

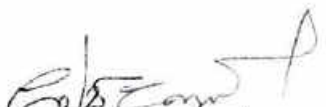
KUNTHAVAI NAACCHIYAAR GOVT. ARTS COLLEGE FOR WOMEN, THANJAVUR - 07
DEPARTMENT OF MATHEMATICS


Minutes of UG Board of Studies on 05.07.2023



The minutes of the UG Board of Studies meeting held on 05.07.2023 at PG and Research Department of Mathematics, KNGAC, Thanjavur.

The following changes are unanimously suggested and approved by the members of the Board. TANSCHÉ Syllabus introduced for the candidates admitted 2023-2024 onwards. In TANSCHÉ Syllabus, We introduced

- All core courses.
- All disciplinary elective courses.
- All skill enhancement courses.
- Internship/Industrial Training.
- Project.
- Reference Books added for same syllabus.


5/7/2023
HOD of maths


University Nominee

1. 
5/7/23
2. 
5/7/23
Subject Experts

**KUNTHAVAI NAACCHIYAAR GOVT. ARTS COLLEGE FOR
WOMEN (AUTONOMOUS), THANAJVUR-7**



SHIFT I

REGULAR TAMIL MEDIUM, ENGLISH MEDIUM AND ADDITIONAL

PG & RESEARCH

DEPARTMENT OF MATHEMATICS

KUNTHAVAI NAACHIYAAR GOVT. ARTS COLLEGE FOR
WOMEN(AUTONOMOUS)

THANJAVUR – 613 007.

CBCS & OBE Scheme of Instruction and Syllabus of Department of Mathematics

VISION

- ❖ To provide quality academic programmes and value oriented higher education to the rural community, equip them to encounter current regional, National and global demands upholding moral standards and intellectual competency.

MISSION

- ❖ To provide conducive environment for quality teaching-learning process and innovative research.
- ❖ To bestow substantial educational experience that is intellectually, socially, and personally transformative.
- ❖ To strive to bring out the latent potentiality and core competency of the learners
- ❖ To foster the culture of research-based learning, independent academic inquiry by encouraging the students to involve in research activities ranging from hands on training, student projects, publications etc.,
- ❖ To nurture essential skills, competent minds and compassionate hearts.
- ❖ To impart a practical, demanding and overall development of the personality generated by love, consideration and care for the society.
- ❖ To serve the society by extending needful outreach programmes to the rural populace.



I. Introduction

B.Sc. Mathematics : Programme Outcome, Programme Specific Outcome and Course Outcome

Mathematics is the study of quantity, structure, space and change, focusing on problem solving, with wider scope of application in science, engineering, technology, social sciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex), Differential Equations, Geometry, and Mechanics. The Bachelor's Degree B.Sc. Mathematics is awarded to the students on the basis of knowledge, understanding, skills, attitudes, values and academic achievements expected to be acquired by learners at the end of the Programme. Learning outcomes of Mathematics are aimed at facilitating the learners to acquire these attributes, keeping in view of their preferences and aspirations for gaining knowledge of Mathematics.

Bachelor's degree in Mathematics is the culmination of in-depth knowledge of algebra, calculus, geometry, differential equations and several other branches of Mathematics. This also leads to study of related areas like Computer science, Financial Mathematics, Statistics and many more. Thus, this programme helps learners in building a solid foundation for higher studies in Mathematics. The skills and knowledge gained have intrinsic aesthetics leading to proficiency in analytical reasoning. This can be utilised in Mathematical modelling and solving real life problems.

Students completing this programme will be able to present Mathematics clearly and precisely, make abstract ideas precise by formulating them in the language of Mathematics, describe Mathematical ideas from multiple perspectives and explain fundamental concepts of Mathematics to non-Mathematicians.

Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.



Under Graduate Programme

Programme Outcomes:

PO1: Disciplinary Knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

PO2: Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

PO3: Problem Solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

PO4: Analytical Reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.

PO5: Scientific Reasoning: Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

PO6: Self-directed & Lifelong Learning: Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.



B. Sc Mathematics

Programme Specific Outcomes:

PSO1: Acquire good knowledge and understanding, to solve specific theoretical & applied problems in different area of mathematics & statistics.

PSO2: Understand, formulate, develop mathematical arguments, logically and use quantitative models to address issues arising in social sciences, business and other context /fields.

PSO3: To prepare the students who will demonstrate respectful engagement with other's ideas, behaviors, beliefs and apply diverse frames of references to decisions and actions. To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) can be carried out accordingly, assigning the appropriate level in the grids:

	POs						...	PSOs		
	1	2	3	4	5	6		1	2	...
CLO1										
CLO2										
CLO3										
CLO4										
CLO5										



2. Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Mathematics based problem solving skills are included as mandatory components in the 'Training for Competitive Examinations' course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.



3. Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome / Benefits
I	Foundation Course To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning abstract Mathematics and simulating mathematical concepts to real world.	<ul style="list-style-type: none"> • Instil confidence among students • Create interest for the subject
I, II, III, IV	Skill Enhancement papers (Discipline centric / Generic / Entrepreneurial)	<ul style="list-style-type: none"> • Industry ready graduates • Skilled human resource • Students are equipped with essential skills to make them employable • Training on Computing / Computational skills enable the students gain knowledge and exposure on latest computational aspects • Data analytical skills will enable students gain internships, apprenticeships, field work involving data collection, compilation, analysis etc. • Entrepreneurial skill training will provide an opportunity for independent livelihood • Generates self-employment • Create small scale entrepreneurs • Training to girls leads to women empowerment • Discipline centric skill will improve the Technical knowhow of solving real life problems using ICT tools
III, IV, V & VI	Elective papers- An open choice of topics categorized under Generic and Discipline Centric	<ul style="list-style-type: none"> • Strengthening the domain knowledge • Introducing the stakeholders to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature • Students are exposed to Latest topics on Computer Science / IT, that require strong mathematical background • Emerging topics in higher education / industry / communication network / health sector etc. are introduced with hands-on-training, facilitates designing of mathematical models in the respective



IV	Industrial Statistics	sectors <ul style="list-style-type: none"> • Exposure to industry moulds students into solution providers • Generates Industry ready graduates • Employment opportunities enhanced
II year Vacation activity	Internship / Industrial Training	<ul style="list-style-type: none"> • Practical training at the Industry/ Banking Sector / Private/ Public sector organizations / Educational institutions, enable the students gain professional experience and also become responsible citizens.
V Semester	Project with Viva – voce	<ul style="list-style-type: none"> • Self-learning is enhanced • Application of the concept to real situation is conceived resulting in tangible outcome
VI Semester	Introduction of Professional Competency component	<ul style="list-style-type: none"> • Curriculum design accommodates all category of learners; 'Mathematics for Advanced Explain' component will comprise of advanced topics in Mathematics and allied fields, for those in the peer group / aspiring researchers; • 'Training for Competitive Examinations' –caters to the needs of the aspirants towards most sought - after services of the nation viz, UPSC, CDS, NDA, Banking Services, CAT, TNPSC group services, etc.
Extra Credits: For Advanced Learners / Honours degree		<ul style="list-style-type: none"> • To cater to the needs of peer learners / research aspirants

Skills acquired from the Courses	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
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K. N. GOVT. ARTS COLLEGE FOR WOMEN (AUTONOMOUS), THAZHUVAR - AUG 2023
B.Sc MATHEMATICS (BATCH I) - COURSE STRUCTURE UNDER CBCS

Batch - I 2023-24



Semester	Part	Course	Sub. Code	Title of the Course	Inst.Hrs	Credits	Exam Hrs	IA	FE	Total
I	I	LC 1	23K1T1	Tamil - I	6	3	3	25	75	100
	II	ELC 1	23K1E1	English - I	6	3	3	25	75	100
	III	CC 1	23K1M01	Algebra and Trigonometry	5	5	3	25	75	100
	III	CC 2	23K1M02	Differential Calculus	3	3	3	25	75	100
	III	EC 1	23K1MECP1:1	Allied Physics - I	4	4	3	25	75	100
			23K1MECP1:2	Applied Physics - I						
	III	EC 2		Allied Practical	2					
	IV	SEC 1	23K1MSEC1	Mathematics For Competitive Examinations - I	2	2	3	25	75	100
	IV	FC	23K1MFC	Bridge Mathematics	2	2	3	25	75	100
			Total	30	22		175	525	700	
II	I	LC 2	23K2T2	Tamil - II	6	3	3	25	75	100
	II	ELC 2	23K2E2	English - II	6	3	3	25	75	100
	III	CC 3	23K2M03	Analytical Geometry(Two and Three Dimensions)	5	5	3	25	75	100
	III	CC 4	23K2M04	Integral Calculus	3	3	3	25	75	100
	III	EC 2	23K2MECP2P	Allied Practical	2	2	3	25	75	100
	III	EC 3	23K2MECP3:1	Allied Physics - II	4	3	3	25	75	100
			23K2MECP3:2	Applied Physics - II						
	IV	SEC 2	23K2MSEC2	Mathematics For Competitive Examinations - II	2	2	3	25	75	100
	IV	SEC 3	23K2MSEC3	Computational Mathematics	2	2	3	25	75	100
			Total	30	23		200	600	800	
III	I	LC 3	23K3T3	Tamil - III	6	3	3	25	75	100
	II	ELC 3	23K3E3	English - III	6	3	3	25	75	100
	III	CC 5	23K3M05	Vector Calculus and its Applications	5	5	3	25	75	100
	III	CC 6	23K3M06	Differential Equations and its Applications	3	3	3	25	75	100
	III	EC 4	23K3MECS4:1	Statistics for Mathematics- I	4	4	3	25	75	100
			23K3MECS4:2	Mathematics and Financial Statistics						
	III	EC 5		Statistics for Mathematics- II	2					
	IV	SEC 4	23K3MSEC4	Statistics with Excel Programming	1	1	3	25	75	100
	IV	SEC 5	23K3MSEC5	Mathematics For Competitive Examinations - III	2	2	3	25	75	100
	V	EVS		Environmental Studies	1					
	IV	ECC1	23K3MECC1:1	Quantitative Aptitude - I*		3*	3		100	100
23K3MECC1:2			MOOC(Value Added Course)*							
	ECC2	23K3MECC2	Foundation Mathematics*		4*					
			Total	30	21		175	375	700	

Semester	Part	Course	Sub. Code	Title of the Course	Inst. Hrs	Credits	Exam Hrs	IA	FE	Total
IV	I	LC 4	23K4T4	Tamil - IV	6	1	1	25	75	100
	II	ELC 4	23K4E4	English - IV	6	1	1	25	75	100
	III	CC 7	23K4M07	Industrial Statistics	4	4	1	25	75	100
	III	CC 8	23K4M08	Elements of Mathematical Analysis	1	1	1	25	75	100
	III	EC 5	23K4MECS5P	Statistics for Mathematics - II Practical	2	2	1	40	60	100
	III	EC 6	23K4MECS6:1	Statistics for Mathematics - III	4	1	1	25	75	100
			23K4MECS6:2	Actuarial Statistics						
	III	SEC 6	23K4MSEC6	Mathematics For Competitive Examinations - IV	2	2	1	25	75	100
	IV	SEC 7	23K4MSEC7	LaTeX Practical	2	2	1	25	75	100
	V	EVS	23K4EVS	Environmental Studies	1	2	1	25	75	100
	IV	ECC3	23K4MECC3:1	Quantitative Aptitude - II*	1*	1		100	100	100
			23K4MECC3:2	MOOC(Value Added Course)*						
				Total	30	24		240	585	900
	V	III	CC 9	23K5M09	Abstract Algebra	6	3	1	25	75
III		CC 10	23K5M10	Real Analysis	6	3	1	25	75	100
III		CC 11	23K5M11	Mathematical Modelling	6	3	1	25	75	100
III		CC 12	23K5M12PW	Project with Viva voce	6	4	1		100	100
IV		EC 7	23K5MECM7:1	Number Theory	4	1	1	25	75	100
			23K5MECM7:2	Numerical Methods with Applications						
V		VE	23K5VE	Value Education Yoga - I	2	1	1	25	75	100
		23K5I	Summer Internship/ Industrial Training		2					
			Total	30	26		125	475	600	
VI	III	CC 13	23K6M13	Linear Algebra	7	6	1	25	75	100
	III	CC 14	23K6M14	Complex Analysis	7	6	1	25	75	100
	III	CC 15	23K6M15	Mechanics	7	6	1	25	75	100
	III	EC 8	23K6MECM8:1	Graph Theory with Applications	7	1	1	25	75	100
			23K6MECM8:2	Difference Equations with Applications						
	IV	SEC 8	23K6MSEC8	Statistics with R Programming	2	2	1	25	75	100
		23K6EA	Extension Activity		1					
			Total	30	24		125	375	500	
GRAND TOTAL				180	140		1040	2935	4200	





K. N. GOVT. ARTS COLLEGE FOR WOMEN (AUTONOMOUS), THANJAVUR - 7
 B.Sc MATHEMATICS (BATCH I) - COURSE STRUCTURE UNDER CBCS



Batch - II 2023-24

Semester	Part	Course	Sub. Code	Title of the Course	Inst.Hrs	Credits	Exam Hrs	IA	EE	Total
I	I	LC 1	23K1T1	Tamil - I	6	3	3	25	75	100
	II	ELC 1	23K1E1	English - I	6	3	3	25	75	100
	III	CC 1	23K1M01	Algebra and Trigonometry	5	5	3	25	75	100
	III	CC 2	23K1M02	Differential Calculus	3	3	3	25	75	100
	III	EC 1	23K1MECP1:1	Allied Physics - I	4	4	3	25	75	100
			23K1MECP1:2	Applied Physics - I						
	III	EC 2		Allied Practical	2					
	IV	SEC 1	23K1MSEC1	Mathematics For Competitive Examinations - I	2	2	3	25	75	100
	IV	FC	23K1MFC	Bridge Mathematics	2	2	3	25	75	100
			Total	30	22		175	525	700	
II	I	LC 2	23K2T2	Tamil - II	6	3	3	25	75	100
	II	ELC 2	23K2E2	English - II	6	3	3	25	75	100
	III	CC 3	23K2M03	Analytical Geometry(Two and Three Dimensions)	5	5	3	25	75	100
	III	CC 4	23K2M04	Integral Calculus	3	3	3	25	75	100
	III	EC 2	23K2MECP2P	Allied Practical	2	2	3	25	75	100
	III	EC 3	23K2MECP3:1	Allied Physics - II	4	3	3	25	75	100
			23K2MECP3:2	Applied Physics - II						
	IV	SEC 2	23K2MSEC2	Mathematics For Competitive Examinations - II	2	2	3	25	75	100
	IV	SEC 3	23K2MSEC3	Computational Mathematics	2	2	3	25	75	100
			Total	30	23		200	600	800	
III	I	LC 3	23K3T3	Tamil - III	6	3	3	25	75	100
	II	ELC 3	23K3E3	English - III	6	3	3	25	75	100
	III	CC 5	23K3M05	Vector Calculus and its Applications	5	5	3	25	75	100
	III	CC 6	23K3M06	Differential Equations and its Applications	3	3	3	25	75	100
	III	EC 4	23K3MECCS4:1	Introduction to Data Science	4	4	3	25	75	100
			23K3MECCS4:2	Robotics and its Applications						
	III	EC 5		Big Data Analysis	2					
				IOT and its Applications						
	IV	SEC 4	23K3MSEC4	Statistics with Excel Programming	1	1	3	25	75	100
	IV	SEC 5	23K3MSEC5	Mathematics For Competitive Examinations - III	2	2	3	25	75	100
	V	EVS		Environmental Studies	1					
IV	ECC1	23K3MECC1:1	Quantitative Aptitude - I*		3*	3		100	100	
		23K3MECC1:2	MOOC(Value Added Course)*							
	ECC2	23K3MECC2	Foundation Mathematics*		4*					
			Total	30	21		175	375	700	

Semester	Part	Course	Sub. Code	Title of the Course	Inst.Hrs	Credits	Exam Hrs	IA	EE	Total
IV	I	LC 4	23K4T4	Tamil - IV	6	3	3	25	75	100
	II	ELC 4	23K4E4	English - IV	6	3	3	25	75	100
	III	CC 7	23K4M07	Industrial Statistics	4	4	3	25	75	100
	III	CC 8	23K4M08	Elements of Mathematical Analysis	3	3	3	25	75	100
	III	EC 5	23K4MECCS5:1	Big Data Analytics	2	2	3	25	75	100
			23K4MECCS5:2	IOT and its Applications						
	III	EC 6	23K4MECCS6:1	Cryptography	4	3	3	25	75	100
			23K4MECCS6:2	Image Processing						
	III	SEC 6	23K4MSEC6	Mathematics For Competitive Examinations - IV	2	2	3	25	75	100
	IV	SEC 7	23K4MSEC7	LaTeX Practical	2	2	3	25	75	100
	V	EVS	23K4EVS	Environmental Studies	1	2	3	25	75	100
	IV	ECC3	23K4MECC3:1	Quantitative Aptitude - II*		3*	3		100	100
23K4MECC3:2			MOOC(Value Added Course)*							
Total					30	24		225	585	900
V	III	CC 9	23K5M09	Abstract Algebra	6	5	3	25	75	100
	III	CC 10	23K5M10	Real Analysis	6	5	3	25	75	100
	III	CC 11	23K5M11	Mathematical Modelling	6	5	3	25	75	100
	III	CC 12	23K5M12PW	Project with Viva voce	6	4	3		100	100
	IV	EC 7	23K5MECM7:1	Number Theory	4	3	3	25	75	100
			23K5MECM7:2	Numerical Methods with Applications						
	V	VE	23K5VE	Value Education Yoga - I	2	2	3	25	75	100
			23K5I	Summer Internship/ Industrial Training		2				
Total					30	26		125	475	600
VI	III	CC 13	23K6M13	Linear Algebra	7	6	3	25	75	100
	III	CC 14	23K6M14	Complex Analysis	7	6	3	25	75	100
	III	CC 15	23K6M15	Mechanics	7	6	3	25	75	100
	III	EC 8	23K6MECM8:1	Graph Theory with Applications	7	3	3	25	75	100
			23K6MECM8:2	Difference Equations with Applications						
	IV	SEC 8	23K6MSEC8	Statistics with R Programming	2	2	3	25	75	100
		23K6EA	Extension Activity		1					
Total					30	24		125	375	500
GRAND TOTAL					180	140		1025	2935	4200



Title of the Course		ALGEBRA & TRIGONOMETRY					
Paper Number		CC 1					
Category	Core	Year	1	Credits	5	Course Code	23K1M01
		Semester	1				
Instructional Hours		Lecture	Tutorial	Lab Practice	Total		
per week		4	1	-	5		

Pre-requisite 12th Standard Mathematics

- Objectives of the Course**
- Basic ideas on the Theory of Equations, Matrices and Number Theory.
 - Knowledge to find expansions of trigonometry functions, solve theoretical and applied problems.

Course Outline

Unit I: Reciprocal Equations-Standard form-Increasing or decreasing the roots of a given equation- Removal of terms, Approximate solutions of roots of polynomials by Horner's method – related problems.
Chapter 6: Sections - 16(16.1,16.2),17-20 of Text Book 1

Unit II: Summation of Series: Binomial– Exponential –Logarithmic series (Theorems without proof) – Approximations - related problems.
Chapter 3: Sections 10,11
Chapter 4: Sections 1 to 3, 5 to 9 of Text Book 1

Unit III: 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.
Chapter 2 : Sections 16 of Text Book 2

Unit IV: Expansions of $\sin^n \theta$, $\cos^n \theta$ in powers of $\sin \theta$, $\cos \theta$ - Expansion of $\tan^n \theta$ in terms of $\tan \theta$, Expansions of $\cos^n \theta$, $\sin^n \theta$, $\cos^m \theta \sin^n \theta$ –Expansions of $\tan(\theta_1 + \theta_2 + \dots + \theta_n)$ -Expansions of $\sin \theta$, $\cos \theta$ and $\tan \theta$ in terms of θ - related problems.
Chapter 3 : Sections 1-5, 5.1 of Text Book 3

Unit V: Hyperbolic functions – Relation between circular and hyperbolic functions Inverse hyperbolic functions, Logarithm of complex quantities, Summation of trigonometric series - related problems.
Chapter 4 : Sections 2 to 2.3 Chapter 5 : Sections 5
Chapter 6: Sections 1 to 3, 3.1 of Text Book of 3

Extended Professional Component (is a part of internal component only. Not to be included in the External Examination question paper)

Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved

(To be discussed during the Tutorial hour)



Handwritten signature and date: 25/5/23
 Department of Mathematics
 N. GOVERNMENT ARTS COLLEGE
 THANE (W) - 401 001

Skills acquired from this course	Knowledge, problem solving, analytical ability, professional competency, professional communication and transferable skill.
Recommended Text	1. Manickavasagam Pillai, T.K., T. Natarajan and Ganapathy KS – Algebra Vol-I, Viswanathan Publishers and Printers Pvt Ltd., - 2008. 2. Manickavasagam Pillai, T.K., T. Natarajan and Ganapathy KS – Algebra Vol-II, Viswanathan Publishers and Printers Pvt Ltd., -2008. 3. Manichavasagam Pillai, T.K. and S. Narayanan, Trigonometry– Viswanathan Publishers and Printers Pvt. Ltd. 2013.
Reference Books	1. W.S. Burnstine and A.W. Panton, Theory of equations 2. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007 3. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005 4. C. V. Durell and A. Robson, Advanced Trigonometry, Courier Corporation, 2003 5. J. Stewart, L. Redlin, and S. Watson, Algebra and Trigonometry, Cengage Learning, 2012. 6. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9 th Edition, 2010.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Classify and Solve reciprocal equations

CLO 2: Find the sum of binomial, exponential and logarithmic series

CLO 3: Find Eigen values, eigen vectors, verify Cayley – Hamilton theorem and diagonalize a given matrix

CLO 4: Expand the powers and multiples of trigonometric functions in terms of sine and cosine

CLO 5: Determine relationship between circular and hyperbolic functions and the summation of trigonometric series

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1



Handwritten signature and text: "MATHS" and "ANNA UNIVERSITY CHENNAI".

Title of the Course		DIFFERENTIAL CALCULUS					
Paper Number		CC 2					
Category	Core	Year	1	Credits	3	Course Code	23K1M02
		Semester	1				
Instructional Hours per week		Lecture		Tutorial		Lab Practice	Total
			2		1		-
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> The basic skills of differentiation, successive differentiation, and their applications. Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems. 					
Course Outline		<p>UNIT-I: 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. Chapter 3: Sections 1.1 to 1.6, 2.1 and 2.2 (Statement only)</p> <p>UNIT-II: Partial Differentiation: Partial derivatives – Successive partial derivatives – Function of a function rule – Total differential coefficient. Chapter 8: Sections 1.1 to 1.3</p> <p>UNIT-III: Partial Differentiation (Continued): Homogeneous functions – Maxima and Minima of functions of two variables . Chapter 8 : Sections 1.6, 4, 4.1</p> <p>UNIT-IV: Envelope: Method of finding the envelope – Another definition of envelope – Envelope of family of curves which are quadratic in the parameter. Chapter 10 : Sections 1.1 to 1.4</p> <p>UNIT-V: Curvature: Definition of Curvature – Circle, Radius and Centre of Curvature – Evolutes and Involutives. Chapter 10 : Sections 2.1 to 2.5</p>					
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)		<p>Questions related to the above topics, from various competitive examinations UPSC // TNPSC / others to be solved</p> <p>(To be discussed during the Tutorial hour)</p>					



Department of Arts
 N. GOVERNMENT ARTS COLLEGE
 THANJAVUR-613 007

Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	I.S. Narayanan and T.K. Manicavachagom Pillay, Calculus-Volume I, (2004), S. Viswanathan Printers Pvt. Ltd.
Reference Books	<ol style="list-style-type: none"> 1. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons. Inc., 2002. 2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2010. 3.M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007. 4. R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer- Verlag, New York, Inc., 1989. 5.T. Apostol, Calculus, Volumes I and II. 6.S. Goldberg, Calculus and mathematical analysis.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with PLOs and PSOs)

Students will be able to

- CLO 1: Find the nth derivative, form equations involving derivatives and apply Leibnitz formula
- CLO 2: Find the partial derivative and total derivative coefficient
- CLO 3: Determine maxima and minima of functions of two variables and to use the Lagrange's method of undetermined multipliers
- CLO 4: Find the envelope of a given family of curves
- CLO 5: Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	-	-	-	3	2	1
CLO3	3	2	3	2	-	-	3	2	1
CLO4	3	2	3	2	1	-	3	2	1
CLO5	3	2	3	2	1	-	3	2	1



Department of Mathematics,
 GOVERNMENT ARTS COLLEGE
 WANIAVILAS 612 007

Title of the Course		MATHEMATICS FOR COMPETITIVE EXAMINATION – I					
Paper Number		SEC I					
Category	SEC	Year	I	Credits	2	Course Code	23KIMSECI
		Semester	I				
Instructional Hours Per week	Lecture	Tutorial		Lab Practice		Total	
	2	-		-		2	
Pre- requisite		12 th Standard Mathematics					
Objective of the Course		<ul style="list-style-type: none"> • Remembering the meaning of HCF and LCM of numbers. • Understanding the concept of percentage on simple problems. • Analyzing the concepts of ratio and proportion. 					
Course Outline		UNIT – I Numbers - H.C.F and L.C.M. of Numbers. (Chapter – 1 & 2)					
		UNIT – II Decimal Fractions – Simplification. (Chapter – 3 & 4)					
		UNIT – III Square Roots and Cube Roots – Average. (Chapter – 5 & 6)					
		UNIT – IV Problems on Numbers - Problems on Ages. (Chapter – 7 & 8)					
		UNIT – V Surds & Indices – Percentage. (Chapter – 9 & 10)					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill.					
Recommended Text		I. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S.Chand co Ltd., 152, Anna Salai, Chennai, 2010					
Reference Books		I. Quantitative Aptitude “by Abhijit Guha, Tata McGraw Hill Publishing Company Limited, New Delhi (2005)					
Website and e – Learning Source		https://nptel.ac.in					



Question Paper Pattern: 75 Objective type questions each carrying 1 Mark.

Department of Mathematics
 N. GOVERNMENT ARTS COLLEGE
 TRIPLIKAVI - 600 072

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 : Perform basic mathematics in Numbers.

CLO 2 : Understand Decimal Fractions and Simplification.

CLO 3 : Develop basic concept of Square Roots and Cube Roots and Average.

CLO 4 : Explain Problems on Numbers - Problems on Ages.

CLO 5 : Critique and evaluate quantitative arguments that utilize mathematics, statistical and quantitative informations.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1



25/8/2023
W.P. ARTS COLLEGE FOR WOMEN
BANGALORE
KARNATAKA

Title of the Course		Foundation course- Bridge Mathematics					
Paper Number		FC					
Category	FC	Year	1	Credits	2	Course Code	23K1MFC
		Semester	1				
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total		
		2	-	--	2		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		To bridge the gap and facilitate transition from higher secondary to tertiary education; To instil confidence among stakeholders and inculcate interest for Mathematics;					
Course Outline		UNIT-I:Algebra: Binomial theorem, General term, middle term. problems based on these concepts					
		Unit II: Sequences and series (Progressions). Fundamental principle of counting. Factorial n.					
		Unit III: Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.					
		Unit IV: Trigonometry: Introduction to trigonometric ratios, proof of $\sin(A+B)$, $\cos(A+B)$, $\tan(A+B)$ formulae, multiple and sub multiple angles. $\sin(2A)$, $\cos(2A)$, $\tan(2A)$ etc., transformations sum into product and product into sum formulae. inverse trigonometric functions. sine rule and cosine rule					
		UnitV: Calculus: Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method.					
Recommended Text		1. NCERT class XI and XII text books. 2. Any State Board Mathematics text books of class XI and XII					
Website and e-Learning Source		https://nptel.ac.in					



Department of ...
K. GOVERNMENT ARTS COLLEGE

Course Learning Outcome

After completion of this course successfully, the students will be able to

CLO1: Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems

CLO2: Find the various sequences and series and solve the problems related to them. Explain the principle of counting.

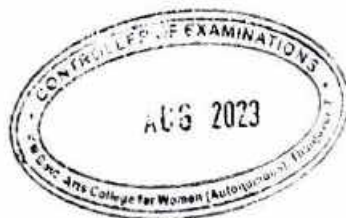
CLO3: Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations

CLO4: Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations.

CLO5: Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.

Mapping of Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) and Programme Specific Outcomes (PSOs)

	Pos						PSOs	
	1	2	3	4	5	6	1	2
CLO1	1	1	1	1	1	1	1	1
CLO2	2	1	1	2	2	1	2	1
CLO3	2	1	1	2	2	1	2	1
CLO4	1	1	1	1	1	1	2	1
CLO5	1	1	1	1	1	1	2	1



Department of Information
B. SUKUMARANI, M.A. M.Phil. M.L.S.
25/8/23

Title of the Course		ANALYTICAL GEOMETRY (Two & Three Dimensions)					
Paper Number		CC8					
Category	Core	Year	I	Credits	5	Course Code	23K2M03
		Semester	II				
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total		
		4	1	--	5		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> Necessary skills to analyze characteristics and properties of two- and three-dimensional geometric shapes. To present mathematical arguments about geometric relationships. To solve real world problems on geometry and its applications. 					
Course Outline		<p>UNIT-I: Pole, Polar - conjugate points and conjugate lines – diameters – conjugate diameters of an ellipse - semi diameters- conjugate diameters of hyperbola. Chapter 9 of Text Book 1</p> <p>UNIT-II: Polar coordinates: General polar equation of straight line – Polar equation of a circle given a diameter, Equation of a straight line, circle, conic – Equation of chord, tangent, normal. Equations of the asymptotes of a hyperbola. Chapter 10 of Text Book 1</p> <p>UNIT-III: System of Planes-Length of the perpendicular-Orthogonal projection. Chapter 2: Sections 2.5 to 2.9 of Text Book 3</p> <p>UNIT-IV: Representation of line-angle between a line and a plane – co – planar lines-shortest distance between two skew lines –length of the perpendicular-intersection of three planes. Chapter 3 : Sections 1 to 8, 10 of Text Book 2</p> <p>UNIT-V: Equation of a sphere-general equation-section of a sphere by a plane-equation of the circle- tangent plane- angle of intersection of two spheres- condition for the orthogonality- radical plane. Chapter 6 : Sections 6.1 to 6.4, 6.6 to 6.8</p>					
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)		<p>Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved</p> <p>(To be discussed during the Tutorial hour)</p> <p style="text-align: right;"><i>Text book is</i></p>					



Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	<ol style="list-style-type: none"> 1. Vittal P.R. and Malini V, Algebra, Analytical Geometry & Trigonometry, Margam Publications, India. 2018. 2. Manicavachagom Pillay T.K. and Natarajan T, A Text book of Analytical Geometry Part I-Two Dimensions, Divya Subramanian for Ananda Book Depot. 1996. 3. Shanti Narayan and Mittal P.K., Analytical Solid Geometry, S Chand Publishing, 2021.
Reference Books	<ol style="list-style-type: none"> 1. S. L. Loney, Co-ordinate Geometry. 2. Robert J. T. Bell, Co-ordinate Geometry of Three Dimensions. 3. William F. Osgood and William C. Graustein, Plane and Solid Analytic Geometry, Macmillan Company, New York, 2016. 4. Calculus and Analytical Geometry, G.B. Thomas and R. L. Finny, Pearson Publication, 9th Edition, 2010. 5. Robert C. Yates, Analytic Geometry with Calculus, Prentice Hall, Inc., New York, 1961. 6. Earl W. Swokowski and Jeffery A. Cole, Algebra and Trigonometry with Analytic Geometry, Twelfth Edition, Brooks/Cole, Cengage Learning, CA, USA, 2010. 7. William H. McCrea, Analytical Geometry of Three Dimensions, Dover Publications, Inc, New York, 2006. 8. John F. Randelph, Calculus and Analytic Geometry, Wadsworth Publishing Company, CA, USA, 1969. 9. Ralph Palmer Agnew, Analytic Geometry and Calculus with Vectors, McGraw-Hill Book Company, Inc. New York, 1962.
Website and Learning Source	https://nptel.ac.in



Handwritten notes and stamps in the bottom right corner. A date stamp '25/03/2023' is visible. Below it, there is a stamp that reads 'GOVERNMENT ARTS COLLEGE FOR WOMEN' and 'THIRUVANANTHAPURAM'.

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Find pole, polar for conics, diameters, conjugate diameters for ellipse and hyperbola

CLO 2: Find the polar equations of straight line and circle, equations of chord, tangent and normal and to find the asymptotes of hyperbola

CLO 3: Explain in detail the system of Planes

CLO 4: Explain in detail the system of Straight lines

CLO 5: Explain in detail the system of Spheres

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	2	2	1	-	-	3	2	1
CLO2	2	2	2	1	-	-	3	2	1
CLO3	3	2	2	1	-	-	3	2	1
CLO4	3	2	3	1	-	-	3	2	1
CLO5	3	2	3	1	-	-	3	2	1



Department

Title of the Course		INTEGRAL CALCULUS					
Paper Number		CC 4					
Category	Core	Year	I	Credits	3	Course Code	23K2M04
		Semester	II				
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total		
		2	1	--	3		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Knowledge on integration and its geometrical applications, double, triple integrals and improper integrals. • Knowledge about Beta and Gamma functions and their applications. • Skills to Determine Fourier series expansions. 					
Course Outline		UNIT-I: Reduction formulae -Types, integration of product of powers of algebraic and trigonometric functions, integration of product of powers of algebraic and logarithmic functions - Bernoulli's formula. Chapter 1: Sec 13,14 and 15.1					
		UNIT-II: Multiple Integrals - definition of double integrals - evaluation of double integrals – double integrals in polar coordinates. Chapter 5 : Sec 1, 2.1,2.2 and 3.1					
		UNIT-III: Triple integrals –applications of multiple integrals - volumes of solids of revolution - areas of curved surfaces. Chapter 5 : Sec 4, 5.1.5.2, 5.3, 6.1 and 7					
		UNIT-IV: Beta and Gamma functions – infinite integral - definitions–recurrence formula of Gamma functions – properties of Beta and Gamma functions- relation between Beta and Gamma functions . Chapter 7: Sec 2.1,2.2,2.3,3 and 4					
		UNIT-V: Geometric and Physical Applications of Integral calculus. Chapter 2: Sec 1.1 to 1.4, 2.1,2.2 and Chapter 3: Sec 1.1 to 1.3					



25/8/23
 DEPARTMENT
 GOVERNMENT ARTS COLLEGE
 THANJAVUR-613 007

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC, TNPSC others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Narayanan S and Manicavachagom Pillay T.K. Calculus-Volume II, (2006). S. Viswanathan Printers Pvt. Ltd.
Reference Books	1. H. Anton, I. Birens and S. Davis. Calculus, John Wiley and Sons, Inc., 2002. 2. G.B. Thomas and R.L. Finney, Calculus, Pearson Education, 2007. 3. D. Chatterjee, Integral Calculus and Differential Equations, Tata-McGraw Hill Publishing Company Ltd. 4. P. Dyke, An Introduction to Laplace Transforms and Fourier Series, Springer Undergraduate Mathematics Series, 2001 (second edition).
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Determine the integrals of algebraic, trigonometric and logarithmic functions and to find the reduction formulae

CLO 2: Evaluate double and triple integrals and problems using change of order of integration

CLO 3: Solve multiple integrals and to find the areas of curved surfaces and volumes of solids of revolution

CLO 4: Explain beta and gamma-functions and to use them in solving problems of integration

CLO 5: Explain Geometric and Physical applications of integral calculus.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	3	1	3	-	-	-	3	2	1
CLO3	3	1	3	-	-	-	3	2	1
CLO4	3	1	3	-	2	-	3	2	1
CLO5	3	1	3	-	2	1	3	2	1



Department of Mathematics,
GOVERNMENT ARTS COLLEGE FOR WOMEN,
PALANI

Title of the Course		MATHEMATICS FOR COMPETITIVE EXAMINATION – II					
Paper Number		SEC 2					
Category	SEC	Year	I	Credits	2	Course Code	23K2MSEC2
		Semester	II				
Instructional Hours Per week		Lecture	Tutorial		Lab Practice		Total
		2	-		-		2
Pre- requisite		12 th Standard Mathematics					
Objective of the Course		<ul style="list-style-type: none"> • Understanding the concepts of chain rule. • Applying the concept of time and distance. • Analyzing the problem on trains with solved examples. 					
Course Outline		UNIT – I Profit & Loss – Ratio & Proportion. (Chapter – 11 & 12)					
		UNIT – II Partnership – Chain Rule. (Chapter – 13 & 14)					
		UNIT – III Time & Work – Pipes & Cistern. (Chapter – 15 & 16)					
		UNIT – IV Time & Distance – Problems on Trains. (Chapter – 17 & 18)					
		UNIT – V Boats & Streams – Alligation or Mixture. (Chapter – 19 & 20)					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill.					
Recommended Text		1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S.Chand co Ltd., 152, Anna Salai, Chennai, 2010					
Reference Books		1. Quantitative Aptitude by Abhijit Guha, Tata McGraw Hill Publishing Company Limited, New Delhi (2005)					
Website and e – Learning Source		https://nptel.ac.in					

Question Paper Pattern: 75 Objective type questions each carrying 1 Mark.



Department of Mathematics,
 N. GOVERNMENT APES COLLEGE
 THANJAVUR-613 007

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 : Explain in detail about Profit & Loss and Ratio & Proportion.

CLO 2 : Explain Partnership and Chain Rule.

CLO 3 : Explain Time & Work and Pipes & Cistern.

CLO 4 : Explain Time & Distance and Problems on Trains.

CLO 5 : Explain Boats & Streams and Alligation or Mixture.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1



25/8/23
DEPARTMENT OF MATHEMATICS
N. GOVERNMENT ARTS COLLEGE
THIRUVANANTHAPURAM
FRAN 18 VLR-612 dms

Title of the Course		COMPUTATIONAL MATHEMATICS				
Paper Number		SEC 3				
Category	SEC	Year	I	Credits	2	Course Code
		Semester	II			23K2MSEC3
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total	
		2	--	--	2	
Pre-requisite		12 th Standard Mathematics				
Objectives of the Course		<ul style="list-style-type: none"> Understand and use the structure of C++ programme, to solve different Numerical Methods. 				
Course Outline		UNIT-I: Algebraic and Transcendental Equations: Bisection method Method of false position- Method of successive approximation- Newton-Raphson's method-Secant Method-Graeff's root squaring method.				
		UNIT-II: System of Linear Algebraic Equations: Direct method- Iterative method-Eigen value problems.				
		UNIT-III: C++ Program for Bisection method-C++ Program for Method of false position- C++ Program for Method of successive approximation-C++ Program for Newton-Raphson's method.				
		UNIT-IV: C++ Program for Secant Method-C++ Program for Graeff's root squaring method-C++ Program for Gauss elimination method-C++ Program for Gauss Jordan method.				
		UNIT-V: C++ Program for Jacobian method-C++ Program for Gauss Seidal method-C++ Program for Largest eigen value by power method.				
Extended Professional Component (is a part of internal component only. Not to be included in the External Examination question paper)		<p>Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>				



Department of Mathematics
 A. GOVERNMENT
 THANJAVUR

Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. R.M. Somasundaram and R.M. Chandrasekaran, "Numerical Methods with C++ Programming", Prentice Hall India Pvt. Ltd., New Delhi, 2005.
Reference Books	1. Pallab Ghosh, "Numerical Methods with Computer Programs in C++", Prentice Hall India Pvt. Ltd., New Delhi, 2009. 2. T. Veerarajan and T. Ramachandran, "Numerical Methods with Programs in C", Second Edition, McGraw Hill Education Pvt. Ltd, New Delhi, 2006.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with PO's and PSO's)

On successful completion of the course, the students will be able to

CLO 1 : Describe the roots of algebraic equations using different methods like, Newton-Raphson method, Secant Method etc.

CLO 2 : Solve system of algebraic equations using direct and iterative methods.

CLO 3 : To write C++ Program to compute roots of algebraic equations using Bisection method, Newton-Raphson method etc.

CLO 4 : To write C++ Program to compute roots of algebraic equations using Secant method, Gauss Jordan method etc.

CLO 5 : To write C++ Program to solve the system of algebraic equations using the Jacobian method, Gauss Seidal method.

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	3
CO2	2	3	3	3	3
CO3	3	3	3	3	3
CO4	2	3	3	2	3
CO5	2	3	3	2	2



Handwritten signature and date: 25/6/23

Title of the Course		VECTOR CALCULUS AND ITS APPLICATIONS					
Paper Number		CC 5					
Category	Core	Year	II	Credits	5	Course Code	23K3M05
		Semester	III				
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total		
		4	1	--	5		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Knowledge about differentiation of vectors and on differential operators. • Knowledge about derivatives of vector functions. • Skills in evaluating line, surface and volume integrals. • The ability to analyze the physical applications of derivatives of vectors. 					
Course Outline		<p>UNIT-I: Vector point function - Scalar point function - Derivative of a vector and derivative of a sum of vectors - Derivative of a product of a scalar and a vector point function - Derivative of a scalar product and vector product.</p> <p>Chapter 2 : Sections 2.1 to 2.3</p> <p>UNIT-II: The vector operator 'del'. The gradient of a scalar point function - Divergence of a vector - Curl of a vector - solenoidal and irrotational vectors - simple applications.</p> <p>Chapter 2: Sections 2.4 to 2.7</p> <p>UNIT-III: Laplacian operator, Vector identities - Line integral - simple problems.</p> <p>Chapter 2 : Section 2.8</p> <p>Chapter 3 : Section 3.1</p> <p>UNIT-IV: Surface integral - Volume integral - Applications.</p> <p>Chapter 3 : Sections 3.5,3.6</p> <p>UNIT-V: Gauss divergence Theorem, Stoke's Theorem, Green's Theorem in two dimensions - Applications to real life situations.</p> <p>Chapter 4 : Sections 4.2,4.4,4.5</p>					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill					
Recommended Text		1. Duraipandian, P and Laxmiduraipandian - Vector Analysis(Revised Edition- Reprint 2005) Emerald Publishers.					



Department
GOVERNMENT

Reference Books	<ol style="list-style-type: none"> 1. J.C. Susan ,Vector Calculus, . (4th Edn.) Pearson Education, Boston, 2012. 2. A. Gorguis, Vector Calculus for College Students, Xilbius Corporation, 2014. 3. J.E. Marsden and A. Tromba ,Vector Calculus, . (5thedn.) W.H. Freeman, New York, 1988.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Find the derivative of vector and sum of vectors, product of scalar and vector point function and to Determine derivatives of scalar and vector products

CLO 2: Applications of the operator 'del' and to Explain solenoidal and ir-rotational vectors

CLO 3: Solve simple line integrals

CLO 4: Solve surface integrals and volume integrals

CLO 5: Verify the theorems of Gauss, Stoke's and Green's(Two Dimension)


	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	1	-	-	3	2	1
CLO2	3	2	3	1	2	-	3	2	1
CLO3	3	3	3	3	-	-	3	3	1
CLO4	3	3	3	3	-	-	3	3	1
CLO5	3	3	3	3	2	-	3	3	1



Department of Mathematics
 25/8/23
 Department of Mathematics
 College for Women, Bangalore

Title of the Course		STATISTICS WITH EXCEL PROGRAMMING					
Paper Number		SEC 4					
Category	SEC	Year	II	Credits	1	Course Code	23K3MSEC4
		Semester	III				
Instructional Hours per week	Lecture		Tutorial		Lab Practice	Total	
	1		--		--	1	
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> To Acquire the knowledge of Statistics with Excel Programming 					
Course Outline		<p>UNIT-I: Distribution of data- Characteristics of data- Frequency distribution- Procedure for Constructing a Frequency Distribution-Using Excel to Construct a Frequency Distribution-Relative Frequency Distribution-Cumulative Frequency Distribution. (Chapter-2: Pages 58 to 70)</p> <p>UNIT-II: Histograms-Relative Frequency Histogram-Normal Distribution-Common Distribution Shapes-Skewness-Using XLSTAT for Histograms-Graphs-Using Excel to Construct a Scatterplot-Correlation Coefficient. (Chapter-2: Pages 70 to 81)</p> <p>UNIT-III: Time-Series Graph-Dotplots-Using XLSTAT for Stemplots-Bar Graphs-Using Excel to Create Bar Graphs-Pareto Charts-Pie Charts-Using Excel to Create Pie Charts-Frequency Polygon-Using Excel to Create Frequency Polygons. (Chapter-2: Pages 81 to 98)</p> <p>UNIT-IV: Descriptive statistics-Measures of Center-Mean-Using Excel to Calculate the Mean-Median-Using Excel to Find the Median. (Chapter-3: Pages 110 to 114)</p> <p>UNIT-V: Mode-Using Excel to Find the Mode-Midrange-Using Excel to Calculate the Midrange-Weighted Mean-Using Excel for Descriptive Statistics. (Chapter-3: Pages 114 to 125)</p>					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication, Transferrable Skill and designing mathematical models towards solving mathematical Applications					
Recommended Text		1. Mario F. Triola, "Elementary Statistics Using Excel", Fifth Edition, Pearson New International Edition, 2014. (Chapter 2 and 3).					




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Reference Books	<ol style="list-style-type: none"> 1. E. Balagurusamy, "Computer Oriented Statistical and Numerical Methods", Macmillan Publishers India Limited, 2000. 2. V. K. Rohatgi, A. M. E. Saleh, "An introduction to probability and statistics", John Wiley & Sons, 2015. 3. B. Held, B. Moriarty & T. Richardson, "Microsoft Excel Functions and Formulas", Stylus Publishing, LLC, 2019. 4. N. J. Salkind, "Excel statistics: A quick guide", Sage Publications, 2015. 5. J. Schmuller, "Statistical analysis with Excel for dummies", John Wiley & Sons, 2013.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

- CLO 1 : Handle distribution of data and analyses the characteristics of data using Excel.
- CLO 2 : To find Normal distribution, common distribution shapes, Correlation Coefficient and plot graphs using Excel.
- CLO 3 : Create Time-Series Graphs, Dotplots, Stemplots, Bar Charts, Pie Charts using Excel.
- CLO 4 : Compute Mean and Median using Excel.
- CLO 5 : Compute Mode, Midrange, Weighted Mean using Excel.



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Title of the Course		MATHEMATICS FOR COMPETITIVE EXAMINATION – III					
Paper Number		SEC 5					
Category	SEC	Year	II	Credits	2	Course Code	23K3MSEC5
		Semester	III				
Instructional Hours Per week	Lecture	Tutorial		Lab Practice		Total	
	2	-		-		2	
Pre-requisite		12 th Standard Mathematics					
Objective of the Course		<ul style="list-style-type: none"> Remembering the concept of Logarithms. Understanding the concept of Simple Interest – Compound Interest. Analyzing the concepts of Stocks and Shares. 					
Course Outline		UNIT – I Simple Interest – Compound Interest.(Chap – 21 & 22)					
		UNIT – II Logarithms - Area.(Chap – 23 & 24)					
		UNIT – III Volume & Surface Areas – Races & Games of Skill. (Chap – 25 & 26)					
		UNIT – IV Calendar - Clocks.(Chap – 27 & 28)					
		UNIT – V Stocks & Shares.(Chap – 29)					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill.					
Recommended Text		1. R.S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S.Chand co Ltd., 152, Anna Salai, Chennai,2010					
Reference Books		1. Quantitative Aptitude 'by Abhijit Guha, Tata McGraw Hill Publishing Company Limited, New Delhi (2005)					
Website and e – Learning Source		https://nptel.ac.in					

Question Paper Pattern: 75 Objective type questions each carrying 1 Mark.



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Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 : Explain in detail about Simple Interest and Compound Interest.

CLO 2 : Explain Logarithms and Area.

CLO 3 : Explain Volume & Surface Areas and Races & Games of Skill.

CLO 4 : Explain Calendar and Clocks.

CLO 5 : Explain Stocks & Shares.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1



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Title of the Course		QUANTITATIVE APTITUDE – I*					
Paper Number		ECC 1					
Category	ECC	Year	II	Credits	3*	Course Code	23K3MECC1:1
		Semester	III				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	--	--		--	--		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> Remembering the HCF and LCM . Understanding the concept of Percentage and Surds Analyzing the concepts of Odd Man Out and Series. 					
Course Outline		UNIT I Numbers – HCF and LCM of numbers – Decimal Fractions Sections 1 -3					
		UNIT II Simplification – Square roots and cube roots – Average Sections 4 - 6					
		UNIT III Problems on Numbers - Problems on ages – Surds and Indices Sections 7 - 9					
		UNIT IV Percentage - Profit and Loss – Ratio and Proportion Sections 10 – 12					
		UNIT V Partnership – Chain rule – Time and Work Sections 13 – 15					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability.					
Recommended Text		Quantitative Aptitude for Competitive Examinations, by R.S.Aggarwal, S.Chand and Company Ltd, RamNagar, New Delhi - 110 055.					
Reference Books		Quantitative Aptitude for Competitive Examinations, by Abhijit Guha.					
Website and e-Learning Source		https://nptel.ac.in					



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Course Learning Outcome (for Mapping with POs and PSOs)

Students will able to

CLO 1: Find the Square roots , LCM and HCF

CLO 2: To solve the ages problem

CLO 3: To determine profit and Loss problem

CLO 4: To find percentage problem

CLO 5: To find time and work problem

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	1	1	3	3	2
CLO2	3	2	3	2	1	1	3	3	2
CLO3	3	2	3	2	1	1	3	3	2
CLO4	3	2	3	2	1	1	3	3	2
CLO5	3	2	3	2	1	1	3	3	2



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Title of the Course		FOUNDATION MATHEMATICS*					
Paper Number		MECC 2					
Category	ECC	Year	II	Credits	4*	Course Code	23K3MECC2
		Semester	III				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	--	--		--	--		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> To introduce the concepts of sets, relations, and functions. To perform the operations associated with sets, functions, and relations. To relate practical examples to the appropriate set, function, or relation model, and interpret the associated operations and terminology in context. 					
Course Outline	UNIT - I						
	Introduction						
	Chapter : 0, Sections: 0.1 - 0.4						
	UNIT - II						
	Set Theory						
Chapter : 1, Sections: 1.1 -1.6							
UNIT - III							
Relation, functions, Discrete Mathematics.							
Chapter : 1, Sections: 1.7 - 1.9							
UNIT - IV							
Power Series, Cardinals, The axiom of choice (AC).							
Chapter : 1, Sections :1.8 - 1.12							
UNIT - V							
Cardinal Arithmetic, The axiom of foundation, Real Numbers and Symbolic Entities.							
Chapter : 1, Sections: 1.13 -1.15							
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability.					



Recommended Text	1. Foundation of Mathematics- Kenneth Kunen, October 29,2007.
Reference Books	1. Foundational Mathematics, Ben McGahee.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will able to

CLO 1: To learn the basics of Mathematics.

CLO 2: To have a brief knowledge Set Theory.

CLO 3: To know about the Relation, functions, Discrete Mathematics

CLO 4: To study about Power Series, Cardinals, The axiom of choice (AC).

CLO 5: To learn the Cardinal Arithmetic, The axiom of foundation, Real Numbers and Symbolic Entities.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	1	1	3	3	2
CLO2	3	2	3	2	1	1	3	3	2
CLO3	3	2	3	2	1	1	3	3	2
CLO4	3	2	3	2	1	1	3	3	2
CLO5	3	2	3	2	1	1	3	3	2



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Title of the Course	INDUSTRIAL STATISTICS				
Paper Number	CC 7				
Category	Core	Year	II	Credits	4
		Semester	IV		
		Course Code	23K4M07		
Instructional Hours per week	Lecture	Tutorial	Lab Practice	Total	
	4	--	--	4	
Pre-requisite	12 th Standard Mathematics				
Objectives of the Course	To bridge the gap between industry academia interface – to apply the theory learnt to industrial applications				
Course Outline	<p>UNIT-I: Introduction- Combinatorial Methods- Binomial coefficients. (Chapter1: Section-1.1, 1.2, 1.3.)</p> <p>UNIT-II: Probability - Introduction-Sample spaces- Events –TheProbability of event- Some Rules of Probability. (Chapter2: Section-2.1, 2.2, 2.3, 2.4, 2.5.)</p> <p>UNIT-III: Conditional Probability- Independent Events- Baye'sTheorem(Only problems). (Chapter2: Section-2.6, 2.7, 2.8.)</p> <p>UNIT-IV: Probability Distributions and Probability Densities- Introduction- Probability Distributions-Continuous Random variables- Probability Density functions-Multivariate Distributions. (Chapter3: Section-3.1, 3.2, 3.3, 3.4, 3.5.)</p> <p>UNIT-V: Marginal Distributions- Conditional Distributions- Mathematical Expectations- Introduction- The Expected value of aRandom variable- Moments. (Chapter3: Section-3.6, 3.7 and Chapter4: Section- 4.1, 4.2, 4.3.)</p>				
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication, Transferrable Skill and designing mathematical models towards solving mathematical Applications				
Recommended Text	1. Freund John E, Mathematical Statistics, Prentice Hall of India, NewDelhi.				
Reference Books	<p>1. Papoulis A. Probability, Random Variables and Stochastic process, Tata McGraw Hill Education Pvt. Ltd., New Delhi</p> <p>2. Baisnab A., Jas M., Elements of Probability and Statistics, TataMcGraw Hill Education Pvt. Ltd., New Delhi, 1993.</p>				
Website and e-Learning Source	https://nptel.ac.in				



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Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Define Combinatorial Methods and few examples

CLO 2: Define Sample spaces and The Probability of

event
CLO 3: Describe Independent Events and problems

CLO 4: Define Probability Distributions, Continuous Random variables

CLO 5: Describe Conditional Distributions and Mathematical Expectations

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	2	3	3	2	2	3	1
CLO2	2	3	3	3	3	2	2	3	1
CLO3	3	3	3	3	3	2	2	3	1
CLO4	2	3	3	2	3	2	2	3	1
CLO5	2	3	3	3	3	2	2	3	1



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Title of the Course		ELEMENTS OF MATHEMATICAL ANALYSIS ✓					
Paper Number		CC 8					
Category	Core	Year	II	Credits	3	Course Code	23K4M08
		Semester	IV				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	3	--		--	3		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> Identify and characterize sets and functions and Understand, test and analyze the convergence and divergence of sequences, series. Understand metric spaces with suitable examples 					
Course Outline		<p>UNIT-I: Sets and Functions: Sets and elements- Operations on sets- functions- real valued functions- equivalence- countability- real numbers- least upper bounds. (Chapter1: Section-1.1 to 1.7)</p> <p>UNIT-II: Sequences of Real Numbers: Definition of a sequence and subsequence-limit of a sequence – convergent sequences–divergent sequences- bounded sequences-monotone sequences (Chapter2: Section-2.1 to 2.6)</p> <p>UNIT-III: Operations on convergent sequences – operations on divergent sequences – limit superior and limit inferior-Cauchy sequences. (Chapter2: Section-2.7 to 2.10)</p> <p>UNIT-IV: Series of Real Numbers: Convergence and divergence – series with non –negative terms-alternating series-conditional convergence and absolute convergence- tests for absolute convergence. (Chapter3: Section-3.1 to 3.4 and 3.6)</p> <p>UNIT-V:Limits and Metric Spaces: Limit of a function on the real line - Metric spaces - Limits in metric spaces – Continuous Functions on Metric Spaces: Function continuous at a point on the real line-Function continuous on a metric space. (Chapter4: Section-4.1 to 4.3 and Chapter5: 5.1 ,5.3)</p>					



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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Richard R. Goldberg, Methods of Real Analysis: Oxford and IBH Publishing, 2017.
Reference Books	1. Ethan D. Bloch, The Real Numbers and Real Analysis. Springer.2011. G.M. 2. The fundamentals of Mathematical Analysis, vol I. Pergamon Press, New York, 1965. 3. T. M. Apostol, Calculus (Vol. 1), John Wiley and Sons (Asia) P.Ltd., 2002. 4. R.G. Bartle and D. R Sherbert, Introduction to Real Analysis. John Wiley and Sons (Asia) P. Ltd., 2000. 5. E. Fischer, Intermediate Real Analysis. Springer Verlag, 1983. 6. K.A. Ross, Elementary Analysis- The Theory of Calculus Series- Undergraduate Texts in Mathematics. Springer Verlag, 2003.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Explain in detail about sets and functions, equivalence and countability and the LUB axiom

CLO 2: Explain Sequence and Subsequence of real numbers and to find the limit of sequence to test for convergent, divergent, bounded and monotone sequences

CLO 3: Explain the operations on convergent and divergent sequences and to Explain the concepts of limit superior and limit inferior and the notion of Cauchy sequences

CLO 4: Classify the series of real numbers and the alternating series and their convergence and divergence, the conditional convergence and absolute convergence and solve problems on convergence of the sequences

CLO 5: Explain about the metric spaces and functions continuous on a Metric space

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	2	3	2	-	3	2	1
CLO2	3	3	2	3	2	-	3	2	1
CLO3	3	3	3	3	2	-	3	2	1
CLO4	3	3	3	3	2	-	3	2	1
CLO5	3	3	2	3	2	-	3	2	

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Title of the Course		MATHEMATICS FOR COMPETITIVE EXAMINATION – IV					
Paper Number		SEC 6					
Category	SEC	Year	II	Credits	2	Course Code	23K4MSEC6
		Semester	IV				
Instructional Hours Per week		Lecture	Tutorial		Lab Practice	Total	
		2	-			2	
Pre- requisite		12 th Standard Mathematics					
Objective of the Course		<ul style="list-style-type: none"> Remembering the Permutation and Combinations. Understanding the concept of Banker's Discount. Analyzing the concepts of Odd Man Out and Series. 					
Course Outline		UNIT – I Permutation & Combinations. (Chapter – 30)					
		UNIT – II Probability – True Discount. (Chapter – 31 & 32)					
		UNIT – III Banker's Discount - Heights & Distances. (Chapter – 33 & 34)					
		UNIT – IV Odd Man Out & Series. (Chapter – 35)					
		UNIT – V Tabulation – Bar Graphs. (Chaper – 36 & 37)					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill.					
Reference Books		1.Quantitative Aptitude "by Abhijit Guha, Tata McGraw Hill Publishing Company Limited, New Delhi (2005)					
Website and e – Learning Source		https://nptel.ac.in					

Question Paper Pattern: 75 Objective type questions each carrying 1 Mark.



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Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 : Explain in detail about Permutation and Combinations.

CLO 2 : Explain Probability and True Discount.

CLO 3 : Explain Banker's Discount and Heights & Distances.

CLO 4 : Explain Odd Man Out and Series.

CLO 5 : Explain Tabulation and Bar Graphs.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1



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Title of the Course		LaTeX-PRACTICAL					
Paper Number		SEC 7					
Category	SEC	Year	II	Credits	2	Course Code	23K4MSEC7
		Semester	IV				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	2	--		--	2		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> To enable the Students to Prepare Research Articles in LaTeX format. 					
Course Outline		<ol style="list-style-type: none"> Creation of a Document with different Alignments(Left, Right, Center, Justify). Typing a Letter for Applying a job. Creation of Own Bio-Data. Creating a Table Structure. Typing a Mathematical Expression involving Differentiation, Integration and Trigonometry. Typing a Mathematical Expression using all Expressions and Inequalities. Creation of an Article using LaTeX. Inserting Picture in a LaTeX. Preparing a question paper in LaTeX Format. Creation of Power Point Presentation in LaTeX. 					
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)		<p>Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>					
Skills acquired from this course		<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>					



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Recommended Text	1. David F Griffiths and Desmond J. Higham, <i>Learning LaTeX</i> , SIAM(Society for Industrial and Applied Mathematics) Publishers, Philadelphia, 1996.
Reference Books	<ol style="list-style-type: none"> 1. Nambudiripad, K.B.M., 2014. <i>LaTeX for beginners</i>. Narosa Publishing House private limited, New Delhi. 2. Martin J. Erickson and Donald Bindner, <i>A student's Guide to the Study, Practice and Tools of Modern Mathematics</i>, CRC Press, Boca Raton, FL, 2011. 3. L. Lamport, <i>LATEX: A Document Preparation System, User's Guide and Reference Manual</i>, Addison-Wesley, Newyork. Second edition, 1994.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome

After completion of the course, the students will be able to

- CLO 1 : Make different Alignments in a document and an Application for a job
- CLO 2 : Generate Bio-Data and Table Structures.
- CLO 3 : Create Mathematical Statements using LaTeX.
- CLO 4 : Prepare Articles and Inserting Pictures.
- CLO 5 : Prepare Question paper and PowerPoint presentation in LaTeX format.



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ES	ENVIRONMENTAL STUDIES	23K4EVS	Inst. Hrs 2	Credit 2
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CO	STATEMENT
1	To learn the concept and Importance of Environment
2	To create awareness about the Biodiversity and its conservation
3	To understand the various pollution, its causes and its prevention
4	To understand the environmental Laws
5	To understand the Environmental Agencies

Unit I: Environment- Definition- Concept, Components and Importance. Ecosystem- Structure and function- Food chain, food web and Ecological pyramids.

Unit II: Biodiversity- Definition- Importance- flora and fauna of India- Endangered and threatened species in India- Conservation strategies (Insitu and Exsitu)

Unit III: Environmental pollution- Definition- Agents/ causes effects and control measures of air, water, land and Noise pollution- Nuclear hazards.

Unit IV: Environmental Laws and Ethics- Wild life Act- Water act- Air act- and Environmental protection Act- Environmental Ethics (Libertarian Extension- Ecological Extension- Conservation Ethics)

Unit V: Environmental Agencies- National (Department of Environment, forest and wildlife) International (UNICED- Earth Summit- Only one Earth)- Man and Biosphere (MAB).

Text Book:

- (1) K. Kumaraswamy, A. Alagappa Moses, M. Vasanthy, "Environmental Studies", Bharathidasan University, Trichy- 620 024.
- (2) P. Chandrasekaran, "Sutrusuzhal payilvugal", U.G.C Core Module Course in Environmental Studies, T K Publication, Pudukkottai. -
- (3) V. Kumaresan, "Plan Ecology and Phytogeography".
- (4) D. Dharmaraj, "Environmental Science".
- (5) N.Arumugam, "Environmental Studies".
- (6) B. Chandrasekaran, "Environmental Studies".

Reference:

- (1) P. D. Sharma, "Ecology and Environment".
- (2) Purohit, "A Text Book of Environmental Sciences".
- (3) M. P. Mishara, "Our Environmental Pollution Control and Future Strategies".



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ES	சுற்றுச்சூழல் கல்வி	23K4EVS	Inst. Hrs 2	Credit 2
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அலகு 1: சுற்றுச்சூழல்: வரைறை- கருத்து , கூறுகள் மற்றும் முக்கியத்துவம் . சூழநிலைமண்டலம் - அமைப்பு மற்றும் பணிகள் - உணவு சங்கலி , உணவு வலை மற்றும் சூழ்நிலை பிரமிடுகள்.

அலகு 2: பல்லாயிரத்தன்மை : வரைறை - முக்கியத்துவம் -இந்தியாவில்உள்ள தாவரங்கள் மற்றும் விலங்கினங்கள் - இந்தியாவின் அழிந்துவரும் மற்றும் அச்சுறுத்தும் இனங்கள் - பாதுகாப்பு உத்திகள் (Insitu and Exsitu)

அலகு 3: சுற்றுச்சூழல் மாசுபாடு : வரைறை - முகவர்கள்., காரணங்கள் விளைவுகள் மற்றும் கட்டுபாட்டு நடவடிக்கைகள் காற்று, நீர் , நிலம் , மற்றும் இரைச்சல் மாசுபாடு . அனு அபாயங்கள் . .

அலகு 4: சுற்றுச்சூழல் சட்டம் மற்றும் நெறிமுறைகள் - வனவிலங்கு சட்டம் - நீர் சட்டம்- காற்று சட்டம் மற்றும் சுற்றுச்சூழல் பாதுகாப்புச்சட்டம் - சுற்றுச்சூழல் நெறிமுறைகள் (சுதந்திர விரிவாக்கம் - சுற்றுச்சூழல் விரிவாக்கம் - பாதுகாப்பு நெறிமுறைகள்).

அலகு 5: சுற்றுச்சூழல் நிறுவனங்கள் - தேசிய (சுற்றுச்சூழல், காடு மற்றும் வனவிலங்கு துறைகள்) சர்வதேச (UNICED - பூமி உச்சிமாநாடு(earth summit) - ஒரே ஒரு பூமி) மனிதன் மற்றும் உயிர் கோலங்கள் (MAB).



பி. சந்திரா
6/7/23

உள்ளம் உயில் சினைத்தொண்டி

Title of the Course		QUANTIATIVE APTITUDE – II*					
Paper Number		ECC 3					
Category	ECC	Year	II	Credits	3*	Course Code	23K4MECC3:1
		Semester	IV				
Instructional Hours per week	Lecture		Tutorial		Lab Practice	Total	
	--		--		--	--	
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> Remembering the Time and Distance . Understanding the concept of Simple interest and Compound Analyzing the concepts of Logarithms, Volume and Area Problems 					
Course Outline		UNIT I Pipes and Cisterns – Time and Distance – Problems on Trains Sections 16 - 18					
		UNIT II Boats and Streams – Alligation or Mixture – Simple Interest –Compound Interest Sections 19 - 22					
		UNIT III Logarithms - Area – Volume and Surface Areas Sections 23 - 25					
		UNIT IV Races and Games of Skills - Calendar – Clocks Sections 26 - 28					
		UNIT V Stocks and Shares – Permutation and Combinations – Probability Sections 29 – 31					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability.					
Recommended Text		Quantitative Aptitude for Competitive Examinations, by R.S.Aggarwal, S.Chand and Company Ltd. RamNagar, New Delhi - 110 055.					
Reference Books		Quantitative Aptitude for Competitive Examinations, by Abhijit Guha.					
Website and e-Learning Source		https://nptel.ac.in					



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Course Learning Outcome (for Mapping with POs and PSOs)

Students will able to

CLO 1: Find the Time and distance.

CLO 2: To solve the Pipes problem

CLO 3: To determine Logarithmic series problem

CLO 4: To find calendar and clock problem

CLO 5: To find permutation and combination problem

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	1	1	3	3	2
CLO2	3	2	3	2	1	1	3	3	2
CLO3	3	2	3	2	1	1	3	3	2
CLO4	3	2	3	2	1	1	3	3	2
CLO5	3	2	3	2	1	1	3	3	2



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Title of the Course		ABSTRACT ALGEBRA					
Paper Number		CC 9					
Category	Core	Year	III	Credits	5	Course Code	23K5M09
		Semester	V				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	5	1		--	6		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Concepts of Sets, Groups and Rings. • Construction, characteristics and applications of the abstract algebraic structures 					
Course Outline		UNIT-I: Introduction to groups- Subgroups- cyclic groups and properties of cyclic groups- Lagrange's Theorem-A counting principle – Examples. (Chapter2: Section-2.1 to 2.5)					
		UNIT-II: Normal subgroups and Quotient group- Homomorphism- Automorphism -Examples. (Chapter2: Section-2.6 to 2.8)					
		UNIT-III: Cayley's Theorem-Permutation groups - Examples (Chapter2: Section-2.9 to 2.10)					
		UNIT-IV: Definition and examples of ring- Some special classes of rings- homomorphism of rings- Ideals and quotient rings- More ideals and quotient rings. (Chapter3: Section-3.1 to 3.5)					
		UNIT-V: The field of quotients of an integral domain-Euclidean Rings - The particular Euclidean Ring – Examples (Chapter3: Section-3.6 to 3.8)					
Extended Professional Component (is question paper)		Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill					



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Recommended Text	1. Topics in Algebra-I.N.Herstein, Wiley Eastern Ltd. Second Edition,2006.
Reference Books	1. John B. Fraleigh, A First Course in Abstract Algebra, 7th Ed., Pearson, 2002. 2. M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011. 3. Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa,1999.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Explain groups, subgroups and cyclic groups

CLO 2: Explain about Normal subgroup, Quotient groups, Homomorphisms and Automorphisms and verify the functions for homomorphism and automorphism properties

CLO 3: Explain Permutation groups and apply Cayley's theorem to problems

CLO 4: Explain Rings, Ideals and Quotient Rings and examine their structure

CLO 5: Discuss about the field of quotient of an integral domain and to Explain in detail about Euclidean Rings

	P o s						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	2	3	1	-	3	3	1
CLO2	3	3	2	3	1	-	3	3	1
CLO3	3	3	2	3	2	-	3	3	1
CLO4	3	3	2	3	1	-	3	3	1
CLO5	3	3	2	3	2	-	3	3	1



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Title of the Course		REAL ANALYSIS					
Paper Number		CC 10					
Category	Core	Year	III	Credits	5	Course Code	23K5M10
		Semester	V				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	5	1		--	6		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Real Numbers and properties of Real-valued functions. • Connectedness, Compactness, Completeness of Metric spaces. • Convergence of sequences of functions, Examples and counterexamples 					
Course Outline		<p>UNIT-I: Continuous Functions on Metric Spaces: Open sets– closed sets– Discontinuous function on \mathbb{R}^1. Connectedness, Completeness and Compactness: More about open sets-Connected sets. (Chapter5: Section-5.4 to 5.6 and Chapter6: Sections-6.1,6.2)</p> <p>UNIT-II: Bounded sets and totally bounded sets: Complete metric spaces-compact metric spaces, continuous functions on compact metric space, continuity of inverse functions, uniform continuity. (Chapter6: Sections-6.3 to 6.8)</p> <p>UNIT-III: Calculus: Sets of measure zero, definition of the Riemann integral, existence of the Riemann integral, properties of Riemann integral. (Chapter7: Sections-7.1 to 7.4)</p> <p>UNIT-IV: Derivatives- Rolle's theorem, The Law of mean, Fundamental theorems of calculus. (Chapter7: Sections-7.5 to 7.8)</p> <p>UNIT-V: Taylor's theorem-Point wise convergence of sequences of functions, uniform convergence of sequences of functions (Chapter8: Sections-8.5and Chapter9: Sections-9.1,9.2)</p>					



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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	Methods of Real Analysis - Richard R. Goldberg (John Wiley & sons, 2 nd edition) (Indian edition - Oxford and IBH Publishing Co, New Delhi, 1 st January 2020)
Reference Books	1. Principles of Mathematical Analysis by Walter Rudin, Tata McGrawHill Education, Third edition (1 July 2017). 2. Mathematical Analysis Tom M A postal, Narosa Publishing House, 2 nd edition (1974), Addison-Wesley publishing company, New Delhi.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Explain the concepts of Continuous and Discontinuous functions, open and close sets, Connectedness, Completeness and Compactness

CLO 2: Explain the concepts of bounded and totally bounded sets, continuity of inverse functions and Uniform continuity

CLO 3: Define the sets of measure zero, to Explain about the existence and properties of Riemann integral

CLO 4: Explain the concept of differentiability and to Explain Rolle's theorem, Law of mean, and Fundamental theorem of calculus

CLO 5: Explain the point wise and uniform convergence of sequence of function and to derive the Taylor's theorem

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	1	3	1	-	3	1	1
CLO2	3	3	1	3	1	-	3	1	1
CLO3	3	3	1	3	1	-	3	1	1
CLO4	3	3	1	3	1	-	3	1	1
CLO5	3	3	1	3	1	-	3	1	1

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Title of the Course		MATHEMATICAL MODELLING					
Paper Number		CC 11					
Category	Core	Year	III	Credits	5	Course Code	23K5M11
		Semester	V				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	5	1		--	6		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Construction and Analysis of Mathematical models found in real life problems. • Modelling through differential and difference equations 					
Course Outline		<p>UNIT-I: Mathematical Modelling: Simple situations requiring mathematical modelling, characteristics of mathematical models. (Chapter I: Section-1.1, 1.4)</p> <p>UNIT-II: Mathematical Modelling through differential equations: Linear Growth and Decay Models. Non-Linear growth and decay models, Compartment models. (Chapter 2: Section-2.1 to 2.4)</p> <p>UNIT-III: Mathematical Modelling, through system of Ordinary differential equations of first order: Prey-predator models, Competition models, Model with removal and model with immigrations. Epidemics: simple epidemic model, Susceptible-infected-susceptible (SIS) model, SIS model with constant number of carriers. Medicine: Model for Diabetes Mellitus. (Chapter 3: Section-3.1: 3.1.1, 3.1.2; 3.2: 3.2.1 to 3.2.4, 3.2.6, 3.5: 3.5.1)</p> <p>UNIT – IV: Introduction to difference equations. (Chapter 5: Section-5.1, 5.2: 5.2.1, 5.2.2, 5.2.3)</p> <p>UNIT-V: Mathematical Modelling through difference equations: Harrod Model, cob web model application to Actuarial Science (Chapter 5: Section-5.3: 5.3.1, 5.3.2, 5.3.4)</p>					



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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. J N Kapur, Mathematical Modeling, New Age International publishers(2009).
Reference Books	<ol style="list-style-type: none"> 1. Mathematical Modeling by Bimalk. Mishra and Dipak K.Satpathi. Ane Books Pvt. Ltd(1 January 2009) 2. Mathematical Modeling Models, Analysis and Applications, by Sandip Banerjee, CRC Press, Taylor & Francis group, 2014 3. Mathematical Modeling applications with Geogebra by Jonas Hall & Thomas Ligefjard, John Wiley & Sons, 2017 4. Mark M. Meerschaert: Mathematical Modeling, Elsevier Publ., 2007. 5. Edward A. Bender: An introduction to mathematical Modeling, CRC Press,2002 6. Walter J. Meyer, Concepts of Mathematical Modeling, Dover Publ., 2000
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Explain simple situations requiring Mathematical Modelling and to Determine the characteristics of such models

CLO 2: Model using differential equations in-terms of linear growth and Decay models

CLO 3: Model using systems of ordinary differential equations of first order, to discuss about various models under the categories 'Epidemics' and 'Medicine'

CLO 4: Explain in detail about difference equations

CLO 5: Model using difference equations

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	3	3	3	2	2	2	3	2
CLO2	2	3	3	3	2	2	2	3	2
CLO3	2	3	3	3	2	2	2	3	2
CLO4	3	2	2	2	2	1	2	3	2
CLO5	2	3	3	3	2	2	2	3	2

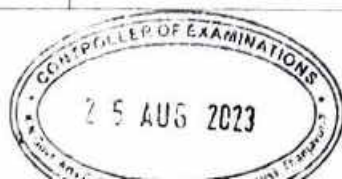
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Title of the Course		PROJECT WITH VIVA VOCE					
Paper Number		CC 12					
Category	Core	Year	III	Credits	4	Course Code	23K5M12PW
		Semester	V				
Instructional Hours per week		Lecture	Tutorial	Lab Practice		Total	
		6	-	--		6	



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Title of the Course		NUMBER THEORY					
Paper Number		EC 7					
Category	ELECTIVE	Year	III	Credits	3	Course Code	23K5MECM7:1
		Semester	V				
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total		
		4	-	--	4		
Pre-requisite		12 th Standard Mathematics.					
Objectives of the Course		To study the divisibility, primes, congruence's and arithmetic functions in number theory.					
Course Outline		<p>UNIT-I: Divisibility Introduction- Divisibility, Greatest Common Divisor, Euclid's Algorithm, Greatest Common Divisor via Euclid's Algorithm- Least Common Multiple- Representation of Integers, Decimal Representation of Integers, Binary Representation of Integers(Chapter:2. Sections 2.1 to 2.4, Related Problems)</p> <p>UNIT-II: Primes Introduction-Primes, Prime counting function, prime number theorem, Test of primality by trial division – Sieve of Eratohenes, Canonocal Factorization, Fundamental theorem of arithmetic, Sieve of Eratohenes, Determining the canonical factorization of a natural number (Chapter3:. Sections-3.1 to 3.3, Related Problems)</p> <p>UNIT-III: Congruences Introduction-Congruences and Equivalence Relations, Equivalence Relations and Linear Congruences - Linear Diophantine Equations and the Chinese Remainder Theorem (Chapter4: Sections 4.1 to 4.4, Related Problems)</p> <p>UNIT-IV: Congruences(continued) PolinomialCongruences- Modular Arithmetic: Fermat's theorem – Wilson's Theorem and Fermat's Numbers – Pythagorean Equation(Chapter4: Sections 4.5 to 4.8, Related Problems)</p> <p>UNIT-V:Arithmetic Functions Introduction- Sigma function, Tau function, Dirichlet product – DirichletInverse, Moebius function, Euler's function, Euler's Theorem, An application of algebra (Chapter5: Sections 5.1 to 5.3, Related Problems)</p>					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication, Transferrable Skill and mathematical applications					
Recommended Text		1. Neville Robinns, Beginning Number Theory, 2 nd Ed., NarosaPublishing House Pvt. Limited, Delhi2006.					
Reference Books		<p>1. David M. Burton, Elementary Number theory 6th Ed., Tata McGraw – Hill Edition, 2007.</p> <p>2. Richard E. Klima, Neil Sigmon, Ernest Stitzinger, Applications of Abstract Algebra with Maple, CRC Press, Boca Raton, 2000.</p>					
Website and e-Learning Source		https://nptel.ac.in					



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Course Learning Outcome (for Mapping with POs and PSOs)

On successful completion of the course, the students will be able to

CLO 1: Describe Euclid's Algorithm, Greatest Common Divisor via Euclid's Algorithm.

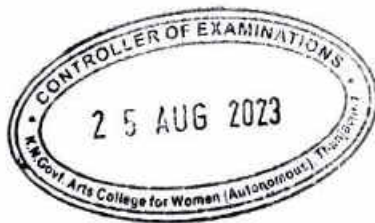
CLO 2: To discuss The Fundamental Theorem of arithmetic, the sieve of Eratosthenes.

CLO 3: To describe Euclid's Algorithm, Greatest Common Divisor via Euclid's Algorithm.

CLO 4: Discuss Linear Diophantine Equations and the Chinese Remainder Theorem.

CLO 5: Discuss Euler's Theorem, An application of algebra.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	3	2	3	3	3	2	3	2
CLO2	2	2	3	3	3	3	2	3	2
CLO3	3	3	2	3	3	3	2	3	2
CLO4	2	3	3	3	3	2	2	3	2
CLO5	3	3	3	2	3	2	2	3	2



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VUR-613 007

Title of the Course		NUMERICAL METHODS WITH APPLICATIONS					
Paper Number		EC 7					
Category	Elective	Year	III	Credits	3	Course Code	23K5MECM7:2
		Semester	V				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	4	--		--	4		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> Numerical methods is a mathematical tool designed to solve numerical problems. It is the study of numerical methods that attempt at finding approximate solutions of problems rather than the exact ones. Apply Numerical differentiation and Numerical integration. 					
Course Outline		<p>UNIT-I: The Bisection Method - The Iteration method - The method of false position - Newton Raphson Method - Generalized Newton's Method - Ramanujan's Method - Muller's method. (Chapter 2: Sections 2.1 to 2.7)</p> <p>UNIT-II: Finite Difference - Forward Differences -Backward Differences - Central Differences - symbolic relations and separation of symbols - Newton's formulae for interpolation - Central Differences interpolation formulae - Gauss Central difference formulae - Stirling Formulae - Bessel's Formulae - Everett's formulae (Problems only). (Chapter 3: Sections 3.3(3.3.1 - 3.3.4), 3.6, 3.7(3.7.1 - 3.7.4))</p> <p>UNIT-III : Lagrange's Interpolation Formulae - Divided differences - Divided differences table - Newton's Divided Difference formulae - Inverse Interpolation. (Problems only) (Chapter 3: Sections 3.9.1, 3.11.1, 3.12)</p> <p>UNIT - IV: Numerical Differences - Maximum and minimum values of Tabulated function - Numerical Integration - Trapezoidal Rule - Simphson 1/3 Rule - Simphson 3/8 Rule - Boole's and Weddle's rule. (Problems only) (Chapter 5: Sections 5.2, 5.3, 5.4(5.4.1 - 5.4.4))</p> <p>UNIT-V: Direct method - Gauss elimination Method - Gauss Jordan Method - Modification of Gauss Method to compute the inverse - Method of Factorization - Iterative Methods -Gauss Jacobi method - Gauss seidel Method. (Problems only) (Chapter 6: Sections 6.3(6.3.2 - 6.3.4), 6.4)</p>					



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GOVERNMENT ARTS COLLEGE
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Skills acquired from this course	Knowledge, Problem Solving, Analytical ability.
Recommended Text	1. S.S. Sastry - Introductory methods of numerical Analysis 3rd Edition, Prentice Hall of India Private Ltd., New Delhi.
Reference Books	1. P. Kandasamy, K. Thilagavathy, K. Gunavathy - Numerical Methods, Third Revised Edition, S.Chand & Company Ltd., Ram Nagar, New Delhi.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will able to

CLO 1: Find the roots of a polynomial equation. Find one of the most commonly used techniques for finding the roots of given equations.

CLO 2: Define for solving differential equations by approximating derivatives with finite differences. To solve the problems using forward and backward formulae.

CLO 3: To determine the functions values even when the parameters are not evenly spaces. In this chapter is used to calculate the values of the independent variable X that corresponds to a given function values.

CLO 4: To find involves the computation of a derivative of a function f from given values of f . To find how to use the Simpson 1/3 and 3/8 formulae for solving the problems.

CLO 5: To find techniques that attempt to find the exact or approximation solutions of non linear systems by applying a finite number of operations, such as matrix factorization, elimination, or inversion.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	1	1	3	3	2
CLO2	3	2	3	2	1	1	3	3	2
CLO3	3	2	3	2	1	1	3	3	2
CLO4	3	2	3	2	1	1	3	3	2
CLO5	3	2	3	2	1	1	3	3	2



25/8/23
 Department of Mathematics
 GOVERNMENT ARTS COLLEGE FOR WOMEN
 PALAKKAD, KERALA

SEM I	VE	VALUE EDUCATION	23K5VE	Ins.Hrs.2	Credit:2
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CO	STATEMENT	
	After successful completion of the course, the students will be able to	
1	Know the value education by various religions.	K1
2	Learn and practice social value and responsibilities.	K2
3	Understand and start applying the essential steps to become good leaders.	K2
4	Analyse the personal value, mind culture value personal health.	K4
5	Collecting news details about value education and to encourage writing skills highlight moral value.	K6

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

UNIT - I

1. Introduction: Definition of Value Education – Need for Value Education – Teachings of values by various religions like Hinduism, Buddhism, Christianity, Jainism, Islam etc.

UNIT - II

2 Living & Social Values

- 2.1 Living Values: Peace, respect, co-operation, freedom, happiness, honesty, humility, love, responsibility, simplicity, tolerance, optimism and positive thinking
- 2.2 Social values: Love and Compassion, Sharing and Generosity, Politeness and Courtesy, Gratitude, Duty and Responsibilities towards Society, Tolerance and Unity.

UNIT - III

- 3.1 **Role of Visionaries and Leaders in Social Reforms:** Rajaram Mohan Roy, Mahatma Gandhi, Swami Vivekananda, EVR Periyar, Mother Therasa.
- 3.2 **Value Crisis:** Religious Fundamentalism and Terrorism – Corruption in Society– commerce without Ethics – Education without Character – Wealth without efforts
- 3.3 Time Management

UNIT - IV

1. **Yoga:** Teaching yoga – Manavalakkalai- by Qualified Yoga Teachers – The aim is to acquire Physical Health – Mental Acuteness- Strength of Life Forces and Wisdom – to achieve a holistic way of life- to take up and get involved in Social Welfare Activities – to learn their commitment to society.



M. S. S. S. S.
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UNIT - V

- 5.1 **Human Rights** : Child Labour – Womens Rights – Bonded Labour – Problems of Refuges.
- 5.2 **Role of State Public service Commission**: Constitution provisions and formation-methods of recruitment – rules and notification , syllabi for different exams – written and oral – placement.

References

1. Radhakrishna, "Religion and Culture"(1968), Orient paperbacks, New delhi.
2. Das, M.S. & Gupta, V.K. (1995), "Social Values among Youth Adults: A Changing Scenario", New Delhi.
3. Venkataiah. M(ed.), (1998), "value Education New Delhi, A PH Publishing Corporation.
4. Sharma. O.P., (1997), "value Education in Action" New Delhi, University Book House.
5. Chakraborti, Mohit., (1997) "value Education: Changing Perspectives", New Delhi, kanishka Publishers, Distributors.
6. C.S. Devnoth (1996) "Adipodai manitha urimaigal" Narmadha Publishers.
D.Kulanthaiyaya "Evai manitha urimaigal " Narmadha Publishers.



Department of Mathematics,
Government Arts College for Women,
Thiruvananthapuram



Title of the Course		LINEAR ALGEBRA					
Paper Number		CC 13					
Category	Core	Year	III	Credits	6	Course Code	23K6M13
		Semester	VI				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	6	1		--	7		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Vector Spaces, linear dependence and independence of vectors. Dual spaces, Inner product and norm – orthogonalization process. • Linear transformations. Various operators on vector spaces 					
Course Outline		<p>UNIT-I: Vector spaces – Subspaces – Linear Combinations and linear span - Systems of Linear equations – Homogenous Equations – Non-homogenous Equations – Elementary Matrices – Row reduced - Echelon form (Chapter1: Section-1.2 to 1.4; Chapter2: 2.7; Chapter3: 3.1)</p> <p>UNIT-II: Linear Dependence and Linear independence – Bases – Dimensions (Chapter1: Section-1.5, 1.6)</p> <p>UNIT-III: Linear transformations, null spaces and ranges – Matrix representation of a linear transformation –invertibility and isomorphisms – dual spaces(Chapter2: Section-2.1,2.2,2.4, 2.6)</p> <p>UNIT – IV: Eigen values, eigen vectors, diagonalizability – invariant subspaces – Cayley–Hamilton theorem(Chapter5: Section-5.1,5.2, 5.4)</p> <p>UNIT-V: Innerproducts and norms – Gram Schmidt Orthogonalization Process - Orthogonal complements(Chapter6: Section-6.1,6.2)</p>					
		<p>Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p> <p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>					
TEXT BOOK		Linear Algebra - Stephen H Friedberg, Arnold J Insel and Lawrence E Spence, 5th edition (2018) Pearson					
REFERENCE BOOKS		<ol style="list-style-type: none"> 1. I.N.Herstein, Topics in Algebra, Wiley Eastern Ltd. Second Edition, 2006. 2. N.S.Gopalakrishnan, University Algebra, New Age International Publications. Wiley Eastern Ltd. 3. John B.Fraleigh, First course in Algebra, Addison Wesley. 					

25/8/23
 DEPARTMENT OF MATHEMATICS
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4. Stephen H. Friedberg, Arnold J. Insel, Lawrence E. Spence, Linear Algebra, 4th Ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2004.
5. David C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
6. S. Lang, Introduction to Linear Algebra, 2nd Ed., Springer, 2005.
7. Gilbert Strang, Linear Algebra and its Applications, Thomson, 2007.

<https://nptel.ac.in>

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Acquire a detailed knowledge about vector spaces and subspaces

CLO 2: Explain the concepts of Linear Dependence, Linear Independence, Bases and Dimension of basis

CLO 3: Explain the concept of Linear Transformations, their Matrix representation and the notion of dual spaces

CLO 4: Find the Eigen values and Eigen vectors, to apply the concepts for diagonalisation

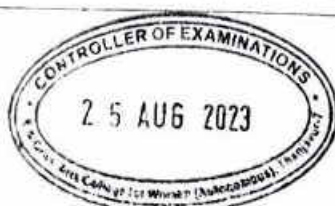
CLO5: Explain about Inner product and norms and to apply Gram Schmidt Orthogonalization Process to problems on inner product spaces

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	2	3	-	-	3	3	1
CLO2	3	3	3	3	-	-	3	3	1
CLO3	3	3	2	3	1	-	3	3	1
CLO4	3	3	3	3	-	-	3	3	1
CLO5	3	3	3	3	1	-	3	3	1



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Title of the Course		COMPLEX ANALYSIS					
Paper Number		CC 14					
Category	Core	Year	III	Credits	6	Course Code	23K6M14
		Semester	VI				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	6	1		--	7		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Apply concept and consequences of analyticity and C-R equations. • Understand the concept of mappings and transformations. • Compute complex contour integrals and applying Cauchy's integral in various versions. • Understand zeros and singularities of an analytic function, apply their properties in the evaluation of definite integral. 					
Course Outline		<p>UNIT-I: Analytic functions: Functions of a Complex variable –Limits–Theorem on limits –Continuity – Derivatives – Differentiation formulas – Cauchy Riemann equation – conditions for differentiability – Polar coordinates– Analytic functions– Harmonic functions. (Chapter2: Section-11,14,15,17,18,19,20,21,22,23,25)</p> <p>UNIT-II: Conformal mapping: Mappings – Mapping by exponential function – Linear transformation – The transformation $w = \frac{1}{z}$ – Mappings by z – Linear fractional transformations (bilinear) (Chapter2: Section-12,13;Chapter8: Section- 83 to 86)</p> <p>UNIT-III: Complex Integration: Contour integrals– Some examples – Simply and Multiply connected domains– Cauchy integral formula – Formula for derivatives– Liouville's theorem –Fundamental theorem of Algebra– Maximum modulus principle. (Chapter4:39,40,46 to 50)</p> <p>UNIT – IV: Sequences and Series: Convergence of sequences –Convergence of series– Taylor's series – Laurent series– Absolute and uniform convergence of power Series – Continuity of sums of power series–Integration & differentiation of power series (Chapter5: Section -51,52,53,55,57,58,59)</p> <p>UNIT-V: Residues and Poles: Isolated singular points – Residues – Cauchy Residue theorem –Residue at infinity– The three types of isolated singular points –Residues at poles – Zeros of analytical functions – Zeros and poles – Evaluation of real improper integrals (excluding poles on the real axis). (Chapter6:Section- 62,63,65,66,68,69;Chapter7: Section-71)</p>					



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Extended Professional Component (is apart of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Complex variables and application, Seventh Edition by James Ward Brown and Ruel V. Churchill, Me-Graw Hill Book Co., International Edition, 2009.
Reference Books	1. Theodore W. Gamelan, Complex Analysis, Springer Verlag, 2008 2. Joseph Bak and Donald J. Newman, Complex analysis, 2nd Ed., Undergraduate Texts in Mathematics, Springer-Verlag New York, Inc., New York, 1997. 3. Richard A. Silverman, Introductory Complex Analysis, Dover Publications, 1972. 4. S. Ponnusamy and H. Silverman, Complex variables with applications, Birkhauser, 2006.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

- CLO 1: Explain about analytic functions, their differentiation and continuity and to verify the Harmonic functions using analyticity conditions
 CLO 2: Explain the concept of Conformal mappings and mappings by linear transformations and linear fractional transformations
 CLO 3: Explain about the integrations of functions over simply and multiply connected domains and to derive the Cauchy integral formula, Liouville's theorem, Fundamental theorem of Algebra and Maximum Module Principle
 CLO 4: Find the convergence the sequences and series, to derive Taylor's and Laurent's series
 CLO 5: Find the nature of singularities, to find the residue of a given function at a given singular point, to Explain about zeros and poles and to evaluate real improper integrals (Excluding poles on the real axis)

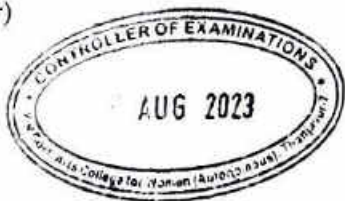
	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	3	2	1	-	3	3	2
CLO2	3	3	3	2	1	-	3	3	2
CLO3	3	3	3	2	1	-	3	3	2
CLO4	3	3	3	2	1	-	3	3	2
CLO5	3	3	3	2	1	-	3	3	2

25/8/2023
 DEPARTMENT OF MATHEMATICS
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Title of the Course		MECHANICS					
Paper Number		CC 15					
Category	Core	Year	III	Credits	6	Course Code	23K6M15
		Semester	VI				
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total		
		6	1	--	7		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Equilibrium of a particle under the action of given forces • Simple Harmonic Motion • Projectiles 					
Course Outline		UNIT-I: Force: Newton's laws of motion – Resultant of two forces on a particle - Equilibrium of a Particle: Equilibrium of a particle – Limiting equilibrium of a particle on an inclined plane. (Chapter2: Section-2.1,2.2; Chapter3: Section-3.1,3.2)					
		UNIT-II: Forces on a Rigid Body: Moment of a Force – General motion of a body – Equivalent systems of forces- Parallel Forces – Forces acting along a Triangle - A specific reduction of Forces: Reduction of coplanar forces into a force and couple – Problems involving frictional forces. (Chapter4: Section-4.1 to 4.5; Chapter5: Sections-5.1,5.2)					
		UNIT-III: Work, Energy and Power: Work – Conservative field of force – Power -Rectilinear Motion under Varying Force: Simple Harmonic Motion - along a horizontal line – along a vertical line. (Chapter11:Section-11.1,11.2,11.3;Chapter12: Section-12.1,12.2,12.3)					
		UNIT – IV: Projectiles: Forces on a projectile – Projectile projected on an inclined plane (Chapter13: Section-13.1, 13.2)					
		UNIT-V: Central Orbits: General orbits – Central orbit – Conic as a centered orbit. (Chapter16: Section-16.1 to 16.3)					



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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour) <div style="text-align: right;">  </div>
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Duraipandian. P.,LaxmiDuraipandian and MuthamizhJayapragasm-Mechanics. 2007. S.Chand and company.
Reference Books	1. A. Ruina and R. Pratap, Introduction to Statics and Dynamics, , Oxford University Press, 2014. 2. S.L. Loney, The Elements of Statics and Dynamics, Cambridge University Press, 1904.J.L. Meriam and L. G. Kraige, Engineering Mechanics: Statics, Seventh Edition,Wiley and sons Pvt Ltd., NewYork, 2012. 3. J.L. Meriam, L. G. Kraige, and J.N. Bolton, Engineering Mechanics: Dynamics, 8 th edn, Wiley and sons Pvt Ltd., New York,2015. 4. A. K. Dhiman,P.Dhinam and D. Kulshreshtha, Engineering Mechanics (Statics and Dynamics) ,McGraw Hill Education(India) Private Limited, New Delhi, 2015.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will able to

CLO 1: Define Resultant, Component of a Force, Coplanar forces, like and unlike parallel forces, Equilibrium of a Particle, Limiting equilibrium of a particle on an inclined plane.

CLO 2: Define Moment of a force and Couple with examples. Define Parallel Forces and Forces acting along a Triangle, Solve problems on frictional forces

CLO 3: Define work, energy, power, rectilinear motions under varying forces. Define Simple Harmonic Motion and find its Geometrical representation.

CLO 4: Define Projectile, impulse, impact and laws of impact. Prove that the path of a projectile is a parabola. Find the direct and oblique impact of smooth elastic spheres

CLO 5: Define central orbits, explain conic as centered orbits and solve problems related to central orbits

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	1	1	3	3	2
CLO2	3	2	3	2	1	1	3	3	2
CLO3	3	2	3	2	1	1	3	3	2
CLO4	3	2	3	2	1	1	3	3	2
CLO5	3	2	3	2	1	1	3	3	2

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Title of the Course		GRAPH THEORY WITH APPLICATIONS					
Paper Number		EC 8					
Category	Elective	Year	III	Credits	3	Course Code	23K6MECM8:1
		Semester	VI				
Instructional Hours per week	Lecture		Tutorial		Lab Practice	Total	
	6		1		--	7	
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> To introduce the concepts of Graphs. To provide a sound knowledge on Trees and Spanning Trees To gain knowledge about Matrices of Graphs and Digraphs. 					
Course Outline		<p>Unit I : Introduction, Paths and Circuits: Introduction- Finite and Infinite graphs-Applications of Graphs- Incidence and degree-Isolated vertex, Pendent vertex and Null graph-Isomorphism-Subgraphs -Walks, Paths and circuits-Connected Graphs- Disconnected Graphs and Components. (Chapter1: Sections 1.1 to 1.5 & Chapter2: Sections 2.1,2.2, 2.4&2.5)</p> <p>Unit II:Paths and Circuits: Euler graphs- Operations on Graphs-More on Euler graphs-Hamiltonian Paths and Circuits Trees and Fundamental Circuits: Trees-Some properties on Trees-Pendent vertices in a Tree-Distance and Canters in a Tree- Spanning Trees. (Chapter2: Sections 2.6 to 2.9 & Chapter3: Sections 3.1 to 3.4, 3.7)</p> <p>Unit III:Matrix Representation of Graphs: Incidence Matrix- Submatrices of $A(G)$-Circuit Matrix-Fundamental Circuit Matrix and Rank of B- Path Matrix-Adjacency Matrix. (Chapter7: Sections 7.1 to 7.9)</p> <p>Unit IV:Coloring, Covering and Partitioning: Chromatic Number-Chromatic Partitioning-Chromatic Polynomial-Matchings -Coverings. (Chapter8: Sections 8.1 to 8.5)</p> <p>Unit V:Directed Graphs: Definition-Some types of Digraphs-Directed Paths and Connectedness-Euler Digraphs-Trees with Directed Edges. (Chapter9: Sections 9.1, 9.4 to 9.6)</p>					



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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved
Skills acquired from this course	Knowledge, problem solving, analytical ability, and professional competency.
Recommended Text	1. Narsingh Deo. [Fifth Edition] ,Graph Theory with Applications to Engineering & Computer Science , Prentice Hall of India, New Delhi . 1974 .
Reference Books	1. Frank Harary. Graph Theory , Narosa Publishing House, Pvt.Ltd., New Delhi. 2001. 2. Arumugam, S. and Ramachandran. S. Invitation to Graph Theory. Scitech Publications, Chennai.2001. 3. S.P.Rajagopalan and R.Sattanathan, Graph Theory, Margham Publications, Chennai.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Understand the concepts of Graph, Sub graph . Walks and Paths

CLO 2: Discuss about Eulerian graphs, Hamiltonian Paths and Trees.

CLO 3: Give Matrix Representations of Graphs

CLO 4: Know about Chromatic number and Chromatic Polynomial

CLO 5: Describe about digraph, Euler digraphs.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	2	1	3	3	2
CLO2	3	2	3	2	2	1	3	3	2
CLO3	3	2	3	2	2	1	3	3	2
CLO4	3	2	3	2	2	1	3	3	2
CLO5	3	2	3	2	2	1	3	3	2



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Title of the Course		DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS					
Paper Number		CC 6					
Category	Core	Year	II	Credits	3	Course Code	23K3M06
		Semester	III				
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total		
		2	1	--	3		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Knowledge about the methods of solving Ordinary and Partial Differential Equations. • The understanding of how Differential Equations can be used as a powerful tool in solving problems in science. 					
Course Outline		<p>UNIT-I: Ordinary Differential Equations: Variable separable - Homogeneous Equation-Non-Homogeneous Equations of first degree in two variables -Linear Equation - Exact differential equations. Chapter 2 : Sections 1 to 5, 6.1 to 6.4</p> <p>UNIT-II: Equation of first order but not of higher degree: Equation solvable for dy/dx- Equation solvable for y-Equation solvable for x- Clairauts' form - Linear Equations with constant coefficients-Particular integrals of algebraic, exponential, trigonometric functions and their products. Chapter 4: Sections 1 to 4 Chapter 5 : Sections 1 to 4</p> <p>UNIT-III: Simultaneous linear differential equations- Linear Equations of the Second Order -Complete solution in terms of a known integrals-Reduction to the Normal form-Change of the Independent Variable-Method of Variation of Parameters. Chapter 6 : Sections 6 Chapter 8 : Sections 1 to 4</p> <p>UNIT-IV: Partial differential equation: Formation of PDE by Eliminating arbitrary constants and arbitrary functions – complete integral – singular integral-General integral-Lagrange's Linear Equations . Chapter 12 : Sections 3,4</p> <p>UNIT-V: Special methods – Standard forms-Charpit's Methods. Chapter 12 : Sections 5, 6</p>					



DEPARTMENT OF EXAMINATIONS
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 THANJAVUR-613 007

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Narayanan S and Manicavachagom Pillay T.K. Differential equations and its application, 2006, S. Viswanathan Printers Pvt.Ltd.
Reference Books	<ol style="list-style-type: none"> 1. Shepley L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, 1984. 2. I. Sneddon, Elements of Partial Differential Equations, McGraw-Hill, International Edition, 1967. 3. G.F. Simmons, Differential equations with applications and historical notes, 2nd Ed, Tata McGraw Hill Publications, 1991. D.A. Murray, Introductory course in Differential Equations, Orient and Longman 4. H.T. H. Piaggio, Elementary Treaties on Differential Equations and their applications, C.B.S Publisher & Distributors, Delhi, 1985. 5. Horst R. Beyer, Calculus and Analysis, Wiley, 2010. 6. Braun, M. Differential Equations and their Applications. (3rd Edn.), Springer-Verlag, New York. 1983. 7. Tyn Myint-U and Lognath Debnath. Linear Partial Differential Equations for Scientists and Engineers. (4th Edn.) Birhauser, Berlin. 2007. 8. 6.. Boyce, W.E. and R.C.DiPrima. Elementary Differential Equations and Boundary Value Problems. (7th Edn.) John Wiley and Sons, Inc., New York. 2001. 9. Sundrapandian, V. Ordinary and Partial Differential Equations, Tata McGraw Hill Education Pvt.Ltd. New Delhi, 2013
Website and e-Learning Source	https://nptel.ac.in



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 DEPARTMENT OF MATHEMATICS
 GOVERNMENT ARTS COLLEGE OF
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Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Determine solutions of homogeneous equations, non-homogeneous equations of degree one in two variables, solve Bernoulli's equations and exact differential equations

CLO 2: Find the solutions of equations of first order but not of higher degree and to Determine particular integrals of algebraic, exponential, trigonometric functions and their products

CLO 3: Find solutions of simultaneous linear differential equations, linear equations of second order and to find solutions using the method of variations of parameters

CLO 4: Form a PDE by eliminating arbitrary constants and arbitrary functions,

find complete, singular and general integrals, to solve Lagrange's equations

CLO 5: Explain standard forms and Solve Differential equations using Charpit's method

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	1	-	3	2	1
CLO2	3	1	3	2	1	-	3	2	1
CLO3	3	1	3	2	1	-	3	3	1
CLO4	3	1	3	2	2	1	3	3	1
CLO5	3	1	3	2	2	1	3	3	1



Department of Mathematics
N. GOVERNMENT ARTS COLLEGE
THANJAVUR-613 007

Title of the Course		DIFFERENCE EQUATIONS WITH APPLICATIONS					
Paper Number		EC 8					
Category	Elective	Year	III	Credits	3	Course Code	23K6MECM8:2
		Semester	VI				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	6	1		--	7		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> It is the study of difference operator and its application. Solving first order difference equations. Solving Difference equations using matrix form. 					
Course Outline		UNIT-I: Difference operator - Summation – Generating functions and approximate summation. (Chapter 2: Sections 2.1 to 2.3)					
		UNIT-II: First order equations - General results for linear equations - Solving linear equations. (Chapter 3: Sections 3.1 to 3.3)					
		UNIT-III: Equations with variable coefficients – The z -transform. (Chapter 3: Sections 3.5 to 3.7)					
		UNIT-IV: Initial value problems for linear systems – Stability of linear systems. (Chapter 4: Sections 4.1, 4.2)					
		UNIT-V: Phase plane Analysis for Linear Systems, Fundamental Matrices and Floquet Theory. (Chapter 4: Sections 4.3, 4.4)					
Skills acquired from this course		Knowledge, Problem Solving.					
Recommended Text		1. W.G. Kelley and A.C. Peterson, "Difference Equations", 2 nd Edition, Academic Press, New York, 2001.					



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 THANJAVUR-613 003

Reference Books	<ol style="list-style-type: none"> 1. R.P. Agarwal, "Difference Equations and Inequalities", 2nd Edition, Marcel Dekker, New York, 2000. 2. S.N. Elaydi, "An Introduction to Difference Equations", 3rd Edition, Springer, India, 2008. 3. R. E. Mickens, "Difference Equations", 3rd Edition, CRC Press, 2015.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will able to

CLO 1: How to use difference operator.

CLO 2: Solving first order difference equation and linear equations.

CLO 3: To Solve equation with variable coefficients.

CLO 4: To solve the initial value problem for linear systems.

CLO 5: To solve the fundamental matrices.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	1	1	3	3	2
CLO2	3	2	3	2	1	1	3	3	2
CLO3	3	2	3	2	1	1	3	3	2
CLO4	3	2	3	2	1	1	3	3	2
CLO5	3	2	3	2	1	1	3	3	2



25/8/23
 DEPARTMENT OF INTERNATIONAL
 GOVERNMENT ARTS COLLEGE FOR WOMEN
 THRISSUR-KERALA

Title of the Course		STATISTICS WITH R PROGRAMMING					
Paper Number		SEC 8					
Category	SEC	Year	III	Credits	2	Course Code	23K6MSEC8
		Semester	VI				
Instructional Hours per week	Lecture		Tutorial		Lab Practice		Total
	2		--		--		2
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> To acquire the practical knowledge of R programming for solving problems in mathematical statistics. 					
Course Outline		<p>UNIT-I: Introduction to R Software: How to Download and Install R-Using R for Descriptive Statistical Analysis and Plots- Basics of R- R Data Types-Scalars-Vectors-Matrices-Data Frames. (Chapter-2 : Section 2.1 to 2.3.2.4)</p> <p>UNIT-II: Lists-Factors-Date and Time-Missing Values-Data Creation-Data Type Conversion-Variable Information. (Chapter- 2: Section 2.3.2.5 to 2.3.6)</p> <p>UNIT-III: Basic Operations in R-Control Structures-Conditional - For Loop-Repeat Loop- While Loop-Built-In Functions in R- Numerical Functions-Character Functions-Statistical Probability Functions-Other Statistical Functions-Other Useful Functions- User-Written Functions. (Chapter-2: Section 2.4 to 2.4.4)</p> <p>UNIT-IV: Importing, Reporting, and Writing Data-Packages- Working Directory and R Script-Reading and Writing Local Flat Files-Reading and Writing Excel Files-Connection Interfaces- Connect to a Database- Data Exploration -Data Exploration through Visualization-Bar Chart-Pie Chart-Box-Plot Distributions. (Chapter-2: Section 2.4.4 to 2.5.1.3)</p> <p>UNIT-V: Descriptive Statistics: Central Tendency-The Mean-The Median-The Mode-Measure of Dispersion-Shapes of the Distribution-Symmetric and Asymmetric- Skewness Illustrated. (Chapter- 3: Section 3.1 to 3.3)</p>					



25/11/23
 Department of Statistics
 N. GOVERNMENT ARTS COLLEGE
 THANJAVUR-613 005

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Mustapha AbiodunAkinkunmi, "Business Statistics with Solutions in R" de Gruyter-Berlin, 2019.
Reference Books	1. Peter Dalgaard, "Introductory Statistics with R" Second Edition, Springer, 2008. 2. Yosef Cohen, Jeremiah Y. Cohen, "Statistics and data with R" John Wiley & Sons Ltd. 2008.
Website and e-Learning Source	https://nptel.ac.in

Course Outcomes (COs)

On successful completion of the course, the students will be able to

CLO 1 : Understand the usage of R Software and able to handle basic data types of R.

CLO 2 : Create data, find the missing values, converting data types.

CLO 3 : Apply the control structures, numerical and statistical functions.

CLO 4 : To import files, able to connect with a data base and handle Pie and Bar Charts.

CLO 5 : Compute mean, median, mode and skewness using R.



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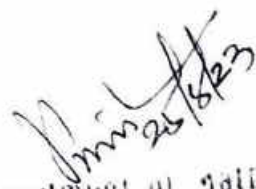
**KUNTHAVAI NAACCHIYAAR GOVT. ARTS COLLEGE FOR WOMEN
(AUTONOMOUS), THANAJVUR-7**

(Course Structure for students admitted from 2023 - 2024 onwards)

ALLIED COURSES OFFERED BY DEPARTMENT OF MATHEMATICS

Semester	Part	Course	Subject code	Title of the paper	Instr. Hrs	Credits	Exam hrs	IA	EE	Total
For B.Sc Physics, Chemistry And Computer Science										
I	III	EC1	23K1CH/P/CSECM1:1	Algebra And Calculus	4	4	3	25	75	100
			23K1CH/P/CSEM1:2	Numerical Methods With Applications						
II	III	EC 2	23K2CH/P/CSECM2:1	Differential Equations and Laplace Transforms	4	2	3	25	75	100
			23K2CH/P/CSECM2:2	Number Theory						
II	III	EC 3	23K2CH/P/CSECM3:1	Discrete Mathematics	5	3	3	25	75	100
			23k2CH/P/CSECM3:2	Mathematical Statistics						




 Department of Mathematics,
 K. GOVERNMENT ARTS COLLEGE
 THANJAVUR-613 007

Title of the Course		ALLIED MATHEMATICS-I: ALGEBRA AND CALCULUS (FOR B.Sc PHYSICS / B.Sc COMPUTER SCIENCE / B.Sc CHEMISTRY)					
Paper Number		EC 1					
Category	Elective	Year	1	Credits	4	Course Code	23K1CH/P/CSECM1:1
		Semester	1				
Instructional Hours per week	Lecture	Tutorial		Lab Practice		Total	
	4	--				4	
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> To learn the basic concepts and problem solving in Theory of equations. Develop the ability of solving the Integrals. 					
Course Outline		UNIT – I : Theory of Equations : Imaginary roots – Irrational roots – Formation of equations – Solutions of equations – Diminishing the roots of an equation & solutions – Removal of the second term of an equation & solutions – Descarte’s rule of sign – Problems only. (Chapter6: Sections 4,9,10 & 11)					
		UNIT – II: Matrices: Definition of Characteristic equation of a matrix –Characteristic roots of a matrix - Eigen values and the Corresponding Eigen vectors of matrix – Cayley Hamilton theorem (Statement only) – Verifications of Cayley Hamilton Theorem – Problems only. (Chapter 5)					
		UNIT – III : Radius of Curvature: Formula of Radius of Curvature in Cartesian coordinates, Parametric coordinates and Polar coordinates (no proof for formulae) – Problems only. (Chapter11)					
		UNIT – IV : Partial Differential Equations Formation of Partial Differential Equations by eliminating the arbitrary constant and arbitrary functions – Lagrange’s Linear Partial Differential Equations – Problems only. (Chapter26)					
		UNIT – V : Integration: Definite Integral : Simple properties of definite Integrals(Chap -15) – Bernoulli’s Formula – Integration by parts – Simple problems : Reduction formula for $\int_0^{\pi} \sin^n x dx$, $\int_0^{\pi} \cos^n x dx$, $\int_0^{\infty} e^{-x} dx$, $\int x^n e^{ax} dx$ simple problems. (Chapter16)					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill					
Recommended Text		1. Dr.P.R. Vittal, Allied Mathematics , Margham publication, Chennai – 17, Reprint 2016					



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Reference Books	<ol style="list-style-type: none"> 1. S.G Venkatachalapathi, Allied Mathematics, Margham publication, Chennai - 17, Reprint 2011 2. P. Kandasamy, K.Thilagavathy, Allied Mathematics Volume I, S.Chand publication, July 2012 3. P. Kandasamy, K.Thilagavathy Allied Mathematics Volume II, S.Chand publication, December 2010
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with Pos and PSOs)

Students will be able to

CLO 1 : Explain in detail about Imaginary roots, irrational roots and formation of equations and Descarte's rule of sign.

CLO 2 : Explain Characteristic equation and roots of the matrix and Eigen values and Eigen vector of the matrix and Verification of Cayley Hamilton theorem.

CLO 3 : Explain Formula for Radius of curvature in Cartesian coordinates and Parametric coordinates and Polar coordinates

CLO 4 : Explain Formation of Partial Differential Equations by eliminating the arbitrary constant and arbitrary functions

CLO 5 : Explain Simple properties of definite Integrals and Bernoulli's Formula and Integration by parts.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1



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GOVERNMENT ARTS COLLEGE
THIRUVANANTHAPURAM-610 002

Title of the Course		NUMERICAL METHODS WITH APPLICATIONS					
Paper Number		EC I					
Category	Elective	Year	III	Credits	4	Course Code	23K1CH/P/CSECM1:2
		Semester	V				
Instructional Hours per week	Lecture		Tutorial		Lab Practice	Total	
	4		--		--	4	
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> Numerical methods is a mathematical tool designed to solve numerical problems. It is the study of numerical methods that attempt at finding approximate solutions of problems rather than the exact ones. Apply Numerical differentiation and Numerical integration. 					
Course Outline		<p>UNIT-I: The Bisection Method - The Iteration method - The method of false position - Newton Raphson Method - Generalized Newton's Method - Ramanujan's Method - Muller's method. (Chapter 2: Sections 2.1 to 2.7)</p> <p>UNIT-II: Finite Difference - Forward Differences - Backward Differences - Central Differences - symbolic relations and separation of symbols - Newton's formulae for interpolation - Central Differences interpolation formulae - Gauss Central difference formulae - Stirling Formulae - Bessel's Formulae - Everett's formulae (Problems only). (Chapter 3: Sections 3.3(3.3.1 - 3.3.4), 3.6, 3.7(3.7.1 - 3.7.4))</p> <p>UNIT-III : Lagrange's Interpolation Formulae - Divided differences - Divided differences table - Newton's Divided Difference formulae - Inverse Interpolation. (Problems only) (Chapter 3: Sections 3.9.1, 3.11.1, 3.12)</p> <p>UNIT - IV: Numerical Differences - Maximum and minimum values of Tabulated function - Numerical Integration - Trapezoidal Rule - Simphson 1/3 Rule - Simphson 3/8 Rule - Boole's and Weddle's rule. (Problems only) (Chapter 5: Sections 5.2, 5.3, 5.4(5.4.1 - 5.4.4))</p>					



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	UNIT-V: Direct method - Gauss elimination Method - Gauss Jordan Method - Modification of Gauss Method to compute the inverse - Method of Factorization - Iterative Methods -Gauss Jacobi method - Gauss seidel Method. (Problems only) (Chapter 6: Sections 6.3(6.3.2 - 6.3.4), 6.4)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability.
Recommended Text	1. S.S. Sastry - Introductory methods of numerical Analysis 3rd Edition, Prentice Hall of India Private Ltd., New Delhi.
Reference Books	1. P. Kandasamy, K. Thilagavathy, K. Gunavathy - Numerical Methods, Third Revised Edition, S.Chand & Company Ltd., Ram Nagar, New Delhi.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will able to

CLO 1: Find the roots of a polynomial equation. Find one of the most commonly used techniques for finding the roots of given equations.

CLO 2: Define for solving differential equations by approximating derivatives with finite differences. To solve the problems using forward and backward formulae.

CLO 3: To determine the functions values even when the parameters are not evenly spaces. In this chapter is used to calculate the values of the independent variable X that corresponds to a given function values.

CLO 4: To find involves the computation of a derivative of a function f from given values of f. To find how to use the Simpson 1/3 and 3/8 formulae for solving the problems.

CLO 5: To find techniques that attempt to find the exact or approximation solutions of non linear systems by applying a finite number of operations, such as matrix factorization, elimination, or inversion.

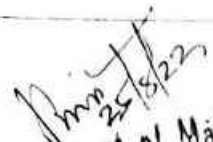
	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	1	1	3	2	3
CLO2	3	2	3	2	1	1	3	3	2
CLO3	3	2	3	2	1	1	3	3	2
CLO4	3	2	3	2	1	1	3	3	2
CLO5	3	2	3	2	1	1	3	3	2



Department of Mathematics
 Government Arts College for Women, Autonam

Title of the Course		ALLIED MATHEMATICS-II: DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS (FOR B.Sc PHYSICS / B.Sc COMPUTER SCIENCE / B.Sc CHEMISTRY)					
Paper Number		EC 2					
Category	Elective	Year	I	Credits	2	Course Code	23K2CH/P/CSECM2:1
		Semester	II				
Instructional Hours per week	Lecture		Tutorial		Lab Practice		Total
	2+2		--				4
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Develop the basic concepts of Maxima and Minima of two variables and Numerical methods problems. • To learn the second order differential equation with constant coefficients. • To learn the basic concepts of Laplace Transforms, Inverse Laplace Transforms & Applications. 					
Course Outline		<p>UNIT – I : Jacobian and Maxima & minima : Jacobian of two variables and three variables – Maxima and Minima functions of two variables – Problems only. (Chapter9: Sections 3 & 4)</p> <p>UNIT – II: Finite Differences: Finite difference – Higher differences – Construction of difference table – Interpolation of missing value – Newton’s Forward and Newton’s Backward difference formula (no proof) – Lagrange’s Interpolation formula (no proof) - simple problems only. (Chapter7)</p> <p>UNIT – III : Second Order Differential Equations: Second Order Differential Equation with constant coefficients – Complementary function – Particular Integral and Solution of the type : e^{ax}, x^n, $\cos ax$ (or) $\sin ax$, $e^{as}x^{bs}$, $e^{as}\sin bx$, $e^{as}\cos bx$ – Problems only. (Chapter23)</p> <p>UNIT – IV : Laplace Transforms: Definition of Laplace Transforms – Standard formula – Linearity property – shifting property – Change of Scale property – Laplace Transforms of derivatives – Problems. (Chapter27)</p> <p>UNIT – V : Inverse Laplace Transforms : Standard formula- Elementary theorems (no proof) – Applications to solutions of second order differential equations with constant coefficients – simple problems. (Chapter27)</p>					




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 N. GOVERNMENT COLLEGE FOR WOMEN
 THIRUVANANTHAPURAM

Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Dr.P.R. Vittal, Allied Mathematics , Margham publication, Chennai – 17, Reprint 2016
Reference Books	1. S.G Venkatachalapathi, Allied Mathematics, Margham publication, Chennai – 17, Reprint 2011 2. P. Kandasamy, K.Thilagavathy Allied Mathematics Volume I, S.Chand publication, July2012 3. P. Kandasamy, K.Thilagavathy Allied Mathematics Volume II, S.Chand publication, December 2010
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1 : Explain Jacobian of two variables and three variables and Maxima and Minima functions of two variables.

CLO 2 : Explain Finite difference and Higher differences and Construction of difference table and Newton's Forward Backward difference formula and Lagrange's Interpolation formula. **CLO 3 :** Explain Second Order Differential Equation with constant coefficients and Particular Integral

CLO 4 : Explain definition of Laplace Transforms and standard formula and linearity property and shifting property and Change of Scale property and Laplace Transforms of derivatives.

CLO 5 : Explain standard formula and elementary theorems and Applications to solutions of second order differential equations with constant coefficients.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	-	-	-	3	2	1
CLO2	2	1	3	1	-	-	3	2	1
CLO3	3	1	3	1	-	-	3	2	1
CLO4	3	1	3	-	-	-	3	2	1
CLO5	3	1	3	-	-	-	3	2	1



Department of Mathematics
A. Govindarajulu Institute of Technology
FRANKFURT

Title of the Course		NUMBER THEORY					
Paper Number		EC 2					
Category	ELECTIVE	Year	I	Credits	2	Course Code	23K2CH/P/CSECM2:2
		Semester	II				
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total		
		2+2	-	--	2		
Pre-requisite		12 th Standard Mathematics.					
Objectives of the Course		To study the divisibility, primes, congruence's and arithmetic functions in number theory.					
Course Outline		UNIT-I: Divisibility Introduction- Divisibility, Greatest Common Divisor, Euclid's Algorithm, Greatest Common Divisor via Euclid's Algorithm- Least Common Multiple- Representation of Integers, Decimal Representation of Integers, Binary Representation of Integers(Chapter:2. Sections 2.1 to 2.4, Related Problems)					
		UNIT-II: Primes Introduction-Primes, Prime counting function, prime number theorem, Test of primality by trial division – Sieve of Eratosthenes, Canonical Factorization, Fundamental theorem of arithmetic, Sieve of Eratosthenes, Determining the canonical factorization of a natural number (Chapter3: Sections-3.1 to 3.3, Related Problems)					
		UNIT-III: Congruences Introduction-Congruences and Equivalence Relations, Equivalence Relations and Linear Congruences - Linear Diophantine Equations and the Chinese Remainder Theorem (Chapter4: Sections 4.1 to 4.4, Related Problems)					
		UNIT-IV: Congruences(continued) Polynomial Congruences- Modular Arithmetic: Fermat's theorem – Wilson's Theorem and Fermat's Numbers – Pythagorean Equation(Chapter4: Sections 4.5 to 4.8, Related Problems)					
		UNIT-V: Arithmetic Functions Introduction- Sigma function, Tau function, Dirichlet product – Dirichlet Inverse, Moebius function, Euler's function, Euler's Theorem, An application of algebra (Chapter5: Sections 5.1 to 5.3, Related Problems)					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication, Transferrable Skill and mathematical applications					
Recommended Text		1. Neville Robbins, Beginning Number Theory, 2 nd Ed., Narosa Publishing House Pvt. Limited, Delhi 2006.					
Reference Books		1. David M. Burton, Elementary Number theory 6 th Ed., Tata McGraw – Hill Edition, 2007. 2. Richard E. Klima, Neil Sigmon, Ernest Stitzinger, Applications of Abstract Algebra with Maple, CRC Press, Boca Raton, 2000.					
Website and e-Learning Source		https://nptel.ac.in					



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CHENNAI

Course Learning Outcome (for Mapping with POs and PSOs)

On successful completion of the course, the students will be able to

CLO 1: Describe Euclid's Algorithm, Greatest Common Divisor via Euclid's Algorithm.

CLO 2: To discuss The Fundamental Theorem of arithmetic, the sieve of Eratosthenes.

CLO 3: To describe Euclid's Algorithm, Greatest Common Divisor via Euclid's Algorithm.

CLO 4: Discuss Linear Diophantine Equations and the Chinese Remainder Theorem.

CLO 5: Discuss Euler's Theorem, An application of algebra.

Mapping of COs with POs

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	3	2	3	3	3	2	3	2
CLO2	2	2	3	3	3	3	2	3	2
CLO3	3	3	2	3	3	3	2	3	2
CLO4	2	3	3	3	3	2	2	3	2
CLO5	3	3	3	2	3	2	2	3	2



Handwritten signature and date: 25/8/23
Department of Mathematics,
K. J. Somaiya Institute of Technology and Management,
Vashi, Mumbai - 401 208

Title of the Course		DISCRETE MATHEMATICS					
Paper Number		EC 3					
Category	Elective	Year	I	Credits	3	Course Code	23K2CH/P/CSECM3:1
		Semester	II				
Instructional Hours per week	Lecture	Tutorial		Lab Practice		Total	
	4	--		--		4	
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> • Mathematical Logic • Truth Table • Relations and Ordering 					
Course Outline		<p>UNIT-I: Mathematical logic - Statements and Notations - Connectives - Negation - Conjunction - Disjunction - Statement formulas and truth table - Conditional and Bi-conditional - Well formed formulas - Tautologies. Chapter 1 (sections 1.1, 1.2.1 to 1.2.4, 1.2.6 to 1.2.8)</p> <p>UNIT-II: Normal forms - Disjunctive Normal forms - Conjunctive Normal forms - Principal Disjunctive Normal forms - Principal conjunctive Normal forms - Ordering and Uniqueness of normal forms - Validity using truth tables - Rules of inference. Chapter 1 (sections 1.3.1 to 1.3.5, 1.4.1, 1.4.2)</p> <p>UNIT-III: The Predicate calculus - Predicates - The Statement function, Variables and quantifiers - Predicate formulas - Free and bound variables - The Universe of discourse - inference theory of the predicate calculus - Valid formulas and Equivalence - Some valid formulas over finite Universes - Special valid formulas involving quantifiers - Theory of inference for the Predicate calculus. Chapter 1 (sections 1.5.1 to 1.5.5)</p> <p>UNIT - IV: Relations and Ordering - Relations - Properties of Binary relations in a set - Partial ordering - Partially ordered set: Representation and Associated terminology - Functions: Definition and Introduction - Composition of functions - Inverse functions - Natural Numbers: Peano axioms and Mathematical induction. Chapter 2 (sections 2.3.1, 2.3.2, 2.3.8, 2.3.9, 2.4.1 to 2.4.3, 2.5.1)</p>					



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	UNIT-V: Lattices as partially ordered sets: Definition and examples - Some properties of Lattices – Sub lattices, Direct product and Homomorphism - Boolean algebra: Definition and examples - Sub Algebra, Direct product and Homomorphism. Chapter 4 (sections 4.1.1, 4.1.2, 4.1.4, 4.2.1, 4.2.2)
Skills acquired from this course	Knowledge, Problem Solving.
Recommended Text	1. J.P. Tremblay, R. Manohar, Discrete Mathematics structure with Applications to computer sciences, Tata Mc Graw hill, 2001.
Reference Books	1. Dr. M.K. Sen and Dr. B.C. Charraborthy, Introduction to Discrete Mathematics, Arunabha Sen Books & allied Pvt. Ltd, 8/1, Chintamani Das Lane, Kolkatta - 700 009. 2. Kenneth H.Rosen, Discrete Mathematics and Its Applications, Fourth Edition.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will able to

CLO 1: To find mathematical logic statement and notations.

CLO 2: To find the decision problem of finding whether a given statement is tautology or contradiction or satisfiable in a finite number of steps.

CLO 3: To find the predicate logic. To find the theory of inference for the Predicate calculus.

CLO 4: Define Relations and Ordering. Define types of functions and natural numbers.

CLO 5: Define Definition and properties of Lattice. To solve Boolean Algebra.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	1	1	3	3	2
CLO2	3	2	3	2	1	1	3	3	2
CLO3	3	2	3	2	1	1	3	3	2
CLO4	3	2	3	2	1	1	3	3	2
CLO5	3	2	3	2	1	1	3	3	2



Department of Mathematics
M. GOVERNMENT ARTS COLLEGE
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Title of the Course		MATHEMATICAL STATISTICS					
Paper Number		EC 3					
Category	Elective	Year	I	Credits	3	Course Code	23K2CH/P/CSECM3:2
		Semester	II				
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total		
	4	-		--	5		
Pre-requisite		12 th Standard Mathematics					
Objectives of the Course		<ul style="list-style-type: none"> To Introduce the concepts of Random Variables and Distribution of Random Variables. To give a good grip on concepts of Mathematical Expectation and Variance. To provide a sound knowledge about some Standard Distributions. 					
Course Outline		<p>Unit I : Random variables and Distribution functions: Introduction- Distribution functions - Discrete random variable (One dimensional)- Probability mass function and Distribution function – Continuous Random variable (one dimensional) –Probability density function – Various Measures of Central tendency-Continuous distribution function-Problems. (Chapter5: Sections 5.1 to 5.4)</p> <p>Unit II: Mathematical Expectation: Introduction –Mathematical Expectation –Expected value of function of Random variable- Properties - Variance – Properties – Covariance. (Chapter6: Sections 6.1 to 6.6)</p> <p>Unit III: Generating functions and Law of large numbers: Moment Generating functions – Cumulants - Characteristic function – Properties – Problems . (Chapter7: Sections 7.1 to 7.4)</p> <p>Unit IV: Special Discrete Probability Distributions: Introduction - Binomial, Poisson, Geometric distributions– Theorems (Statements only)- Properties and Problems. (Chapter8: Sections 8.1, 8.4, 8.5, 8.7.)</p> <p>Unit V: Some Continuous Probability Distributions: Normal distribution, Uniform distribution and Exponential distribution - Theorems (Statements only) -Properties and Problems. (Chapter9: Sections 9.1 to 9.3, 9.8)</p>					



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Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TNPSC / others to be solved
Skills acquired from this course	Knowledge, problem solving, analytical ability, and professional competency.
Recommended Text	1. Gupta S.C. and Kapoor V.K. Fundamentals of Mathematical Statistic [Twelfth Edition]. Sulthan Chand and Sons, New Delhi 2020.
Reference Books	1. Gupta S.C. and Kapoor V.K. Elements of Mathematical Statistics. [Third Edition]. Sulthan Chand and Sons, New Delhi.2001 2. Vittal, P.R. Mathematical Statistics. Margham Publications, Chennai.2020.
Website and e-Learning Source	https://nptel.ac.in

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Define Random variables, Probability mass function, Probability density function, and Distribution functions.

CLO 2: Compute Expectation, Variance and Covariance.

CLO 3: Know about Moment Generating functions and Characteristic functions.

CLO 4: Solve problems involving the concepts of theoretical Discrete distributions.

CLO 5: Solve problems involving the concepts of theoretical continuous distributions.

	Pos						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	3	1	1	2	3
CLO2	3	2	3	2	3	1	3	3	2
CLO3	3	2	3	2	2	1	3	3	2
CLO4	3	2	3	2	2	1	3	3	2
CLO5	3	2	3	2	2	1	3	3	2



Department of Mathematics
Government Arts College for Women
Tirunelveli