.1- 7.4, 8(Page No. 40-46)
UNIT-II	Chapter 1	:	Sections 12, 13, 14, 15.1.
UNIT-III	Chapter 5	:	Sections 2.1, 2.2, 3.1, 3.2, 4.
UNIT-IV	Chapter 7		Sections 2.1 - 2.3, 3, 4.
	:		
UNIT-V	Chapter 2	:	Sections $1.1 - 1.4$

#### **Reference Books**

- 1. Shanti Narayan & Mittal, P. K (2008). *Integral Calculus*, S. Chand & Company Ltd.
- 2. Singh. U. P. Srivastava, R. J & Siddiqui, N. H. (2011). A Text Book of Integral Calculus, Wistom Press.
- 3. Singh. J. P. (2014) Calculus, Ane Books Pvt. Ltd.

#### Web References

- 1. <u>https://youtu.be/GIGJdvdrdhs?si=-zflb8uCpb7Aw0WT</u>
- 2. <u>https://youtu.be/ocgjfF2AboA?si=8NMu-wdGBn9Yij9F</u>
- 3. <u>https://youtu.be/5SuPKa3Q9BM?si=taJPIYim2zdBJqZA</u>
- 4. https://youtu.be/rCQZjpoVJ-o?si=VCw5630f1FEcLRh-
- 5. <u>https://youtu.be/xU1HBisdJJs?si=nChZzYPOKF8foCPT</u>
- 6. <u>https://math.mit.edu/~nehcili/data/mat136\_integration.pdf</u>
- 7. <u>https://www.academia.edu/31132415/MA\_210\_lecture\_notes\_INTEGRAT\_ION\_TECHNIQUES\_pdf</u>

## Pedagogy

Chalk and Talk, Power point presentation, Group Discussion, seminar,

Assignment and Quiz.

#### **Course Designer**

Dr. P. Sudha

## CORE PRACTICAL –I (CP)

## STATISTICS WITH EXCEL (P)

#### (2023-2024 Onwards)

Semester II	Internal Marks: 40	External Marks:60			
COURSE	<b>COURSE TITLE</b>	CATEGORY	Hrs / Week	CREDITS	
CODE					
23UMA2CC1P	STATISTICS	CORE	2	2	
	WITH EXCEL	PRACTICAL			
	( <b>P</b> )				

#### **Course Objective**

- Understands the basic concepts in quantitative data analysis.
- Apply the technical knowledge to **interpret** and **solve** the problems.
- **Explore** the ideas of Excel in Statistics.

#### **Course Outcomes**

**Course Outcome and Cognitive Level Mapping** 

СО	CO Statement	Cognitive
Number	On the successful completion of the course, students will	Level
	be able to	
CO1	Explore various statistical concepts in Excel.	K3
CO2	Solve the different types of statistical problems using	K3
	Excel.	
CO3	Make use of formulas, including the use of built-in	K3
	functions.	
CO4	Compute Statistical data's using Excel.	K3
CO5	Analyze the concepts of statistical methods and apply it to	K4
	the real-life problems.	

## Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	1	2	3	2	2	2	3	2	2	2
CO2	1	2	3	2	2	2	3	2	2	2
CO3	1	2	3	2	2	2	3	2	2	2
CO4	1	2	3	2	2	2	3	2	2	2
CO5	1	2	3	2	2	2	3	2	2	2

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

## LIST OF PROGRAMS:

- 1. Arithmetic Mean, Geometric Mean and Harmonic Mean.
- 2. Median and Mode.
- 3. Quartile Deviation and Mean Deviation.
- 4. Standard Deviation and Co-efficient of Variation.
- 5. Moments and Kurtosis.
- 6. Fitting of a Binomial Distribution.
- 7. Fitting of a poisson distribution.
- 8. Karl Pearson's Co-efficient of correlation.
- 9. Rank Correlation.
- 10. Fit the regression line.
- 11. Test the hypothesis for the difference between two sample means.
- 12. Test the hypothesis for single proportion.
- 13. Test the significance of hypothesis using 't' test.
- 14. Test the significance of hypothesis using 'F' test.
- 15. Test the significance of hypothesis using chi-square test.

#### Web References

- 1. https://youtu.be/rRGJZp6GLsY
- 2. <u>https://youtu.be/6dw3KNn0dYw</u>
- 3. <u>https://youtu.be/L9TiYC6tQmU</u>
- 4. https://youtu.be/rAKu30EtVg8
- 5. <u>https://youtu.be/GzUNF0PspYw</u>
- 6. https://youtu.be/vqvBX0fe0S8
- 7. https://youtu.be/bcUW8kELOLw
- 8. <u>https://youtu.be/sPgm9e8pDQM</u>
- 9. <u>https://youtu.be/7Y1g340tcbU</u>
- 10. https://youtu.be/L a8Z0BVjyM
- 11. https://youtu.be/0Bjf8LKnSOA
- 12. https://youtu.be/BIS11D2VL\_U

#### Pedagogy

Power point presentations, Live Demo, Hands on training.

#### **Course Designer**

Dr. C. Saranya

## FIRST ALLIED COURSE – III (AC) APPLIED STATISTICS (2023-2024 Onwards)

Semester II	Internal Marks: 25	External Marks:75			
COURSE	<b>COURSE TITLE</b>	CATEGORY	Hrs /Week	CREDITS	
CODE					
23UMA2AC3	APPLIED STATISTICS	ALLIED	4	3	

#### **Course Objective**

- **Define** the notion of measures of central tendency, measures of dispersion.
- **Explore** the fundamental concepts correlation and regression.
- **Apply** the idea of large sample tests and small sample tests in various fields.

#### **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

СО	CO Statement	Cognitive
Number	On the successful completion of the course, students will	Level
	be able to	
CO1	Define measures of central tendency, correlation,	<b>K1</b>
	regression, measures of dispersion, large and small	
	sample tests.	
CO2	Explain the basic concepts of measures of central	K2
	tendency, measures of dispersion, correlation,	
	regression, large and small sample tests.	
CO3	Apply the various concepts of correlation, regression,	К3
	measures of central tendency & dispersion and sampling	
	tests for solving the problems.	
CO4	Solve the problems using measures of central tendency	К3
	and dispersion, correlation, regression, large and small	
	sample tests.	
CO5	Examine the given data and interpret the results.	K4

## Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	<b>PO4</b>	<b>PO5</b>
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  $\neg$  "-" indicates there is no correlation.

TINIT	CONTENT	HOUDS	CO.	COGNITI
UNIT	CONTENT	HOURS	COs	VE LEVEL
	Measures of Central Tendency:			
I	Arithmetic Mean – Properties of Arithmetic Mean – Merits and Demerits of Arithmetic Mean – Weighted Mean – Median – Merits and Demerits of Median – Mode – Merits and Demerits of Mode – Geometric Mean - Merits and Demerits of Geometric Mean – Harmonic Mean - Merits and Demerits of Harmonic Mean – Selection of an Average – Partition Values.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
	Measures of Dispersion:			
II	Measures of Dispersion – Range – Quartile Deviation – Mean Deviation – Standard Deviation and Root Mean Square Deviation – Relation between Standard Deviation and Root Mean Square Deviation – Different Formulae for Calculating Variance – Theorem (Variance of the Combined Series) - Coefficient of Dispersion – Coefficient of Variation.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
	Correlation and Regression:		CO1	
III	Karl Pearson Coefficient of Correlation – Limits of Correlation Coefficient – Rank Correlation – Repeated Ranks – Regression – Lines of Regression – Regression Curves – Regression Coefficients – Properties of Regression Coefficients.	12	CO2, CO3, CO4, CO5	K1, K2, K3, K4
	Sampling and large Sample Tests:			
IV	Tests of Significance for Large Samples - Sampling of Attributes – Test for Single Proportion – Test of Significance for Difference of Proportions – Test of Significance for Single Mean – Test of Significance for Difference of means – Test of Significance for the Difference of Standard Deviations. (Problems Only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
	Exact Sampling Distribution:		CO1,	K1
v	Chi-square Test as a Test for Population Variance – Chi-square Test of Goodness of Fit – Independence of Attributes – Test for Single Mean – F-test for Equality of Population Variance. (Problems Only).	12	CO2, CO3, CO4, CO5	K1, K2, K3, K4
	Self Study for Enrichment:			
VI	(Not included for End Semester Examinations) Graphical Location of Partition Values _ Moments – Probable Error of Correlation Coefficient – Angle between two Lines of Regression – Standard Error of sample Mean – Applications of Chi-square Distribution – Applications of t-distribution – Applications of F-distribution.	_	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

#### Text Book

1. Gupta.S.C and Kapoor.V.K. (2003). *Elements of Mathematical Statistics* (*Third Edition*). Sultan Chand & Sons Educational Publishers, New Delhi.

#### Chapters and Sections

UNIT-I	Chapter 2: Sections 2.5 – 2.11 (Omit 2.11.1)
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- UNIT-II Chapter 3: Sections 3.3 3.8
- UNIT-III Chapter 10: Sections 10.3, 10.6 & 10.7 (10.7.1 10.7.4)
- UNIT- IV Chapter 12: Sections 12.8, 12.9, 12.13 12.15
- UNIT- V Chapter 13: Sections 13.5.1 13.5.3

Chapter 14: 14.2.6, 14.2.7, 14.3.2

#### **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://tinyurl.com/yu57nmb5
- 2. https://youtu.be/pSm9mgi65l4
- 3. <u>https://youtu.be/BiLIcCtXmm0</u>
- 4. <u>https://youtu.be/xTpHD5WLuoA</u>
- 5. <u>https://tinyurl.com/yb57hh5e</u>
- 6. https://tinyurl.com/h3nbyj35
- 7. <u>https://rb.gy/muaxp</u>

## Pedagogy

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

#### **Course Designer**

Dr. S. Vidhya

# **III SEMESTER**

## **CORE COURSE – V (CC)**

#### ANALYTICAL GEOMETRY (3D)

#### (2022-2023 Onwards)

Semester III	Internal Marks: 25	External Marks:75		
COURSE	COURSE TITLE	CATEGORY	Hrs /Week	CREDITS
CODE				
22UMA3CC5	ANALYTICAL	CORE	4	4
	GEOMETRY (3D)			

#### **Course Objective**

- **Understand** the geometrical terminology and idea of the Planes, Straight line, Sphere and Cone.
- **Explain** the properties of four basic three-dimensional shapes.
- **Recognize** three-dimensional shapes in the world around them.

#### **Course Outcomes**

#### **Course Outcome and Cognitive Level Mapping**

CO	CO Statement	Cognitive
Number	On the successful completion of the course, students will	Level
	be able to	
CO1	Remember the basic concepts of Straight Line, Plane, the Sphere and the Cone.	K1
CO2	Understand the aspects of Modern Mathematics through Straight Line, Plane, the Sphere and the Cone.	K2
CO3	Relate the Various forms of equation of a plane, Straight line, Sphere and Cone.	К3
CO4	Determine the angle between the plane, the line and infer about coplanar lines and Shortest distance between two lines.	K4
CO5	Evaluate the Problems based on Properties of the Coordinate system of equations.	K5

## Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	<b>PO4</b>	<b>PO5</b>
CO1	3	3	3	3	3	3	3	2	2	3
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  $\neg$  "-" indicates there is no correlation.

				COGNITI
UNIT	CONTENT	HOURS	COs	VE
				LEVEL
			CO1,	K1,
	Coordinate System:		CO2,	K2,
Ι	Introduction - Rectangular Cartesian Coordinates -	12	CO3,	K3,
	Distance between two Points - Direction Cosines.		CO4,	K4,
			CO5	K5
			CO1,	K1,
	Planes:		CO2,	K2,
II	Equation of a Plane – Angle Between two Planes –	12	CO3,	K3,
	Angle Bisectors of two Planes.		CO4,	K4,
			CO5	K5
			CO1,	K1,
	Straight Lines:	12	CO2,	K2,
III	Equation of a Straight Line – A Plane and a Line –		CO3,	K3,
	Equations of Two Skew Lines in a Simple form.		CO4,	K4,
			CO5	K5
			CO1,	K1,
	The Sphere:		CO2,	K2,
IV	Introduction – Equation of a Sphere – Tangent Line and Tangent Plane – Section of a Sphere.	12	CO3,	K3,
			CO4,	K4,
			CO5	K5
			CO1,	K1,
	Cones :		CO2,	K2,
V	Definition - Equation of a Cone with a conic as Guiding	12	CO3,	КЗ,
	curve - Enveloping Cone of a Sphere.		CO4,	K4,
			CO5	K5
	Self Study for Enrichment:			
	(Not included for End Semester Examination)		CO1,	K1,
	Equations of Two Skew Lines in a Simple Form - The		CO2,	K2,
VI	Intersection of Three Planes - Orthogonal Projection on	-	CO3,	КЗ,
	a Plane - Volume of a Tetrahedron - Angle of		CO4,	K4,
	Intersection of Two Spheres - Quadratic Cones with		CO5	K5
	Vertex at Origin.			

#### **Text Books**

- 1. Arumugam S and Thangapandi Isaac A (2011). *Analytical Geometry 3D and Vector Calculus*. New Gamma Publishing House, Palayamkottai.
- 2. Shanti Narayanan and Mittal P.K. (2007). *Analytical Solid Geometry* .S. Chand & Company Ltd. New Delhi.

## **Chapters and Sections**

UNIT	-I	Chapter	I:	Sections	1.0 -	1.3 [	[1]
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UNIT-II Chapter II: Sections 2.1 - 2.3 [1]

- UNIT-III Chapter III: Sections 3.1 3.3 [1]
- UNIT- IV Chapter IV: Sections 4.0 4.3 [1]
- UNIT- V Chapter VII: Sections 7.1, 7.1.1, 7.1.2 [2]

#### **Reference Books**

- 1. Duraipandian P, Laxmi Duraipandian and Muhilan D (1984). *Analytical Geometry Three Dimensional*. Emerald Publishers.
- 2. Pandey H.D, Khan M.Q and Gupta B.N. (2011). *A Text Book of Analytical Geometry and Vector Analysis*. Wisdom Press.
- Manicavachagom Pillai T.K. and Natarajan T (2009). A Text book of Analytical GeometryPart II - Three Dimensions. Viswanathan, S., Printers & Publishers Pvt Ltd.

#### Web References

- 1. <u>https://www.pdfdrive.com/analytical-geometry-of-three-dimensions-</u> e158533348.html
- 2. <u>https://sist.sathyabama.ac.in/sist\_coursematerial/uploads/SMT1303.pdf</u>
- 3. <u>https://school.careers360.com/maths/three-dimensional-geometry-</u> <u>chapter-pge</u>
- 4. <u>https://youtu.be/UXIT-68QvTE</u>
- 5. <u>https://www.youtube.com/watch?v=rbPMX0h2hWQ</u>

#### Pedagogy

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

#### **Course Designer**

Dr. P. Sudha

## CORE COURSE – VI (CC) VECTOR CALCULUS AND FOURIER SERIES (2023-2024 Onwards)

Semester III	Internal Marks: 25	ExternalMarks:75			
COURSE	COURSE TITLE	CATEGORY	Hrs	CREDITS	
CODE			/Week		
23UMA3CC6	VECTOR	CORE	5	4	
	CALCULUS AND				
	FOURIER SERIES				

#### **Course Objective**

- **Explain** the basics principles of vector calculus.
- **Explore** the mathematical methods with vector integration.
- Understand the concepts and properties of Fourier Series.

#### **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

CO	CO Statement	Cognitive
Number	On the successful completion of the course, students will	Level
	be able to	
C01	Remember and recall the concepts of Vector Calculus and Fourier Series.	K1
CO2	Explain the concepts of odd and even functions.	K2
CO3	Solve various types of problems in the Core area.	K3
CO4	Describe the development of series.	K3
CO5	Examine the concepts of integration for finding solution.	K4

## Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	<b>PO1</b>	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	2	3	3	2	3	3	2	2	3
CO3	3	2	3	3	2	3	3	3	3	2
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  $\neg$  "2" – Moderate (Medium) Correlation  $\neg$ 

"3" – Substantial (High) Correlation  $\neg$  "-" indicates there is no correlation

UNIT	CONTENT	HOURS	COs	COGNITI VE LEVEL
	Vector Differentiation:			
Ι	Vector valued function of a single scalar variable <b>Differential Operators:</b> Definition – The Vector differential operator – The operator $a.\nabla$ , where a is a unit vector – The Gradient of a scalar point function – Equation of tangent plane and normal -Divergence and Curl of a vector	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
	Vector Integration:			
II	Vector Integration - Line integrals-Normal Surface Integral $\int_{S} \vec{F} \cdot \vec{n} \cdot dS$ - Flux across a Surface- Volume Integral $\int_{V} F \cdot dV$ (Simple Problems only)	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
	Vector Integration:		001	
III	Gauss's Divergence Theorem $\int_{S} \vec{F} \cdot \vec{n} \cdot dS = \int_{V} div \vec{F}  dV$ - Stoke's theorem $\int_{C} \vec{F} \cdot \vec{n} \cdot d\vec{r} = \int_{S} curl \vec{F} \cdot \vec{n}  dS$ - Green's theorem - Stoke's theorem in space	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
	Fourier series:			
IV	Fourier series – definition - Fourier Series expansion of periodic functions with Period $2\pi$ and period 2a – Odd & even functions in Fourier Series.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
	Fourier series:		CO1,	<b>V</b> 1
V	Half- range Fourier Series – definition - Development in Cosine series - Development in Sine series - Change of interval	15	CO2, CO3, CO4, CO5	K1, K2, K3, K4
	Self Study for Enrichment:			
VI	(Not included for End Semester Examination) Theorems on differentiation- Properties of grad $\phi$ - Stoke's theorem in Cartesian form - Properties of odd and even functions- Combination of Series.	_	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

#### **Text Books**

- Khanna. M.L., (1986) Vector Calculus, Jai Prakash Nath and Co., 8<sup>th</sup> Edition.
- 2. Narayanan.S, Manicavachagam Pillai. T.K., (2014). *Calculus*, Vol.III, S.Viswanathan (Printers and Publishers) Pvt Limited.

#### **Chapters and Sections**

UNIT-I	Chapter I: Section 1 [1]
	Chapter II: Sections 2-4, 6,7[1]
UNIT-II	Chapter III: Sections 1 – 4 [1]
UNIT-III	Chapter III: Sections 5 - 7 [1]
UNIT- IV	Chapter IV: Sections 1-3 [2]
UNIT- V	Chapter IV: Sections 4-6 [2]

#### **Reference Books**

- 1. Duraipandiyan. P & Lakshmi Duraipandian, Vector Analysis, Emarald Publishers (1998).
- 2. Vittal. P.R. & V.Malini, Vector Analysis, Margham Publications (2014).
- 3. Sankarappan. S & Arulmozhi. G. (2006). *Vector Calculus, Fourier Series and Fourier Transforms*, Vijay Nicole imprints Private Limited, Chennai.

#### Web References:

- 1. <u>https://www.youtube.com/watch?v=FfJtVvQtqTM&list=PLU6SqdYcYsfJ</u> z9FAzbgocIjlkw4NXAar-
- 2. <u>https://www.youtube.com/watch?v=9LqzrAHrSS0&list=PLeIE3weEKo4</u> <u>YnuLABAWpfuN9ufYJjg1SR</u>
- 3. <u>https://www.youtube.com/watch?v=KCS-</u> <u>VTm398I&list=PLhSp9OSVmeyLke5\_cby8i8ZhK8FHpw3qs</u>
- 4. <u>https://www.rtu.ac.in/expert/app/documents/kjangid@rtu.ac.in\_51629122</u> 020100932am.pdf

#### Pedagogy

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

#### **Course Designer**

Dr. R. Radha

#### SECOND ALLIED COURSE – I (AC)

#### PYTHON PROGRAMMING

#### (2023-2024 Onwards)

Semester III	Internal Marks: 25	External Marks:75		
COURSE	COURSE TITLE	CATEGORY	Hrs	CREDITS
CODE			/Week	
23UMA3AC4	PYTHON	Allied Course	4	3
	PROGRAMMING			

## **Course Objective**

- > **Understand** the basic principles of Python.
- > **Provide** basic idea on functions and concepts of Python programming.
- > **Inculcate** the basic techniques of Python programming.

#### **Course Outcomes**

~	-	~	 
Ourco	Outcome and	Cognitivo	Manning
Course	Outcome and	Cugmure.	mapping
		0	

CO	CO Statement	Cognitiv
Number	On the successful completion of the course, students will	e Level
	be able to	
CO1	Understand Python's core data types while writing new	K1, K2
	programs.	
CO2	Demonstrate programs using simple Python statements	K2
	and expressions.	
CO3	Interpret the fundamental Python syntax and semantics	K3
	and be fluent in the use of Python control flow	
	statements.	
CO4	Compare algorithmic solutions to simple computational	K4
	problems.	
CO5	Construct Python programs step-wise and Acquire	K5
	programming skills in core Python.	

## Mapping of CO with PO and PSO

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

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

"3" – Substantial (High) Correlation  $\neg$  "-" indicates there is no correlation.

UNIT	CONTENT	HOU RS	COs	COGNITIVE LEVEL
Ι	<b>Basics of Python Programming</b> : Introduction – Python Character Set – Token – Python Core Data Type– The print() Function – Assigning Value to a Variable – Multiple Assignments – Statement in Python– Multiline Statement in Python – Writing Simple Programs in Python – The input() Function – The eval() Function – Formatting Number and Strings – Python Inbuilt Functions.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	<b>Operators and Expressions</b> : Introduction – Operators and Expressions – Arithmetic Operators – Membership Operator – Identity Operator – Operator Precedence and Associativity – Changing Precedence and Associativity of Arithmetic Operators – Translating Mathematical Formulae into Equivalent Python Expressions – Bitwise Operator – The Compound Assignment Operator. <b>Decision Statements</b> : Introduction – Boolean Type – Boolean Operators – Using Numbers with Boolean Operators – Using String with Boolean Operators – Boolean Expressions and Relational Operators – Decision Making Statements – Conditional Expressions.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	Loop Control Statements : Introduction – The while Loop – The range() Function – The for Loop – Nested Loops – The break Statement – The continue Statement. Functions : Introduction – Syntax and Basics of a Function – Use of a Function – Parameters and Arguments in a Function – Variable Length Non-Keyword and Keyword Arguments – The Local and Global Scope of a Variable – The return Statement– Recursive Functions – The Lambda Function.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	<b>Strings :</b> Introduction – The str class – Basic Inbuilt Python Functions for String – The index[] Operator – Traversing String with for and while Loop – Immutable Strings – The String Operators – String Operations. <b>Lists :</b> Introduction - Creating Lists - Accessing the Elements of a List – Negative List Indices - List Slicing [Start : End] - List Slicing with Step Size - Python Inbuilt Functions for Lists - The List Operator – List Comprehensions- List Methods - List and Strings - Splitting a String in List - Passing List to a Function - Returning List from a Function.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
v	<b>Tuples, Sets and Dictionaries</b> : Introduction to Tuples – Sets – Dictionaries.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

			CO1,	K1,
	Self Study for Enrichment:		CO2,	K2,
VI	(Not included for End Semester Examination)	-	CO3,	K3,
	File Handling – Exception Handling.		CO4,	K4,
			CO5	K5

## **Text Book**

1. Ashok Namdev Kamthane, Amit Ashok Kamthane (2020), *Programming and Problem Solving with PYTHON*, Second Edition, McGraw Hill Education

#### **Chapters and Sections**

UNIT-I	Chapter II Sections: 2.1 – 2.14
UNIT-II	Chapter III & IV Sections: $3.1 - 3.10 & 4.1 - 4.8$
UNIT-III	Chapter V & VI Sections: 5.1 – 5.7 & 6.1 – 6.9
UNIT- IV	Chapter VII & VIII Sections: 7.1 – 7.8 & 8.1 – 8.14
UNIT- V	Chapter XI & XII Sections: 11.1 – 11.3

## **Reference Books**

- 1. Jeeva Jose and Sojan Lal P. (2021), *Introduction to Computing and Problem Solving with PYTHON*, Khanna Book Publising Co. (P) Ltd., New Delhi.
- 2. Satyanarayana Ch., Radhika Mani M., and Jagadesh B.N. (2018), *Python Programming*, Universities Press, Hyderabad.
- 3. Dr Nageswara Rao R. (2021), *Core Python Programming*, Dreamtech Press, New Delhi.

#### Web References

- 1. https://www.geeksforgeeks.org
- 2. <u>https://www.python.org</u>
- 3. <u>https://www.tutorialspoint.com</u>
- 4. <u>https://www.pythonforbeginners.com</u>
- 5. https://www.w3schools.com

#### Pedagogy

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

#### **Course Designer**

Ms. R. Soundaria

## SECOND ALLIED COURSE – II (AP)

## **PYTHON PROGRAMMING (P)**

#### (2023-2024 Onwards)

Semester III	Internal Marks: 40		External N	Aarks: 60
COURSE	COURSE TITLE	CATEGORY	Hrs	CREDITS
CODE			/Week	
23UMA3AC5P	PYTHON	Allied Course	3	3
	PROGRAMMING (P)			

#### **Course Objective**

- **Explore** python programming language to construct basic programs.
- > Acquire programming skills in core Python.
- > Analyze the basics of problem solving.

#### **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

СО	CO Statement	Cognitive
Number	On the successful completion of the course, students will	Level
	be able to	
CO1	Understand and apply Python's basic concepts.	K1
CO2	Demonstrate different data types and its usage.	K2
CO3	Build and execute simple Python programs.	K3
CO4	Make use of Python lists, tuples, and dictionaries to represent compound data.	K4
C05	Develop algorithmic solutions to simple computational problems.	K5

## Mapping of CO with PO and PSO

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

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

"3" – Substantial (High) Correlation  $\neg$  "-" indicates there is no correlation.

#### LIST OF PRACTICALS

- 1. Get inputs from user and display them.
- 2. Develop a calculator.
- 3. Implement Decision making and Loop control statements.
- 4. Create and call an user defined function.
- 5. Strings and their built-in functions.
- 6. List and their built-in functions.
- 7. Working with Tuples.
- 8. Working with Dictionaries.
- 9. Bar chart, Pie Chart and Line graph.
- 10. Plotting 2D and 3D graphs.
- 11. Create Fibonacci series.
- 12. Create Pascal Triangle.
- 13. Performing Matrix operations.
- 14. Finding roots of an equations.
- 15. Calculating HCF, LCM and GCD.

#### Web References

- 1. https://www.geeksforgeeks.org
- 2. <u>https://www.python.org</u>
- 3. <u>https://www.tutorialspoint.com</u>
- 4. https://www.pythonforbeginners.com
- 5. <u>https://www.w3schools.com</u>

#### Pedagogy

Power point presentations, Group Discussions, Hands on training, Assignment.

#### **Course Designer**

Ms. R. Soundaria

#### **GENERIC ELECTIVE COURSE – I (GEC)**

## MATHEMATICS FOR COMPETITIVE EXAMINATIONS-I

#### (2022-2023 Onwards)

Semester III	Internal Marks: 25		External	Marks:75
COURSE	COURSE TITLE	CATEGORY	Hrs	CREDITS
CODE			/Week	
22UMA3GEC1	MATHEMATICS	GENERIC	2	2
	FOR COMPETITIVE	ELECTIVE		
	<b>EXAMINATIONS-I</b>	COURSE		

#### **Course Objective**

- **Explain** many short tricks to solve the mathematical problems easily.
- Apply the knowledge to interpret and solve the problems.
- **Explore** the ideas and to solve the Mathematical problems.

#### **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

CO	CO Statement	Cognitive
Number	On the successful completion of the course, students	Level
	will be able to	
CO1	Explain the knowledge of the various techniques of	K1, K2
	Quantitative Aptitude and Reasoning.	
CO2	Apply the concepts in solving mathematical problems	К3
	to succeed in various Competitive examinations.	
CO3	Examine various types of Problems using Arithmetic	К3
	and Reasoning test.	
CO4	Apply the different concepts of Arithmetic and	K3
	Reasoning test to solve the problems.	
CO5	Analyze real-life problems and finding solutions.	K4

#### Mapping of CO with PO and PSO

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

"1" – Slight (Low) Correlation  $\neg$  "2" – Moderate (Medium) Correlation  $\neg$ 

"3" – Substantial (High) Correlation  $\neg$  "-" indicates there is no correlation.

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
			CO1,	K1,
	Problems on Numbers - Problems on		CO2,	K2,
Ι	Ages	6	CO3,	K3,
	11203.		CO4,	K4
			CO5	
			CO1,	K1.
	Time & Distance – Calendar – Clocks.		CO2,	K2.
II		6	CO3,	K3.
			CO4,	K4
			CO5	
			CO1,	K1.
	Data Interpretation: Bar Graphs – Pie	6	CO2,	K2,
III	Charts – Line Graphs.		CO3,	K3.
	1		CO4,	K4
			CO5	774
		<i>.</i>	COI,	K1,
<b>TX</b> 7	Reasoning (Including Mathematical):	6	CO2,	K2,
IV	Series – Codes – Relationship –		CO3,	K3,
	Classification.		CO4,	<b>K</b> 4
			C05	
			CO1,	K1,
V	Logical Dessenting	6	$CO_2$ ,	K2,
v	Logical Reasoning.	0	CO3,	КЗ,
			C04,	K4
	Self-Study for Enrichment		0.05	
	(Not included for End Semester		CO1,	<b>K</b> 1
	Examination)		CO2,	K?
VI	Numbers -HCF and LCM of Numbers	-	CO3,	K3.
	-Time and Work- Tabulation -		CO4,	K4
	Analogy.		CO5	

## Text Book

- 1. Aggarwal. R.S. (2015). *Quantitative Aptitude For Competitive Examinations (Fully Solved)*. S.Chand & Company Pvt.Ltd.
- 2. Dr.Kautilya.K. (2018). *UGC NET/JRF/SET Teaching & Research Aptitude* (*General Paper I*). UPKAR PRAKASHAN, AGRA 2, Sixth Edition.

#### **Chapters and Sections**

UNIT-I	Chapter 7	Pg.No 161 – 181 [1]
	Chapter 8	Pg.No 182 - 194 [1]
UNIT-II	Chapter 17	Pg.No 384 – 404 [1]
	Chapter 27	Pg.No 593 – 596 [1]
	Chapter 28	Pg.No 597 - 604 [1]
UNIT-III	Chapter 37	Pg.No 676 – 694 [1]
	Chapter 38	Pg.No 695 - 708 [1]
	Chapter 39	Pg.No 709-726 [1]
UNIT- IV	Unit-5	Sections 1-3,5 [2]
UNIT- V	Unit-6	Pg.No 162 – 190 [2]

## **Reference Books**

- 1. Edgar Thorpe. (2000). *Test of Reasoning for Competitive Examinations*. Tata McGraw-Hill Publishing Company Limited, New Delhi, 2nd Edition.
- Sinha. T.K. (2002). 80+ Practice Sets of Quantitative Aptitude for Bank PO Exams. Arihant Publication (India) limited.
- Abhijit Guha.(2014). *Quantitative Aptitude for Competitive Examinations*. McGraw-Hill Publishing Company Limited, New Delhi, 5 th Edition.

## Web References

- 1. <u>https://www.youtube.com/watch?v=viKaYznFJbw&list=PL5cSYiJ8KoW</u> <u>GqLLS\_w6\_G80U5FUEI0T39</u>.
- 2. <u>https://www.youtube.com/watch?v=ufbDCFUn6PY</u>
- 3. <u>https://www.youtube.com/watch?v=hGFGybSQDxQ</u>
- 4. <u>https://www.youtube.com/watch?v=\_up3mXnsVEc&list=PLOoogDtEDyv</u> <u>s3Qznc3-1DnlpbQSRuWP-z</u>
- 5. <u>https://www.youtube.com/watch?v=MV00SQU\_f7E&list=PLOoogDtEDy</u> vvDNHO\_Ba58OrE567nCzzl2
- 6. <u>https://www.youtube.com/watch?v=31qZR-BbPIs</u>
- 7. <u>https://www.youtube.com/watch?v=ev2SkXJVAbA&list=PLOoogDtEDyv</u> <u>sBG38tzlj1Zkd0PLxgZwXV</u>

#### Pedagogy

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

#### Course Designer

Dr.L.Mahalakshmi

# **IV SEMESTER**

## **CORE COURSE VII – (CC)**

#### **SEQUENCES AND SERIES**

#### (2022-2023 Onwards)

Semester IV	Internal Marks: 25	External Marks:75		
COURSE	COURSE TITLE	CATEGORY	Hrs /	CREDITS
CODE			Week	
22UMA4CC7	SEQUENCES AND	CORE	5	5
	SERIES			

#### **Course Objective**

- > To lay a good foundation for classical analysis.
- > To study the behavior of sequences and series.
- To acquire the knowledge of solving problems in Binomial, Logarithm & Exponential Series.

#### **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

	CO Statement	Cognitive
CO	On the Successful completion of the course, students will be	Level
Number	able to	
CO1	Explain the concepts of convergent sequences, divergent	K2
	sequences and series.	
CO2	Apply the ideas of sequences in Algebra of limits and	K3
	Compute the behavior of monotonic functions.	
CO3	Apply the theory of Cauchy's condensation test and	K3
	Cauchy's root test on series.	
CO4	Solve the problems based on binomial, logarithmic and	K3
	exponential series.	
CO5	Examine infinite series using D' Alembert's ratio test.	K4

## Mapping of CO with PO and PSO

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

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

"3" – Substantial (High) Correlation  $\neg$  "-" indicates there is no correlation.

UNIT	CONTENT	HOURS	Cos	COGNITIVE LEVEL
I	Introduction – Sequences – Bounded Sequences – Monotonic Sequences – Convergent Sequences – Divergent Sequences and Oscillating Sequences – The Algebra of Limits.	15	CO1, CO2, CO3, CO4, CO5	K2, K3, K4
II	Behavior of Monotonic sequences – Some theorems on limits –Subsequences -Limit points.	15	CO1, CO2, CO3, CO4, CO5	K2, K3, K4
III	Infinite Series – Definition of Convergence, Divergence & Oscillate – Convergence of Geometric series – Some general theorems concerning infinite series – Series of positive terms – Comparison test- convergence of $\sum \frac{1}{n^k}$ – D' Alembert's Ratio test.	15	CO1, CO2, CO3, CO4, CO5	K2, K3, K4
IV	Cauchy's Condensation test – Cauchy's Root test and their simple problems – Absolute Convergence Series– Conditional Convergence Series – Alternative Series.	15	CO1, CO2, CO3, CO4, CO5	K2, K3, K4
V	Binomial theorem for a rational index – Some important particular case of the Binomial expansion – Sign of terms in binomial expansion – Numerically greatest term – Method of splitting functions into partial fractions – Application of the Binomial theorem to the summation of series – Exponential limit – The exponential theorem – Summation – Logarithmic series – Modification of the logarithmic series – Summation of series – Series which can be summed up by the logarithmic series.	15	CO1, CO2, CO3, CO4, CO5	K2, K3, K4
VI	Self Study for Enrichment: (Not included for End Semester Examination) Cauchy sequence - Raabe's test - Uniform Convergence- Approximate values - Euler's constant - The application of the exponential and logarithmic series to limits and approximations.	-	CO1, CO2, CO3, CO4, CO5	K2, K3, K4

#### **Text Book**

- 1. Dr.S.Arumugam & Mr.A.Thangapandi Isaac(2015), Sequences and Series, New Gamma Publishing House.
- 2. T.K.Manicavachagam Pillai, T.Natarajan & K.S.Ganapathy (2010), Algebra, Volume I, S.Viswanathan Pvt Limited.

#### **Chapters and Sections**

UNIT-I	Chapter III: Sections 3.0-3.6[1]
UNIT-II	Chapter III: Sections 3.7-3.10[1]

- UNIT-III Chapter II: Sections 8-14, 16 [2]
- UNIT- IV Chapter II: Sections 15, 17, 21-24[2]
- UNIT- V Chapter III: Sections 5-10 [2] Chapter IV: Sections 1-3, 5-7, 9[2]

#### **Reference Books**

- M.K. Singal and Asha Rani Singal (2018). A First course in Real Analysis. R.chand & Co.
- Shanti Narayan, P.K.Mittal (2002). A Course of Mathematical Analysis . S.Chand & Company Ltd.
- 3. Dr.P.R. Vittal (2014). Allied Mathematics. Margham Publications.

#### Web References

- 1. https://youtu.be/XdkoTb8PEG0?si=u\_ZtB1anBe7bI0vt
- 2. https://youtu.be/BZ-LQpz5EBc?si=9H5Ydbq9amtAxUX4
- 3. <u>https://youtu.be/zg9N2gAf6a4?si=\_07ubR0LII3GBhMU</u>
- 4. https://youtu.be/Fjrb8f-assM?si=Hsn2y6rGxAS4AU-V
- 5. https://youtu.be/jmZIEyabJIU?si=PQB-8QllG1OGxEvv

#### Pedagogy

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

#### **Course Designer**

Dr. R.Divya

#### **CORE COURSE – VIII (CC)**

#### METHODS IN NUMERICAL ANALYSIS

#### 2023-2024 Onwards

Semester IV	Internal Marks: 25	External Marks:75				
COURSE	COURSE TITLE	CATEGORY	Hrs	CREDITS		
CODE			/Week			
23UMA4CC8	METHODS IN	CORE	5	4		
	NUMERICAL					
	ANALYSIS					

#### **Course Objective**

- **Explore** the basic concepts of solving algebraic and transcendental equations.
- > Apply the numerical techniques of interpolation in various intervals.
- Analyze the knowledge of numerical techniques of differentiation and integration.

#### **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

СО	CO Statement	Cognitive						
Number	Number be able to							
CO1	Apply numerical methods to solve Algebraic,	K1, K2						
	Transcendental equations.							
CO2	Classify and solve the numerical techniques of	K2, K4						
	interpolation in various intervals.							
CO3	Solve numerical integration and differentiation problems.	K3						
CO4	Compute the numerical solution of ordinary differential	K3						
	equation using different methods.							
CO5	Determine the system of algebraic equations by various	K5						
	methods.							

#### Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	<b>PO1</b>	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	2	2	3
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

LINIT	CONTENT	HUIDS	COs	COGNITIVE
UNII	CONTENT	ΠΟυκδ		LEVEL
Ι	SOLUTION OF ALGEBRAIC AND	15	CO1,	K1
	TRANSCENDENTAL		CO2,	K2
	EQUATIONS:		CO3,	K3
	Introduction- Bisection Method -		CO4,	K4
	Method of False Position – Iteration		CO5	K5
	Method –Newton - Raphson Method –			
	Ramanujan's Method – Secant Method			
	(Problems only).			
II	INTERPOLATION:	15	CO1,	K1
	Finite differences – Forward		CO2,	K2
	Differences - Backward Differences -		CO3,	K3
	Central Differences – Symbolic		CO4,	K4
	Relations and Separation of Symbols –		CO5	K5
	Newton's formulae for interpolation –			
	Interpolation with unevenly spaced			
	intervals – Lagrange's interpolating			
	Polynomial (Proof not needed).			
III	NUMERICAL DIFFERENTIATION	15	CO1,	K1
	AND INTEGRATION:		CO2,	K2
	Introduction – Numerical		CO3,	K3
	Differentiation – Numerical Integration:		CO4,	K4
	Trapezoidal Rule – Simpson's 1/3 Rule		CO5	K5
	- Simpson's 3/8 Rule - Boole's and			
	Weddle's Rules – Romberg Integration			
	- Newton-Cotes Integration Formulae.			
IV	NUMERICAL LINEAR ALGEBRA:	15	CO1,	K1
	Introduction – Solution of Linear		CO2,	K2
	Systems – Direct Methods : Gauss		CO3,	K3
	Elimination – Necessity for pivoting –		CO4,	K4
	Gauss-Jordan Method – Modification of		CO5	K5
	the Gauss Method to Compute the			
	Inverse Solution of linear systems-			
	Iterative methods.			
V	NUMERICAL SOLUTION OF	15	CO1,	K1
	ORDINARY DIFFERENTIAL		CO2,	K2
	EQUATIONS:		CO3,	K3
	Introduction – Solution by Taylor's		CO4,	K4
	Series – Picard's Method of Successive		CO5	K5
	Approximations – Euler's Method:			
	Modified Euler's Method, Runge -			

	Kutta Methods – Predictor - Corrector Methods– Adams-Moulton Method (Problems only).			
VI	Self Study for Enrichment: (Not included for End Semester Examination) Muller's Method - Divided differences and their properties – Application of Newton's General Interpolating formula – Numerical Integration with different step size – Use of Cubic Splines –Milne's method.	-	CO1, CO2, CO3, CO4, CO5	K1 K2 K3 K4 K5

#### Text Book

 S.S.Sastry, Introductory Methods of Numerical Analysis, 5<sup>th</sup> edition, PHI Learning Pvt. Limited, 2018.

#### **Chapters and Sections**

UNIT I	Chapter 2: Sections $2.1 - 2.7$
UNIT II	Chapter 3: Sections 3.3, 3.3.1-3.3.4, 3.6, 3.9, 3.9.1
UNIT III	Chapter 6: Sections 6.1, 6.2, 6.4, 6.4.1 – 6.4.4, 6.4.6, 6.4.7
UNIT IV	Chapter 7: Sections 7.1, 7.5, 7.5.1-7.5.4, 7.6
UNIT V	Chapter 8: Sections 8.1, 8.2, 8.3, 8.4, 8.4.2, 8.5, 8.6, 8.6.1

#### **Reference Books**

- 1. S. Arumugam, A. Thangapandi Isaac and A. Somasundaram, (2017), *Numerical Methods*, Second Edition ,Scitech Publications (India) Pvt. Ltd.
- M.K. Jain, S.R.K. Iyengar and R.K. Jain (1999), Numerical Methods for Scientific and Engineering Computations, New Age International Private Limited.
- 3. Dr. P. Kandasamy, Dr. K. Thilagavathy and Dr. K. Gunavathi, (2013) *Numerical Methods*, S. Chand & Company Pvt Ltd.

#### Web References

- 1. <u>https://youtu.be/39pu-</u> <u>z3KpAQ?list=PLbzVLFZiGEdQnmR2M2jDmi0nVHUF3WPyG</u>
- 2. https://youtu.be/ukNbG7muKho
- 3. https://youtu.be/Ym1EUjTWMnE

- 4. <u>https://youtu.be/o7uwKpZNa\_k</u>
- 5. <u>https://youtu.be/82IDoaiYU0c</u>
- 6. <u>https://youtu.be/oTN7hGoSPMw</u>
- 7. https://youtu.be/-Lf0VZzKRw0

## Pedagogy

Power point presentation, Group Discussion, Seminar, Quiz, Assignment.

## **Course Designer**

Dr. R. Radha

## SECOND ALLIED COURSE-III (AC) **INTERNET OF THINGS** 2022-2023 Onwards

Semester IV	Internal Marks:	Externa	l Marks:75	
COURSE	COURSE	CATEGORY	Hrs	CREDITS
CODE	TITLE		/Week	
22UMA4AC6	INTERNET OF	SECOND	4	3
	THINGS	ALLIED		
		COURSE III (AC)		

#### **Course Objective**

- > Able to understand building blocks of Internet of Things and characteristics.
- > Apply the concept of Internet of Things in the real-world scenario.
- > Understand the application areas of Internet of things.

#### **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

СО	CO Statement	Cognitive
Number	On the successful completion of the course, students	Level
	will be able to	
CO1	Understand building blocks of Internet of Things and its	K1, K2
	characteristics.	
CO2	Analyze basic protocols in wireless sensor network.	K3
CO3	Categorize different sensor technologies for sensing real	K4
	world entities and identify the applications.	
CO4	Demonstrate the ability to transmit data wirelessly	K5
	between different devices.	
CO5	Design IoT applications in different domains and able to	K5
	analyze their performance.	

#### Mapping of CO with PO and PSO

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

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

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	Introduction to Internet of Things: Introduction –Overview of Internet of Things (IoT) -Characteristics of IoT - IOT Applications - Workingand Implementation of IoT - Components of an IoTSystem - IoT Architecture and Levels - IoTEcosystem - Value chain and global value chain -Types of Networks – IoT Technologies andProtocols – Technologies used in IoT.Introduction to Internet of Things:Communication Protocols – IOT EnablingTechnologies – Building blocks of IoT – The logicaland Physical design of IoT – Functional blocks ofIoT – IoT design Methodology – Communication	12	CO1, CO2, CO3, CO4, CO5 CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5 K1, K2, K3, K4, K5
III	models. <b>Things and Connections</b> : Introduction to control systems – Working of controlled systems – Feedback systems – Connectivity models – OSI model – TCP/IP model – Types of modes – Wired and Wireless Methodology – Transmission media – Guided media – Unguided media.	12	CO3, CO2, CO3, CO4, CO5	K3 K1, K2, K3, K4, K5
IV	Sensors, Actuators and Microcontrollers: Introduction – Sensor – Classification of Sensors – Types of Sensors – Criteria to choose a Sensor – Actuators – Classification of Actuators – Microcontroller – Classification of Microcontrollers – Components of Microcontroller – Types of Microcontrollers – Application of Microcontroller – Embedded System – Real time Embedded system.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	<b>Building IoT Applications:</b> Introduction to Arduino – Types of Arduino Boards – Introduction to Arduino IDE – Parts of Arduino IDE – Development Cycle – Writing/Editing Code in Sketch – Compiling – Debugging – Uploading and Running a File – Role of Serial Monitor – Role of Serial Plotter – LED Programming – Open Your First Sketch.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	Self -Study for Enrichment: (Not included for End Semester Examination) Development tools used in IoT - The process flow of IoT- Embedded 'C' Language Basics – Variables and Identifiers – Keywords – Built –in Data Types – Variable Scope.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

#### **Text Book**

 Prof. Satish Jain & Shashi Singh (2020). *IoT and its Applications*, BPB Publications, India.

#### **Chapters and Sections**

UNIT-I	Chapter 1	:	Sections 1.1 – 1.12
UNIT-II	Chapter 1	:	Sections 1.13 – 1.19
UNIT-III	Chapter 2	:	Sections 2.1 – 2.11
UNIT-IV	Chapter 3	:	Sections 3.1 – 3.14
UNIT-V	Chapter 4	:	Sections 4.1 – 4.12

#### **Reference Books**

- 1. Arshdeep Bahga and Vijay Madisetti (2014). *Internet of Things A Hands-on Approach*, Universities Press.
- Raj Kamal (2017). Internet of Things Architecture and Design Principles, Mc Graw Hill Education (India) Private Limited.
- 3. Preston Gralla (2012). How the Internet Works, Pearson Education.

#### Web References

- 1. https://iotbyhvm.ooo/physical-design-of-iot/
- 2. https://www.javatpoint.com/iot-internet-of-things
- 3. https://www.oracle.com/in/internet-of-things/what-is-iot/
- 4. https://www.edureka.co/blog/iot-applications/
- 5. <u>https://www.rfpage.com/applications-of-internet-of-things-iot/</u>

#### Pedagogy

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

#### **Course Designer**

Ms. R. Soundaria

#### **GENERIC ELECTIVE COURSE – II (GEC)**

### **MATHEMATICS FOR COMPETITIVE EXAMINATIONS - II** (2022-2023 Onwards)

Semester IV	Internal Marks: 25	External Marks:75				
COURSE	COURSE TITLE	CATEGORY	Hrs	CREDITS		
CODE			/Week			
22UMA4GEC2	MATHEMATICS FOR	GENERIC	2	2		
	COMPETITIVE	ELECTIVE				
	EXAMINATIONS-II					

#### **Course Objective**

- **Explain** many short tricks to solve the mathematical problems easily.
- Apply the knowledge and to develop their logical reasoning thinking ability.
- Analyze the Problems and Explore the ideas and to solve the Mathematical problems.

#### **Course Outcomes**

#### **Course Outcome and Cognitive Level Mapping**

CO	CO Statement	Cognitive
Number	On the successful completion of the course, students will be	Level
	able to	
CO1	Explain the knowledge of the various techniques of	K1, K2
	Quantitative Aptitude and Reasoning.	
CO2	Analyze the Problems logically and approach the problems in	K3
	a different manner.	
CO3	Solve a problem and to identify the appropriate computing requirement	K3
CO4	Apply the different concepts of Arithmetic and Reasoning	K3
	test to solve the problems and Motivate the students to prepare for high level competitive exams.	
CO5	Analyze real-life problems and finding solutions.	K4

#### Mapping of CO with PO and PSO

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

"1" – Slight (Low) Correlation  $\neg$  "2" – Moderate (Medium) Correlation  $\neg$ 

"3" – Substantial (High) Correlation  $\neg$  "-" indicates there is no correlation.

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL	
			CO1,	K1,	
T			CO2,	K2,	
Ι	Decimal Fractions – Simplification.	6	CO3,	КЗ,	
			CO4,	K4	
			CO5		
			CO1,	<b>K</b> 1	
	Square Roots - Cube Roots - Profit &		CO2,	кі, к2	
II	Loss	6	CO3,	K2, K3	
			CO4,	K3, K4	
			CO5		
			CO1,	K1.	
	Ratio & Proportion - Problems on Trains - Boats and Streams.		CO2,	K2.	
III		6	CO3,	K3.	
			CO4,	K4	
			CO5		
			CO1,	K1, K2,	
		6	CO2,		
IV	Simple Interest - Compound Interest.		CO3,	КЗ,	
			CO4,	K4	
			CO5		
			CO1,	K1.	
	Percentage - Permutations &		CO2,	K2.	
V	Combinations.	6	CO3,	K3.	
			CO4,	K4	
			CO5		
	Self -Study for Enrichment:		CO1,	K1,	
	(Not included for End Semester		CO2,	K2,	
VI	Examination)	-	CO3,	K3,	
	Numbers- Approximation- Average -		CO4,	K4	
	Time and Work - Odd Man Out & Series		CO5		

## Text Book

 Aggarwal. R.S. (2015). *Quantitative Aptitude For Competitive Examinations* (*Fully Solved*). S.Chand & Company Pvt.Ltd.

#### **Chapters and Sections**

UNIT-I	Chapter 3, 4	: Pg.No 46 – 116
UNIT-II	Chapter 5, 11	: Pg.No 117 – 138, 251-293
UNIT-III	Chapter 12,18,19	: Pg.No 294-310 , 405 - 434
UNIT- IV	Chapter 21,22	: Pg.No 445 – 486
UNIT- V	Chapter 10,30	: Pg.No 208 – 250, 613 – 620

#### **Reference Books**

- 1. Edgar Thorpe. (2000). *Test of Reasoning for Competitive Examinations*. Tata McGraw-Hill Publishing Company Limited, New Delhi, 2nd Edition.
- Sinha. T.K. (2002). 80+ Practice Sets of Quantitative Aptitude for Bank PO Exams. Arihant Publication (India) limited.
- Abhijit Guha.(2014). *Quantitative Aptitude for Competitive Examinations*. McGraw-Hill Publishing Company Limited, New Delhi, 5 th Edition.

## Web References

- 1. <u>https://www.youtube.com/watch?v=wR0aaQMfxwI</u>
- 2. https://www.youtube.com/watch?v=Sjpkp8-0t1s
- 3. https://byjus.com/govt-exams/train-problems/
- 4. <u>https://www.sscadda.com/compound-interest-formulas-tricks-and-</u> <u>questions/</u>
- 5. <u>https://www.youtube.com/watch?v=6B-dvOMTeV8</u>
- 6. <u>https://www.youtube.com/watch?v=VSoJwlYdCWM</u>

## Pedagogy:

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

## **Course Designer:**

Dr.L.Mahalakshmi

## SKILL ENHANCEMENT COURSE – I (SEC) STATISTICAL TOOLS AND TECHNIQUES - R PROGRAMMING (P) (2022 - 2023 Onwards)

Semester IV	Internal Marks: 40		External	Marks: 60
COURSE	COURSE TITLE	CATEGORY	Hrs	CREDITS
CODE			/Week	
22UMA4SEC1P	STATISTICAL	SKILL		
	TOOLS AND	ENHANCEMENT	2	2
	<b>TECHNIQUES - R</b>	COURSE (SEC)		
	PROGRAMMING			
	( <b>P</b> )			

## **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.

## **Course Outcomes**

## **Course Outcome and Cognitive Level Mapping**

CO	CO Statement	Cognitive
Number	On the successful completion of the course, students will	Level
	be able to	
C01	Calculate simple arithmetic and statistical operations in R.	K1
CO2	Interpret the R programming language and its programming Environment.	K2
CO3	Apply the Statistical Programming Software.	К3
CO4	Manipulate data within R and to create simple graphs and charts.	K3
CO5	Compute R programming from a statistical Perspective.	K4

## Mapping of CO with PO and PSO

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. Creating and displaying data.
- 2. Matrix Manipulations.
- 3. Creating and manipulating a List and an Array.
- 4. Bar diagrams, Bar plots and subdivided Bar plots.
- 5. Pie diagram, 3D Pie diagram and Histogram.
- 6. Reading a CSV file and Calculating the Measures of Central Tendency.
- 7. String Manipulations.
- 8. Vector Operations.
- 9. Control Statements.
- 10. User defined functions.

## Web References

- 1. https://www.w3resource.com/r-programming-exercises/
- 2. https://www.r-project.org/about.html
- 3. <u>https://www.tutorialspoint.com/r/index.htm</u>
- 4. <u>https://modernstatisticswithr.com/introduction.html#welcome-to-r</u>
- 5. <u>https://www.w3schools.com/r/default.asp</u>

## **Pedagogy:**

Power point presentations and Illustrations.

## **Course Designer**

Ms. R. Soundaria